

Regulating FinTech:
The perspectives of law, economics, and technology

FinTech reguleren:
De perspectieven van recht, economie en technologie

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List of Abbreviations

ABS	Association of Banks in Singapore
ABSs	asset-backed securities
AFR	adaptive financial regulation
AISPs	account information services providers
AML	anti-money laundering
AML/CFT	anti-money laundering and counter terrorist financing
AMLD 4	the fourth Anti-Money Laundering Directive
AMLD5	the fifth Anti-Money Laundering Directive
APIs	application programming interfaces
ASEAN	Association of Southeast Asian Nations
ASIC	Australian Securities and Investments Commission
ASPSPs	account servicing payment service providers
ATM	automatic teller machine
BAROC	Bankers Association of the Republic of China (Taiwan)
BigTechs	big technology companies
BTCST	Bitcoin Savings and Trust
CC	Competition Commission
CDOs	collateralized debt obligations
CEA	Commodity Exchange Act
CFPB	Consumer Financial Protection Bureau
CFTC	Commodity Futures Trading Commission
CMA	Competition and Markets Authority
CMA9	nine financial institutions mandated to open data pools on the instructions of the CMA
COVID-19	coronavirus disease 2019
CPI	Corruption Perceptions Index
CSE	Canadian Securities Exchange
CVC	convertible virtual currency

EBA	European Banking Authority
EC	European Commission
EEA	European Economic Area
ERS	enhanced regulatory sandbox
EU	European Union
Exchange Act	Securities Exchange Act of 1934
FATF	Financial Action Task Force
FCA	Financial Conduct Authority
FinCEN	Financial Crimes Enforcement Network
FinTech	financial technology
FISC	Financial Information Service Co., Ltd.
FIU	financial intelligence unit
FSA	Financial Service Authority
FSC	Financial Supervisory Commission
GAO	Government Accountability Office
GDPR	General Data Protection Regulation
GFC	the global financial crisis in 2008
GFIN	Global Financial Innovation Network
HKMA	Hong Kong Monetary Authority
ICOs	initial coin offerings
ICO Framework	Framework for ‘Investment Contract’ Analysis of Digital Tokens
IPOs	initial public offerings
IMF	International Monetary Fund
JOBS Act	Jumpstart Our Business Startups Act
KYC	know your customer
MAS	Monetary Authority of Singapore
ML/FT	money laundering and financing of terrorism
MLRs	Money Laundering and Terrorist Financing and Transfer of Funds (Information on the Payer) Regulations 2017
MiCA	the Regulation on Markets in Crypto Assets

MiFID II	the second Markets in Financial Instruments Directive
MPBR	more principles-based regulation
NGOs	non-governmental organizations
OB	open banking
OBIE	Open Banking Implementation Entity
OCC	Office of the Controller of the Currency
OFT	Office of Fair Trading
P2P	peer-to-peer
PBOC	People’s Bank of China
PISPs	payment initiation services providers
PRA	Prudential Regulation Authority
PSD1	the first Payment Services Directive
PSD2	the second Payment Services Directive
PSRs 2017	Payment Services Regulations 2017
Reg CF	Regulation Crowdfunding
RegTech	regulatory technology
SCA	strong customer authentication
SEC	The U.S. Securities and Exchange Commission
Securities Act	Securities Act of 1933
SMEs	small- and medium-sized enterprises
SPEs	special purpose entities
STOs	security token offerings
SupTech	supervisory technology
TPPs	third-party providers
UAE	United Arab Emirates
UK	United Kingdom
US	United States
XS2A	access to account

Chapter 1

Introduction

1. Background

Financial technology (“FinTech”), which refers to the employment of technology to provide financial services or products,¹ has been a buzzword in recent years. Being defined as this, FinTech encompasses a variety of services, products, or technology applications.² Online payments and the associated services such as online payments initiators and online integrators of consumers’ financial data are examples.³ Blockchain-based applications such as cryptocurrency and fundraising tokens are also examples.⁴ The recent developments of FinTech in different regions across the world also vary, forming the global landscape of FinTech.

For instance, according to the IMF (International Monetary Fund, the “IMF”) and the World Bank, Asia is ahead of other regions in the world in several aspects of FinTech.⁵ FinTech’s expanding from payments to lending, insurance, and investments in Asian countries is particularly noteworthy.⁶

¹ Douglas W. Arner, János Barberis & Ross P. Buckley, *FinTech, RegTech, and the Reconceptualization of Financial Regulation*, 37 NW. J. INT’L L. & BUS. 371, 373 (2017).

² See, e.g., CARLA STAMEGNA & CEMAL KARAKAS, EUROPEAN PARLIAMENT, FINTECH (FINANCIAL TECHNOLOGY) AND THE EUROPEAN UNION: STATE OF PLAY AND OUTLOOK 1 (2019), [https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/635513/EPRS_BRI\(2019\)635513_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/635513/EPRS_BRI(2019)635513_EN.pdf).

³ See *infra* Chapter 4, Section 2.2.2.

⁴ See *infra* Chapter 3, Section 1.

⁵ INTERNATIONAL MONETARY FUND & WORLD BANK GROUP, FINTECH: THE EXPERIENCE SO FAR 46 (2019), <https://documents1.worldbank.org/curated/en/130201561082549144/pdf/Fintech-The-Experience-so-Far-Executive-Summary.pdf>.

⁶ *Id.* at 47.

For example, this expansion has been observed in China. The popularity of social-media platforms therein has supported FinTech’s development with respect to lending, insurance, and investments.⁷ Besides, mobile payments are growing rapidly in countries such as China, India, and Bangladesh.⁸ According to the ASEAN (Association of Southeast Asian Nations, the “ASEAN”) and the World Bank, in southeast Asia, mobile payments have also been seen as one of the most popular FinTech applications in countries such as Indonesia, the Philippines, Singapore, Vietnam, and Thailand.⁹

In the global landscape of FinTech, FinTech could also be seen developing rapidly in Europe, and the FinTech’s potential improvement in Europe is expected to be promising due to the high popularity of mobile phones and of internet.¹⁰ In particular, the IMF and the World Bank pointed out that the UK (United Kingdom, the “UK”) has pioneered FinTech development and innovation, being ahead of the rest of Europe.¹¹ Regulators in Europe have also observed the growing of FinTech and its benefits and potential risks. Regulatory responses to FinTech could thus be seen in Europe.¹² According to the IMF and the World Bank, FinTech regulations in Europe are advancing.¹³

Besides, FinTech has been growing also in the Americas, within which the features of FinTech’s developments are slightly different across regions. For example, in Latin America and the Caribbean, FinTech’s development has manifested itself as the growing of FinTech startups which particularly

⁷ *Id.*

⁸ *Id.* at 46.

⁹ WORLD BANK GROUP & ASSOCIATION OF SOUTHEAST ASIAN NATIONS, ADVANCING DIGITAL FINANCIAL INCLUSION IN ASEAN: POLICY AND REGULATORY ENABLERS 72 (2019), <https://documents1.worldbank.org/curated/en/856241551375164922/pdf/134953-WorldBankASEANDigitalFinancialInclusioninASEANpublicationJan.pdf>.

¹⁰ INTERNATIONAL MONETARY FUND & WORLD BANK GROUP, *supra* note 5, at 50.

¹¹ *Id.* at 50-51.

¹² *See id.* at 51-52.

¹³ *Id.* at 51.

focus on digital payments and money transfer services.¹⁴ In the US (United States, the “US”), consumer lending has been one of the most popular types of FinTech.¹⁵ In Canada, FinTech’s development has been observed to be significantly associated with firms headquartered in the US, thereby reflecting a cross-border nature.¹⁶

In the Middle East and Central Asia, concentrations of FinTech activities in specific countries could be observed according to the IMF and the World Bank. For instance, 75 percent of FinTech activities in the Middle East are concentrated in Egypt, Jordan, Lebanon, and the UAE (United Arab Emirates, the “UAE”).¹⁷ In central Asia, FinTech activities are concentrated in Kazakhstan.¹⁸ However, the IMF and the World Bank especially pointed out that while FinTech is still comparatively under development in the Middle East and Central Asia, FinTech’s potential therein is far above its current status.¹⁹

After briefly defining FinTech and illustrating its global landscape above, it is worth describing how the literature has discussed FinTech from a more academic angle. The literature has been, among other topic, studying how FinTech develops and impacts the financial markets. For instance, according to the literature, FinTech has drawn people’s attention as modern financial markets have witnessed the transformations brought by FinTech after the global financial crisis in 2008 (“GFC”).²⁰ These transformations particularly manifested themselves as, for instance, the rise of new players such as smaller-sized FinTech firms, which are not financial incumbents,

¹⁴ *Id.* at 54.

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ *Id.* at 52.

¹⁸ *Id.*

¹⁹ *Id.* at 53.

²⁰ *See* Arner et al., *supra* note 1, at 373.

providing financial services or products.²¹ The emergence of FinTech firms is thus changing the landscape of modern financial markets.²² Accordingly, facilitating digital finance,²³ facilitating the access to financial services,²⁴ and ensuring financial inclusion²⁵ have been analyzed in studies as they are deemed to be the impacts or goals of FinTech. Moreover, the discussions about the above notions could be seen in a historical context that the GFC is regarded as a watershed moment.²⁶ Since 2020, the COVID-19 (coronavirus disease 2019, the “COVID-19”) pandemic seems to mark another moment from which FinTech is gaining momentum again as it could help reduce human contact.²⁷

²¹ See Douglas W. Arner, János Barberis & Ross P. Buckley, *The Evolution of FinTech: A New Post-Crisis Paradigm*, 47 GEO. J. INT’L L. 1271, 1289 (2016).

²² See *The Fintech Revolution*, THE ECONOMIST (May 9, 2015), <https://www.economist.com/leaders/2015/05/09/the-fintech-revolution>.

²³ While digital finance has been described as the digitalization of financial industry, the impact brought by FinTech has been deemed to be an important factor or accelerator in this process. See, e.g., Peter Gomber, Jascha-Alexander Koch & Michael Siering, *Digital Finance and FinTech: Current Research and Future Research Directions*, 87 J. BUS. ECON. 537, 539, 542 (2017); Arner et al., *supra* note 21, at 1276.

²⁴ See, e.g., *id.* at 1286; Thomas Philippon, *On FinTech and Financial Inclusion 2* (BIS Working Papers No. 841, Feb. 2020), <https://www.bis.org/publ/work841.pdf>; Alma Pekmezovic & Gordon Walker, *The Global Significance of Crowdfunding: Solving the SME Funding Problem and Democratizing Access to Capital*, 7 WM. & MARY BUS. L. REV. 347, 443 (2016).

²⁵ See, e.g., Iris H-Y Chiu, *FinTech and Disruptive Business Models in Financial Products, Intermediation and Markets – Policy Implications for Financial Regulators*, 21 J. TECH. L. & POL’Y 55, 89 (2016); Ross P. Buckley, Douglas W. Arner & Dirk A. Zetzsche, *Sustainability, FinTech and Financial Inclusion* 12-13 (European Banking Institute Working Paper Series 2019/41; UNSW Law Research Paper No. 19-63; University of Hong Kong Faculty of Law Research Paper No. 2019/038, May 22, 2019), <https://ssrn.com/abstract=3387359>; Ross P. Buckley & Louise Malady, *The New Regulatory Frontier: Building Consumer Demand for Digital Financial Services – Part I*, 131 BANKING L.J. 834, 834-35 (2014). The G20 Principles advocated providing “an enabling and proportionate legal and regulatory framework for digital financial inclusion.” G20 HIGH-LEVEL PRINCIPLES FOR DIGITAL FINANCIAL INCLUSION, GLOBAL PARTNERSHIP FOR FINANCIAL INCLUSION 1 (2016), <https://www.gpfi.org/sites/gpfi/files/documents/G20%20High%20Level%20Principles%20for%20Digital%20Financial%20Inclusion%20-%20Full%20version-.pdf>.

²⁶ See Arner et al., *supra* note 21, at 1273.

²⁷ See Douglas W. Arner, János N. Barberis, Julia Walker, Ross P. Buckley, Andrew M. Dahdal & Dirk A. Zetzsche, *Digital Finance & COVID-19 Crisis* 2, 5 (University of Hong Kong Faculty of Law Research Paper No. 2020/017, UNSW Law Research), <https://ssrn.com/abstract=3558889>.

The aforementioned studies are part of the literature on FinTech. However, studies fundamentally discussing FinTech with respect to its technological nature seem to be comparatively rare. While FinTech refers to the use of technology in financial markets, the generated risks might be associated with its technological nature. For instance, is it possible that FinTech applications will be too complicated due to the novel technology applied and hence create some hidden risks? If so, how can one find and cope with these risks? These issues, in fact, have been partly analyzed in several studies as described in the following.

In general, the nature of technology has been described as the fact that it brings concerns whilst it provides benefits to fulfil a certain purpose.²⁸ Whereas the use of technology leads to innovation, complexity might arise.²⁹ These phenomena could be observed in modern financial markets according to several studies because of the application of technology therein.³⁰ Against this background, the term “complexity” was defined in the context of modern financial markets as the state of being complicated.³¹ This study will employ the above concepts to analyze FinTech. That is, the introduction of FinTech has been deemed in studies to be a double-edged sword because not only benefits but also risks might be created.³² Mitigating the risks while promoting the benefits to strike a balance will thus be an important and challenging task.³³ However, few studies have analyzed how to cope with

²⁸ See, e.g., W. BRIAN ARTHUR, *THE NATURE OF TECHNOLOGY: WHAT IT IS AND HOW IT EVOLVES* 11, 28 (2009).

²⁹ W. BRIAN ARTHUR, *COMPLEXITY ECONOMICS: A DIFFERENT FRAMEWORK FOR ECONOMIC THOUGHT*, IN *COMPLEXITY AND THE ECONOMY* 1, 5, 7 (2015).

³⁰ See, e.g., Stefano Battiston et al., *Complexity Theory and Financial Regulation*, 351 *SCIENCE* 818, 818 (2016); Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 *WASH. U. L. REV.* 211, 213 (2009).

³¹ Steven L. Schwarcz, *Rethinking the Disclosure Paradigm in a World of Complexity*, 1 *U. ILL. L. REV.* 1, 2 (2004).

³² See, e.g., Chiu, *supra* note 25, at 63; Dan Awrey, *Complexity, Innovation, and the Regulation of Modern Financial Markets*, 2 *HARV. BUS. L. REV.* 235, 259, 276-77 (2012).

³³ See, e.g., Chang-Hsien Tsai & Kuan-Jung Peng, *The FinTech Revolution and Financial Regulation: The Case of Online Supply-Chain Financing*, 4 *ASIAN J. L. & SOC'Y* 109,

the risks resulting from this complex nature of technology from a regulatory viewpoint.³⁴ Therefore, this study will examine the nature of FinTech such as its complex specialty, analyzing the risks brought by FinTech and accordingly looking into the question of whether regulation is needed.

In practice, several regulatory responses to FinTech could be found in jurisdictions.³⁵ Nevertheless, are the existing FinTech regulations perfect when considering the nature of FinTech? If regulation is needed, there might be several difficulties in regulating. For example, while technology is rapidly and continuously evolving, it might be doubtful if regulation is capable of keeping pace with it, or of accommodating the changes in the regulatory landscape.³⁶ This pacing issue thus becomes worth studying.³⁷ Both schools of law and technology and law and economics have studied the pacing and timing issues. The pacing issue is also worth an appraisal in the context of FinTech as, among other reasons, enhancing regulatory adaptability is aimed by regulators at FinTech's rapid development.³⁸

111 (2017); Dirk A. Zetsche, Ross P. Buckley, János N. Barberis & Douglas W. Arner, *Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation*, 23 *FORDHAM J. CORP. & FIN. L.* 31, 36 (2017).

³⁴ *E.g.*, Schwarcz, *supra* note 30; Awrey, *supra* note 32. The definition of "regulation" described by Ogus which emphasizes its public nature is adopted in this study. Regarding the details of this definition, *see* ANTHONY I. OGUS, *REGULATION: LEGAL FORM AND ECONOMIC THEORY 2* (Hart Publ'g 2004) (1994).

³⁵ *See, e.g.*, KPMG, *Regulation and Supervision of FinTech 2* (Mar. 2019), <https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/03/regulation-and-supervision-of-fintech.pdf>. Regarding some examples of the existing regulatory responses to FinTech, *see infra* Chapter 4.

³⁶ *See, e.g.*, Gary E. Marchant, *The Growing Gap Between Emerging Technologies and the Law*, in *THE GROWING GAP BETWEEN EMERGING TECHNOLOGIES AND LEGAL-ETHICAL OVERSIGHT* 19, 20-21 (Gary E. Marchant, Braden R. Allenby & Joseph R. Herkert eds., 2011); Lyria Bennett Moses, *How to Think about Law, Regulation and Technology: Problems with Technology as a Regulatory Target*, 5 *LAW INNOVATION & TECH.* 1, 8-9 (2013); ROGER BROWNSWORD & MORAG GOODWIN, *LAW AND TECHNOLOGIES OF THE TWENTY-FIRST CENTURY: TEXT AND MATERIALS* 65, 67 (2012); GUIDO CALABRESI, *A COMMON LAW FOR THE AGE OF STATUTES* 6 (1982).

³⁷ *See generally, e.g.*, Francesco Parisi, Vincy Fon & Nita Ghei, *The Value of Waiting in Lawmaking*, 18 *EUR. J. L. ECON.* 131 (2004); Jacob E. Gersen & Eric A. Posner, *Timing Rules and Legal Institutions*, 121 *HARV. L. REV.* 543 (2007); Barbara Luppi & Francesco Parisi, *Optimal Timing of Legal Intervention: The Role of Timing Rules*, 122 *HARV. L. REV. F.* 18 (2009).

³⁸ For instance, as I will study in Chapter 6, this goal was explicitly stressed by the

Therefore, this study will also appraise the current and potential regulatory approaches to FinTech, studying the pros and cons of them in the face of the pacing issue. It will then explore the key elements of enhancing regulatory adaptability in the context of FinTech, the barriers to the regulatory adaptability, and the solutions to these barriers.

2. Research Questions

Against the background illustrated above, the research questions that will be analyzed in this study are as follows. The research questions start from, as mentioned in Section 1, FinTech's benefits and risks and hence the question of whether FinTech should be regulated. That is, what are the social benefits and costs of FinTech? Should FinTech be regulated to improve social welfare? As described in Section 1, these topics have rarely been analyzed in the literature from the viewpoint of complexity, which seems to be particularly relevant to the nature of technology. Thus, this study will refer to this viewpoint to study the nature of FinTech. Moreover, the study will analyze if regulation is needed from the perspective of law and economics. Then, if regulation is needed, this study will further explore a more fundamental aspect of FinTech – the pacing issue. This issue does not seem to have been fully studied in the context of FinTech, and this study will attempt to fill the gap. Breaking down the pacing issue in the context of FinTech, this study will analyze how to adaptively regulate FinTech to deal with the pacing issue, what the barriers to adaptive regulation are, and how

financial regulator in Taiwan. *Jin Guan Hui Fa Bu* 「*Jin Rong Ke Ji Fa Zhan Lu Jing Tu*」, *Yi 3 Nian Ti Sheng Shu Wei Jin Rong Fu Wu Xiao Lü*、*Ke Ji Xing*、*Shi Yong Xing Ji Pin Zhi* (金管會發布「金融科技發展路徑圖」, 以 3 年提升數位金融服務效率、可及性、使用性及品質) [*The FSC Issued "FinTech Development Roadmap". Enhance the Efficiency, Accessibility and Quality of Digital Financial Services in 3 Years.*], JIN RONG JIAN DU GUAN LI WEI YUAN HUI (金融監督管理委員會) [Financial Supervisory Commission R.O.C. (Taiwan)] (27 Aug. 2020), https://www.fsc.gov.tw/ch/home.jsp?id=96&parentpath=0,2&mcustomize=news_vie_w.jsp&dataserno=202008270008&dtable=News.

these barriers could be addressed. Thus, the above leads to the following research questions.

- (1) *Should FinTech be regulated? Why? If so, are traditional regulatory approaches suitable?*
- (2) *How to regulate FinTech adaptively to deal with the pacing issue?*
- (3) *What are the barriers to adaptive and effective FinTech regulation?*
- (4) *How to address the barriers?*

3. Methodologies

The task of this study is to appraise FinTech-related regulatory issues at the intersection of law, economics, and technology. Different perspectives from which this appraisal is conducted will thus be involved. Sections 3.1 and 3.2 explain how the perspectives of *law and economics* and *law and technology* will be utilized in this study. Besides, the use of the research methods of *legal analysis* and *case study* is described in Sections 3.3 and 3.4.

3.1 Law and Economics

Concepts of law and economics will be seen throughout this study. For instance, first, as described in Section 1 above, FinTech may bring both benefits and risks to financial markets. The risks might be associated with FinTech's technological nature such as complexity,³⁹ thereby meriting attention. This study will thus look into these potential risks, to discover if market failures occur and if regulation is accordingly needed. These issues will be studied through the lens of law and economics. The aim is to explore the rationales for regulating FinTech. In particular, as described before, the

³⁹ The modern markets have been deemed to be complex. It can be because of participants' behavioral patterns. W. Brian Arthur, *Complexity and the Economy*, 284 SCIENCE 107, 107 (1999). Or, it can be because of the circumstance of the modern financial markets as being complicated. Schwarcz, *supra* note 31, at 2.

modern financial markets have been deemed to be complex. In the literature, this characteristic has been associated with the rationales for regulating.⁴⁰ Therefore, this study will combine the concepts of law and economics with those of complexity.

Second, concepts of law and economics will also be applied when studying the pacing issue. The more fundamental issue arising amid the aforementioned complexity is that regulation might be incapable of keeping pace with the changing markets.⁴¹ This study will thus resort to the studies of law and economics and of law and technology to analyze this pacing issue. Specifically, by resorting to law and economics studies, the critical factors in designing an appropriate regulatory approach to FinTech when facing the pacing issue will be found. For instance, studies regarding rules versus standards will be resorted to in this study to analyze how to regulate FinTech adaptively in the face of the pacing issue. For example, according to studies, prescriptive rules could provide more regulatory certainty and lower information costs when interpreting the regulations than standards would.⁴² In this situation, do rules or standards, namely principles,⁴³ fit better when regulating FinTech, which is fast evolving? Moreover, in the case that FinTech might bring more complexity, other factors such as enactment costs and enforcement costs should be considered as well. That is, if choosing either rules or standards, how will enactment costs and enforcement costs be associated with complexity? Does the presence of complexity, for instance,

⁴⁰ See generally Schwarcz, *supra* note 30.

⁴¹ E.g., Andrew W. Lo, *Regulatory Reform in the Wake of the Financial Crisis of 2007-2008*, 1 J. FIN. ECON. POL'Y 4, 7 (2009). Regarding the relationship between complexities and the pacing issue, see Chapter 3, Section 4.2.

⁴² See, e.g., Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557, 569, 571-72 (1992); Cass R. Sunstein, *Problems with Rules*, 83 CAL. L. REV. 953, 958, 972-73 (1995).

⁴³ As I will explain in more detail in Chapter 7, the concepts of both standards and principles are similar. The two terms will be used interchangeably. See *infra* Chapter 7, Section 3.3.6. When specifically resorting to law and economics studies, the term standards is mainly used to be aligned with those studies. However, in the context of FinTech, I will mainly use the term principles.

amplify the increase of enactment costs when rules are chosen? This study will refer to the relevant studies to appraise the above issues.⁴⁴ Furthermore, since the pacing issue will be one of the focuses of this study, obsolescence costs and the costs of adapting regulation will also be the important factors that should be considered when choosing between rules and standards. For instance, do rules or standards fit better when FinTech regulation may need to be revised more often due to its fast pace? This study will refer to the associated studies to appraise these factors in the context of FinTech.⁴⁵

Last, regulation theory will particularly be applied in this study. For instance, it is worth studying the applicability of various regulatory approaches in the context of FinTech. Therefore, the applicability of, for example, responsive regulation, self-regulation, and smart regulation in the context of FinTech will be discussed in this study.⁴⁶ In addition, this study will also make use of public choice theory to explain why FinTech regulation may not be adaptive and effective.⁴⁷ Nevertheless, the analysis from the viewpoint of public choice will not be comprehensive and will serve as a starting point for future research.

3.2 Law and Technology

⁴⁴ See, e.g., *id.* at 958, 972-73, 976; Kaplow, *supra* note 42, at 572, 574; Vincy Fon & Francesco Parisi, *On the Optimal Specificity of Legal Rules*, 3 J. INSTITUTIONAL. ECO. 147, 157 (2007).

⁴⁵ See, e.g., *id.* at 157; Isaac Ehrlich & Richard A. Posner, *An Economic Analysis of Legal Rulemaking*, 3 J. LEGAL STUD. 257, 273-74, 279 (1974). Nuno Garoupa & Andrew P. Morriss, *The Fable of the Codes: The Efficiency of the Common Law, Legal Origins, and Codification Movements*, 2012 U. ILL. L. REV. 1443, 1450, 1485 (2012); Nuno Garoupa & Mariana Pargendler, *A Law and Economics Perspective on Legal Families*, 7 EUR. J. LEGAL STUD. 36, 54 (2014).

⁴⁶ See *infra* Chapter 5.

⁴⁷ The studies that will be referred to include, but are not limited to, OGUS, *supra* note 34; George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MANAGE. SCI. 3 (1971); DENNIS C. MUELLER, PUBLIC CHOICE III (2003); Sam Peltzman, *Toward a More General Theory of Regulation*, 19 J. L. ECON. 211 (1976); MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION (1971); MARVER H. BERNSTEIN, REGULATING BUSINESS BY INDEPENDENT COMMISSION (1955).

The law and technology viewpoint will also be adopted in this study. First, the viewpoint of law and technology and the one of law and economics will complement each other in Chapter 5 in which the pacing issue is addressed.⁴⁸ Looking into these two schools is beneficial. It is because the viewpoint of law and economics focuses on, for instance, the optimal timing of intervention by considering several factors such as the ones related to information.⁴⁹ However, the studies of law and technology can provide another viewpoint which particularly focuses on the nature of technology. This study will therefore also resort to law and technology studies, looking into the nature and characteristics of FinTech. For example, this study will explain in the following chapters how a gap between regulation and technology might emerge and result in disconnection between them.⁵⁰

Second, the law and technology concepts could also be the grounds on which the design of an appropriate regulatory approach is based. That is, if the pacing issue exists in the context of FinTech, what exactly are the difficulties such as how such an issue manifests itself? For instance, if one of these difficulties is the dilemma of intervening earlier or later, what did the scholars suggest from the viewpoint of law and technology?⁵¹

3.3 Legal Analysis

Legal analysis is also one of the methodologies that will be utilized in

⁴⁸ See *infra* Chapter 5.

⁴⁹ See, e.g., Steven Shavell, *The Optimal Structure of Law Enforcement*, 36 J.L. & ECON. 255, 264-65 (1993).

⁵⁰ See, e.g., Wulf A. Kaal, *Dynamic Regulation for Innovation 5* (U. of St. Thomas (Minnesota) Legal Studies Research Paper No. 16-22, 2016), <https://ssrn.com/abstract=2831040>; Marchant, *supra* note 36, at 20-21; Moses, *supra* note 36, at 7; Brownsword & Goodwin, *supra* note 36, at 65.

⁵¹ For instance, it was suggested that the intervention should be earlier despite the lack of information, see Bert-Jaap Koops, *Ten Dimensions of Technology Regulation. Finding Your Bearings in the Research Space of An Emerging Discipline*, in DIMENSIONS OF TECHNOLOGY REGULATION 311, 317 (Morag Goodwin, Bert-Jaap Koops & Ronald Leenes eds., 2010).

this study. For instance, I will conduct descriptive legal analyses of several FinTech regulations that could be found in different jurisdictions as of the writing. The regulations that will be analyzed include the financial regulations that are associated with FinTech⁵² and the more novel regulatory approach such as sandboxes that is particularly applied to FinTech.⁵³ The sources of these analyses encompass both primary ones such as statutes, government policies and guidelines and secondary ones such as online news, blog articles, reports, commentators' opinions and academic literature.

Through conducting legal analyses, lawmakers' actual reactions to FinTech in jurisdictions can be found. Then, the answers to how these regulations are established and functioning in practice could also be comprehended. Ultimately, the advantages and disadvantages of these FinTech regulations could be discovered, with an understanding of whether the fundamental FinTech's nature and specialties are considered by these regulations. Therefore, the solutions to address the potential problems could be proposed.

3.4 Case Study

Taiwan's FinTech sandbox will be studied as a case.⁵⁴ Several sandboxes in other countries will only be briefly studied to complement the case study of Taiwan.⁵⁵ As I will explain, sandboxes are regarded as a more suitable way to adaptively regulate FinTech,⁵⁶ and sandboxes exist in different jurisdictions.⁵⁷ The reasons why Taiwan's sandbox is chosen are the following. First, Taiwan's sandbox seems to be a unique case as it

⁵² See *infra* Chapter 4.

⁵³ See *infra* Chapters 6 and 7.

⁵⁴ See *infra* Chapters 6 and 7.

⁵⁵ See *infra* Chapter 7.

⁵⁶ See *infra* Chapter 5.

⁵⁷ See *infra* Chapter 6.

represents a specific design model of sandboxes. As I will explain further,⁵⁸ Taiwan's sandbox is based on detailed rules. Taiwan's sandbox will thus be chosen as an example to look into the actual operation of a sandbox and to analyze whether this type of sandbox is truly effective and adaptive. Second, some interesting information about the operation of the sandbox in Taiwan can easily be obtained as Taiwan is my mother country. In addition to studying the operation of Taiwan's sandbox, several real examples of the experiments in Taiwan's sandbox will also be analyzed to explore the advantages and disadvantages of the sandbox. The analyses of these cases, however, might not result in very strong conclusions. Still, this study aims to draw implications from these cases to ultimately suggest several regulatory design principles that fit FinTech.

4. Structure

Chapters 2, 3 and 4 will focus on the research questions – *what is FinTech? Should FinTech be regulated? Why? If so, are traditional financial regulatory approaches suitable?* Chapter 2 will describe what FinTech is from the perspective of technological change. The goal of Chapter 2 is not only giving an overview but also establishing the foundation for other chapters by revealing the regulatory challenges that might be brought by FinTech. Chapter 3 will draw on the concepts of complexity in modern financial markets to analyze both the benefits and challenges brought by FinTech, finding the rationales for regulating. Chapter 3 will also reveal the pacing issue in the era of FinTech. Chapter 4 will embark on legal analyses of several regulatory approaches to FinTech in different jurisdictions to mirror the pacing issue.

Chapter 5 will focus on the research question – *how to regulate FinTech adaptively to deal with the pacing issue?* Chapter 5 will theoretically explore

⁵⁸ See *infra* Chapter 7.

how an adaptive FinTech regulation should be crafted by adding a dimension of time and by considering complexity. By being based on the discourses from both schools of law and economics and law and technology, Chapter 5 will propose a regulatory solution, namely AFR (adaptive financial regulation, “AFR”) of FinTech. Chapter 5 will also explore the key elements of AFR.

Chapter 6 will focus on the research question – *what are the barriers to adaptive and effective FinTech regulation?* Chapter 6 will study the sandboxes epitomizing AFR. The sandbox in Taiwan will be examined as an example. Specifically, several real cases, including both successful and unsuccessful examples, of the experiments in Taiwan’s sandbox will be analyzed. Based on these cases, Chapter 6 will reveal the advantages and disadvantages of Taiwan’s sandbox. The barriers to adaptive and effective FinTech regulation will thus be identified.

Chapter 7 will focus on the last research question – *how to address the barriers?* Chapter 7 will propose the solutions to the barriers found in Chapter 6. Examples of these solutions will be given as well.

Chapter 8 will present the research trajectory of this study to summarize. Chapter 8 will also show how each research question is answered in this research trajectory. In addition, Chapter 8 will explain the limitations of this study and describe several directions for future research.

Chapter 2

What Is FinTech?

1. Introduction

This Chapter defines FinTech. As described in Chapter 1, FinTech has been gaining its momentum due to the transformations brought by it to the modern financial markets.⁵⁹ Along the lines of this notion, there is a substantial body of literature studying FinTech from different perspectives by focusing on, for instance, FinTech's disruptive potential in financial markets.⁶⁰ This Chapter aims to explain FinTech with a bird's eye view rather than being limited to any particular FinTech application or any specific sector of financial markets. As such, this Chapter will lay the basis for the following chapters as a scene is set herein.

The point of view on which this Chapter is based is mainly technological change. In fact, it is not the first time that this viewpoint has been adopted in the context of FinTech even though the relevant studies seem to be comparatively rare. For example, looking at the intersection of technological change and FinTech, one study argued that the advances in technology have historically spurred technological change, enabling new

⁵⁹ See *supra* Chapter 1, Section 1.

⁶⁰ A large number of studies researching FinTech by looking into, among other things, FinTech's ability and potential to alter or disrupt different sectors of financial markets. These studies were in fact based on different perspectives but commonly focusing on the disruption brought by FinTech. See, e.g., Iris H-Y Chiu, *FinTech and Disruptive Business Models in Financial Products, Intermediation and Markets – Policy Implications for Financial Regulators*, 21 J. TECH. L. & POL'Y 55 (2016); Peter Gomber, Robert J. Kauffman, Chris Parker & Bruce W. Weber, *On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services*, 35 J. MGMT. INFO. SYS. 220 (2018); Jean Dermine, *Digital Disruption and Banking Lending*, in FINTECH AND BANKING. FRIENDS OR FOES? 63 (Giorgio Barba, Giacomo Calzolari & Alberto Franco Pozzolo eds., 2017).

players such as FinTech firms to act like traditional financial institutions by providing financial services or products.⁶¹ This phenomenon is associated with the emergence of FinTech.⁶² Moreover, these phenomena may result in changes in, and implications for, social welfare.⁶³ Drawing on the above concepts, this Chapter will study the definition of FinTech and reveal several issues that merit attention.

The remainder of this Chapter proceeds as the following. Section 2 studies the definitions of FinTech that could be found in the literature. Specifically, these definitions are based on the literal and historical approaches. Section 3 explains what FinTech is from the viewpoint of technological change to complement the definitions from the literal and historical perspectives. This section will especially map FinTech along the process of technological change to show the contents of FinTech. This Chapter thus lays the foundation for the subsequent chapters by defining FinTech and revealing the potential issues. Section 4 concludes.

2. Definitions of FinTech in the Literature

In this Section, FinTech will be explained by generally referring to the relevant studies. In the literature, it seems that there are mainly two approaches to explaining what FinTech is. One is a more literal approach. Another is mainly based on FinTech's history. Therefore, Sections 2.1 and 2.2 respectively focus on them. Section 2.3 summarizes.

⁶¹ W. Scott Frame, Larry Wall & Lawrence J. White, *Technological Change and Financial Innovation in Banking: Some Implications for FinTech*, in THE OXFORD HANDBOOK OF BANKING 263, 263-64 (Allen N. Berger, Philip Molyneux & John O. S. Wilson eds., 3rd ed., 2019). Regulatory requirements may spur technological change. Adam B. Jaffe, Richard G. Newell & Robert N. Stavins, *Environmental Policy and Technological Change*, 22 ENV'T & RES. ECON. 41, 43-44 (2002).

⁶² See Frame et al., *supra* note 61, at 264.

⁶³ See, e.g., *id.* at 263, 266, 279; Rory Van Loo, *Making Innovation More Competitive: The Case of FinTech*, 65 UCLA L. REV. 232, 232, 252 (2018); Itay Goldstein, Wei Jiang & G. Andrew Karolyi, *To FinTech and Beyond*, 32 REV. FIN. STUD. 1647, 1658, 1660 (2019).

2.1 A More Literal Approach

Several literal definitions of FinTech could be found in the literature. They seem to define FinTech mainly on the basis of the explanation for what happens at the intersection of finance and technology. For instance, a brief definition of FinTech was given in Chapter 1 – the employment of technology to provide financial services or products.⁶⁴ This definition explains from a broader perspective what happens when technology meets finance – financial services and products are accordingly provided in a way that is more technology-based. In addition, a definition defines FinTech in a more detailed way. In comparison with the aforementioned definition, this detailed definition emphasizes not only the provision of financial services and products but also other aspects. This definition is quoted in the following.

“FinTech is a dynamic segment at the intersection of the financial services and technology sectors where technology-focused start-ups and new market entrants innovate the products and services currently provided by the traditional financial services industry.”⁶⁵

Based on the aforementioned definitions, it could be observed that FinTech encompasses several elements. First, similar to the first definition above, the provision of financial services and products are based on the use of technology. In fact, a study pointed out that such a provision is exclusively online, thereby differing from the historical provision of financial services and products.⁶⁶ The examples that were given in that study are online

⁶⁴ Douglas W. Arner, János Barberis & Ross P. Buckley, *FinTech, RegTech, and the Reconceptualization of Financial Regulation*, 37 NW. J. INT'L L. & BUS. 371, 373 (2017).

⁶⁵ PWC, BLURRED LINES: HOW FINTECH IS SHAPING FINANCIAL SERVICES 3 (March 2016), <https://www.pwc.de/de/newsletter/finanzdienstleistung/assets/insurance-inside-ausgabe-4-maerz-2016.pdf>.

⁶⁶ Chiu, *supra* note 60, at 77.

crowdfunding and P2P (peer-to-peer, “P2P”) finance.⁶⁷ In addition, online payments and the associated services, which will be discussed in Chapters 4,⁶⁸ also exemplify the provision of financial services that is solely online. Due to the introduction of these online payments and the associated services, consumers are thus enabled to transit from, for instance, credit cards to Google Pay when making payments.⁶⁹

Second, the rise of new market players is envisaged due to FinTech. That is, further to the provision of financial services and products described above, those financial services and products could be offered by technology-based firms rather than only by traditional financial institutions such as banks. For instance, the online crowdfunding and P2P finance mentioned above are operated or facilitated by online platforms, resulting in a new form of intermediaries and in decentralization.⁷⁰ A study further argued that the rise of these new market players mirrors that their platform-based business model could lower transaction costs.⁷¹ However, while FinTech brings some benefits, will there be any costs? Is regulation needed as a result? I will study

⁶⁷ *Id.* Online crowdfunding is a way in which people could invest online through social networks, originating from the idea of crowdsourcing. See, e.g., John S. (Jack) Wroldsen, *The Social Network and the Crowdfund Act: Zuckerberg, Saverin, and Venture Capitalists’ Dilution of the Crowd*, 15 VAND. J. ENT. & TECH. L. 583, 602-03 (2013); Andrew A. Schwartz, *Keep It Light, Chairman White: SEC Rulemaking Under the CROWDFUND Act*, 66 VAND. L. REV. EN BANC 43, 47 (2013); Thomas Lee Hazen, *Crowdfunding or Fraudfunding? Social Networks and the Securities Laws – Why the Specially Tailored Exemption Must be Conditioned on Meaningful Disclosure*, 90 N.C. L. REV. 1735, 1736 (2012). P2P finance refers to way in which financial services or products are provided through online platforms by matching providers and demanders. See, e.g., Chiu, *supra* note 60, at 79; Robin Hui Huang, *Online P2P Lending and Regulatory Responses in China: Opportunities and Challenges*, 19 EUR. BUS. ORG. L. REV. 63, 64 (2018).

⁶⁸ See *infra* Chapter 4, Section 2.2.2.

⁶⁹ See Chiu, *supra* note 60, at 91.

⁷⁰ See, e.g., Guido Ferrarini, *Regulating FinTech: Crowdfunding and Beyond*, in FINTECH AND BANKING. FRIENDS OR FOES? 121, 123-24 (Giorgio Barba, Giacomo Calzolari & Alberto Franco Pozzolo eds., 2017).

⁷¹ See Michael Munger, *Coase and the “Sharing Economy”*, in FOREVER CONTEMPORARY: THE ECONOMICS OF RONALD COASE 187, 189 (Cento Veljanovski ed., 2015).

these issues in Chapter 3.⁷² Further issues regarding the current regulations of FinTech such as their establishment, operation, advantages and disadvantages, and the solutions to address the disadvantages will be studied from Chapter 4 to Chapter 7.

Third, in addition to the aforementioned two aspects, the aforementioned definitions of FinTech also reflect an important nature of FinTech – dynamism. For instance, FinTech’s dynamism was explained by arguing that financial services and products could be offered by FinTech firms in a more dynamic and agile manner.⁷³ To be clear, this dynamism could be epitomized by the changing landscape of financial markets due to FinTech. For instance, the emergence of novel business models in which new players involve may change the landscape of financial markets. The recent trend of platform-based business models in which digital platforms connect suppliers and customers is an example.⁷⁴ Commentators thus argued that how regulation, if it is needed, could be crafted to respond to this dynamism is an indispensable issue in the age of FinTech.⁷⁵ Chapters 5, 6 and 7 will specifically look at the intersection of the dynamism nature of FinTech and regulation, if it is needed.

After defining FinTech above, the characteristics of FinTech are

⁷² See *infra* Chapter 3.

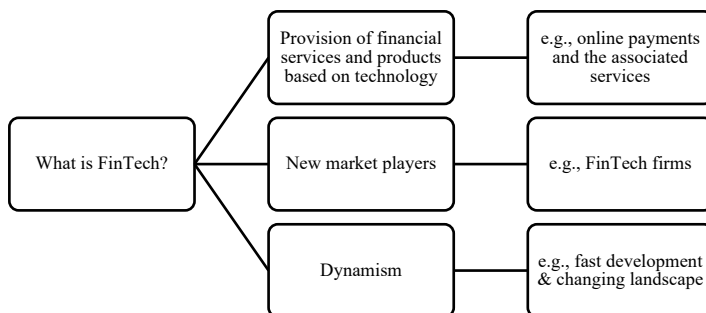
⁷³ PWC, *supra* note 65, at 20.

⁷⁴ See Markos Zachariadis & Pinar Ozcan, *The API Economy and Digital Transformation in Financial Services: The Case of Open Banking 6-7* (SWIFT Inst. Working Paper No. 2016-001, 15 June 2017), <https://ssrn.com/abstract=2975199>; Annabelle Gawer & Rebecca Henderson, *Platform Owner Entry and Innovation in Complementary Markets: Evidence from Intel*, 16 J. ECON. & MGMT. STRATEGY 1, 1-2 (2007); Elisabeth Noble, *Digital Platform: A New Source of Financial System Interconnectedness*, OXFORD BUSINESS LAW BLOG (Sep. 27, 2021), <https://www.law.ox.ac.uk/business-law-blog/blog/2021/09/digital-platforms-new-source-financial-system-interconnectedness-0>.

⁷⁵ See, e.g., Arner et al., *supra* note 64, at 381, 412; Hilary J. Allen, *Regulatory Sandboxes*, 87 GEO. WASH. L. REV. 579 (2019); Dirk A. Zetsche, Ross P. Buckley, János N. Barberis & Douglas W. Arner, *Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation*, 23 FORDHAM J. CORP. & FIN. L. 31 (2017).

illustrated in the following figure.

Figure 1: What is FinTech? – A More Literal Approach



2.2 A More Historical Approach

Another way to define FinTech that could be found in literature is based on a more historical viewpoint. That is, FinTech is not a brand-new idea; rather, it has been in existence in the broad sense for a long time.

For example, commentators pointed out that the history of FinTech could be dated back to 1866, which is the year that financial industries started to employ technology such as the use of telecommunication cables.⁷⁶ Later, the first ATM (Automatic Teller Machine, “ATM”) was installed in the UK in 1967, and this introduction was marked as the beginning of the modern FinTech.⁷⁷ Commentators deemed this period, which is from 1866 to 1967, as “FinTech 1.0”.⁷⁸ Following this, financial institutions have gradually adopted information technology, and financial services were largely

⁷⁶ Douglas W. Arner, János Barberis & Ross P. Buckley, *The Evolution of FinTech: A New Post-Crisis Paradigm*, 47 GEO. J. INT’LL. 1271, 1274 (2016).

⁷⁷ *Id.*

⁷⁸ *Id.* at 1274-76.

provided digitally by the late 1980's.⁷⁹ This period until the GFC is regarded as “FinTech 2.0”, being characterized by the introduction of digital finance.⁸⁰ After the GFC, “FinTech 3.0” began.⁸¹ This period is characterized not only by modern digital finance being conducted by financial institutions but also the emergence of new market players with digitally provided financial services and products.⁸² Moreover, the COVID-19 pandemic from late 2019 or the beginning of 2020 seems to mark another watershed moment from which FinTech is gaining momentum again.⁸³ It is because the digital finance facilitated by FinTech could be one of the means of reducing the spread of the virus as it helps avoid human contact.⁸⁴ After this, the development of FinTech might accelerate.⁸⁵ In this period, it seems that FinTech is bringing its impact to not only financial markets but to society as a whole. Could the period after 2020 be regarded as “FinTech 4.0” in which FinTech is accelerating faster than before and bringing broader impacts? The answer might be positive.

The different stages of FinTech's development described above are illustrated in the following figure.

Figure 2: What is FinTech? – A More Historical Approach

⁷⁹ *Id.* at 1276.

⁸⁰ *Id.*

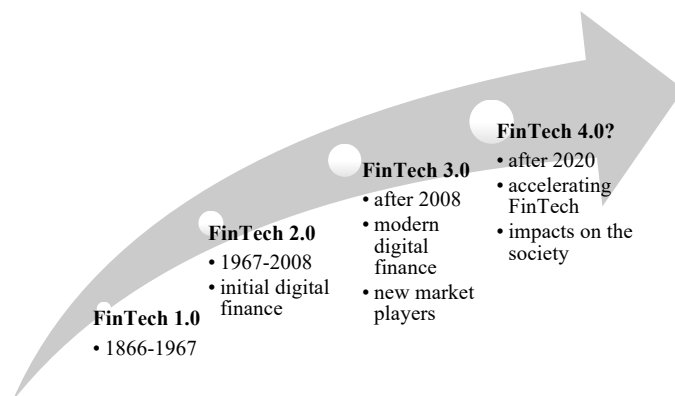
⁸¹ *Id.*

⁸² *See id.* at 1276, 1286-87.

⁸³ *See* Douglas W. Arner, János N. Barberis, Julia Walker, Ross P. Buckley, Andrew M. Dahdal & Dirk A. Zetzsche, *Digital Finance & COVID-19 Crisis* 2, 5 (University of Hong Kong Faculty of Law Research Paper No. 2020/017, UNSW Law Research), <https://ssrn.com/abstract=3558889>.

⁸⁴ *Id.* at 4-5.

⁸⁵ *See id.* at 23.



Source: the content of this Figure is partly summarized from Arner et al., *supra* note 76, at 1274-76, 1286-87.

2.3 Summary

This Section presented the definitions of FinTech that could be found in the literature. In a more literal approach, the definitions seem to emphasize what happens at the intersection of finance and technology. For instance, first, the provision of financial services and products that is based on the use of technology is emphasized. Second, the rise of new market players envisaged due to FinTech is also stressed in these definitions. That is, because of the aid of technology, financial services and products could be offered by FinTech firms rather than only by traditional financial institutions such as banks. Third, these definitions also mirror the nature of FinTech – dynamism. FinTech’s changing landscape and rapid development epitomize this nature. This Section also gave examples of FinTech to explain the above notions.

Besides, in a more historical approach, different stages of FinTech’s development could be found. According to scholars, periods from 1866 to 1967 and from 1967 to 2008 are respectively regarded to be FinTech 1.0 and

FinTech 2.0.⁸⁶ The GFC in 2008 marked the moment from which FinTech 3.0 has begun.⁸⁷ This period is characterized by the introduction and flourishing of modern digital finance, in which new market players have emerged.⁸⁸ The COVID-19 pandemic since 2020 seems to mark another watershed moment from which FinTech is accelerating and gaining momentum again.⁸⁹ This period could be called FinTech 4.0. Equally important, it seems that FinTech in this period brings its impact to not only financial markets but society as a whole as it could help reduce the spread of the virus.

Both approaches explain what FinTech is. However, as revealed in Chapter 1, the pacing issue might emerge when considering regulatory issues. Neither of the approaches explicitly reveal or explain this pacing issue. Thus, in the following Section 3, the viewpoint of technological change will be adopted as it is associated with the pacing issue in the context of technology and regulation.

3. An Alternative Approach Based on Technological Change

This Section embarks on explaining FinTech from a revolutionary perspective – technological change. This perspective can identify the new issues raised by new technology.⁹⁰ This viewpoint also focuses on the pace of technology,⁹¹ thereby explaining the dynamic nature of technology. Section 3.1 studies the concepts of technological change as the framework in which FinTech will be explained. Section 3.2 explains FinTech from this

⁸⁶ Arner et al., *supra* note 76, at 1276, 79.

⁸⁷ *Id.* at 1286-87.

⁸⁸ *See id.*

⁸⁹ Arner et al., *supra* note 83, at 5, 23.

⁹⁰ *See, e.g.,* Lyria Bennett Moses, *How to Think about Law, Regulation and Technology: Problems with Technology as a Regulatory Target*, 5 LAW INNOVATION & TECH. 1, 7 (2013).

⁹¹ *See, e.g., id.;* Lyria Bennett Moses, *Agents of Change: How the Law Copes with Technological Change*, 20 GRIFFITH L. REV. 763, 764 (2011).

point of view. Section 3.3 summarizes.

3.1 Concepts of Technological Change

According to scholars, the ideas about innovation mark the origin of technological change.⁹² A substantial body of literature has referred to the technological process by which technology spreads throughout the markets. This process consists of, firstly, the stage of *invention*, in which production processes are reformed, new products are produced or old products are produced in a new way.⁹³ Secondly, the stage of *innovation* is deemed to be distinct from *invention*, and *innovation* could happen without being paired with *invention*.⁹⁴ At this stage, the new products or production processes are commercialized.⁹⁵ In the broad sense, *innovation* was defined as “the setting up of a new production function,” including new products, new forms of organization or new markets.⁹⁶ However, since *innovation* could happen without being paired with *invention*, bringing something that is already existing to the markets also exemplifies what happens at this stage.⁹⁷ Thirdly, *innovation* may spread while it is widely adopted and available, and this process is called *diffusion*.⁹⁸ A definition of *diffusion* is quoted in the following.

“*Diffusion* is the process by which an innovation is communicated through certain channels over time among members of a social system. It is a special type of communication, in that the messages are concerned with new ideas. *Communication* is a process in which

⁹² Jaffe et al., *supra* note 61, at 43.

⁹³ *See id.*; JOSEPH A. SCHUMPETER, CAPITALISM, SOCIALISM & DEMOCRACY 132 (Published in Taylor & Francis e-Library, 2003).

⁹⁴ *See* JOSEPH A. SCHUMPETER, BUSINESS CYCLES 80-81 (1939); Thomas S. Robertson, *The Process of Innovation and the Diffusion of Innovation*, 31 J. MKTG. 14, 14 (1967).

⁹⁵ Jaffe et al., *supra* note 61, at 43.

⁹⁶ SCHUMPETER, *supra* note 94, at 84.

⁹⁷ *See, e.g., id.* at 81-82; Jaffe et al., *supra* note 61, at 43.

⁹⁸ *Id.*; EVERETT M. ROGERS, DIFFUSION OF INNOVATION 5-6 (4th ed., 1995).

participants create and share information with one another in order to reach a mutual understanding.”⁹⁹

3.2 Explaining FinTech

Explaining FinTech based on the concepts of technological change could be with reference to the explanations of the term “financial innovation” that are also based on the technological change concepts. It is because both terms FinTech and financial innovation have been often linked together in the literature.¹⁰⁰

According to Tufano, “financial innovation is the act of creating and then popularizing new financial instruments as well as new financial technologies, institutions and markets.”¹⁰¹ As such, financial innovation involves both invention and the diffusion of new products, services and ideas,¹⁰² consisting of, among other types, *product* and *process* innovations.¹⁰³ In the following, FinTech will be briefly re-explained by studying what are the *product* and *process* innovations associated with FinTech.

With respect to FinTech *product* innovations, commentators pointed out that the products based on blockchain technology epitomize such innovations.¹⁰⁴ As such, some financial instruments have been invented to help and facilitate, for instance, the fundraising process. The issuance and

⁹⁹ *Id.*

¹⁰⁰ *See, e.g.*, Frame et al., *supra* note 61, at 268, 274-75.

¹⁰¹ Peter Tufano, *Financial Innovation*, in HANDBOOK OF THE ECONOMICS OF FINANCE: VOLUME 1A CORPORATE FINANCE 307, 310 (George M. Constantinides, Milton Harris, René M. Stulz eds., 2003).

¹⁰² *Id.* at 311.

¹⁰³ *Id.* at 310.

¹⁰⁴ Frame et al., *supra* note 61, at 275. Regarding the definition of blockchain technology, *see infra* Chapter 3, Section 1.

sale of digital tokens exemplify these newly invented products.¹⁰⁵ In addition, cryptocurrency also exemplifies the invented product while they work as a novel form of currency.¹⁰⁶ The popularity of these inventions nowadays mirrors the diffusion of them.¹⁰⁷ However, the changes brought by these product innovations have both benefits and challenges, possibly being ignored by people if focusing on only one aspect.¹⁰⁸ Therefore, Chapter 3 will specifically focus on the changes brought by blockchain technology and the associated issues.

With respect to FinTech *process* innovations, commentators pointed out that blockchain technology also epitomizes this type of innovation because it is reshaping the financial markets as it brings a new decentralized process by which the aforementioned products are supplied.¹⁰⁹ In fact, the innovative process created and facilitated by blockchain technology seems to be the decentralized process by which information is dealt with differently. For instance, by this process, truth is discovered, and participants theoretically have little incentives to acquire information.¹¹⁰ In addition, another FinTech *process* innovation could be that consumers can gain more information thanks to FinTech firms. For example, a study argued that

¹⁰⁵ See STEVE DAVIES ET AL., STRATEGY& & PWC, 4TH ICO / STO REPORT: A STRATEGIC PERSPECTIVE 1 (Mar., 2019), <https://cryptovalley.swiss/wp-content/uploads/ch-20190308-strategyand-ico-sto-report-q1-2019.pdf>.

¹⁰⁶ See Andrew Rossow, *Former Goldman Sachs Banker Brings Cryptocurrency To The Financial Mainstream*, FORBES (Feb. 28, 2018, 09:02 PM), <https://www.forbes.com/sites/andrewrossow/2018/02/28/former-goldman-sachs-banker-brings-cryptocurrency-to-the-financial-mainstream/#637f0be55af2>.

Regarding brief explanations of cryptocurrency's definition and of its operation, see *infra* Chapter 3, Section 1.

¹⁰⁷ See generally Jacob Wood, Haejin Jang, Artem Lenskiy & Gohar Feroz Khan, *The Diffusion and Adoption of Bitcoin: A Practical Survey of Business*, 11 INT'L BUS. MANAG. 1278 (2017).

¹⁰⁸ See, e.g., Christian Catalini, *Blockchain Technology and Cryptocurrencies: Implications for the Digital Economy, Cybersecurity, and Government*, 19 GEORGET. J. INT. AFF. 36, 36 (2018).

¹⁰⁹ Frame et al., *supra* note 61, at 268-69.

¹¹⁰ See, e.g., Hossein Nabilou & André Prüm, *Ignorance, Debt and Cryptocurrencies: The Old and New in the Law and Economics of Concurrent Currencies*, 5 J. FIN. REG. 29, 62 (2019).

FinTech firms process and integrate information to enable consumers to better assess information, thereby enhancing the information availability.¹¹¹ In this era, this FinTech *process* innovation centering on information seems to be widely spread and diffused as reflected by its popularity and by being deemed to be a significant development.¹¹²

Looking into FinTech through the perspective of technological change further reveals a topic – the pace. That is, scholars argued that the pace of the *diffusion* of innovation triggers the pacing issue if it is needed to regulate.¹¹³ Therefore, in the following chapters, I will first examine whether it is needed to regulate FinTech and then I will examine the pacing issue when regulation is needed.

3.3 Summary

This Section explained FinTech through an alternative approach – technological change. The technological change viewpoint could be the alternative and complementary approach. In fact, there is a substantial body of the literature studying technological change, but few of them relate to FinTech. According to scholars, technological change is associated with the process consisting of *invention*, *innovation*, and *diffusion*.¹¹⁴ This Section examined how these concepts have been employed to study financial innovation, which has been deemed to be relevant to FinTech. In the context of financial innovation, according to Tufano, *product* and *process* innovations are types of financial innovation.¹¹⁵ In the context of FinTech, blockchain technology, with its applications such as tokens and

¹¹¹ See, e.g., Simonetta Vezzoso, *Fintech, Access to Data, and the Role of Competition Policy*, in COMPETITION AND INNOVATION 30, 33 (V. Bagnoli ed., 2018).

¹¹² See *id.* at 32.

¹¹³ See Moses, *supra* note 90, at 8.

¹¹⁴ See SCHUMPETER, *supra* note 94, at 80-81, 84; ROGERS, *supra* note 98, at 5-6; Jaffe et al., *supra* note 61, at 43; Robertson, *supra* note 94, at 14.

¹¹⁵ Tufano, *supra* note 101, at 310-11.

cryptocurrency, and online payments services were briefly studied in this Section as examples of *product* and *process* innovations. The popularity of these innovations mirrors the consequences of the diffusion of them.

This Section further revealed a topic – the pace. That is, scholars argued that the pace of the diffusion of innovation triggers the pacing issue if it is needed to regulate.¹¹⁶ Being inspired by this notion, in the following chapters, I will firstly examine if it is needed to regulate FinTech and then the pacing issue when regulation is needed.

4. Conclusion

While FinTech has been a buzzword in recent years, there are various ways to explain it. This Chapter explained what FinTech is through three approaches – literal, historical and technological change approaches. This Chapter found that both the literal or historically approaches are capable of describing what FinTech is in detail. However, the technological change approach further reveals the pacing issue arising at the intersection of technology and regulation. Thus, the technological change viewpoint complements the literal and historical approaches. Later chapters will consider if it is needed to regulate FinTech and then the pacing issue when regulation is needed.

¹¹⁶ See Moses, *supra* note 90, at 8.

Chapter 3

Rethinking Financial Regulation in the Era of FinTech: A Study in Blockchain Technology, Complexity, and Financial Regulation

1. Introduction

The innovative technology employed in financial industries has been catalyzing modern finance and adding value to business in manifold ways. For instance, new instruments or players have emerged in the modern financial markets because of the innovative technology such as blockchain technology.¹¹⁷ Those new instruments and players, however, might bring changes in the complexity in the financial markets in spite of benefits. As the complexity of the financial markets has been a compelling issue in the field of financial regulation,¹¹⁸ this Chapter asks the following questions. *Should*

¹¹⁷ To define blockchain technology in a simplified way, the concept of it could be traced back to the ideas proposed by Haber & Stornetta in 1991 to fix the rights of intellectual property through time stamping documents digitally, which converts data into a hexadecimal code. Regarding the relevant concepts, *see generally* Stuart Haber & W. Scott Stornetta, *How to Time-stamp a Digital Document*, 3 J. CRYPTOLOGY 99 (1991). These ideas were further developed by Nakamoto in 2008 to refer to the data structure called “chains of blocks”, which is secured by cryptographic proof. The idea of chains of blocks, namely blockchain, was employed as the underlying methodology to validate the ownership of cryptocurrency such as Bitcoin. SATOSHI NAKAMOTO, BITCOIN: A PEER-TO-PEER ELECTRONIC CASH SYSTEM 1 (2008), <https://bitcoin.org/bitcoin.pdf>; David Yermack, *Corporate Governance and Blockchains*, 21 REV. FIN. 7, 7-8 (2017). Cryptocurrency is thus a form of currency on the basis of the operation without a central party. *See* cryptocurrency, Merriam-Webster, <https://www.merriam-webster.com/dictionary/cryptocurrency> (last visited Mar. 23, 2021). According to a report published by the World Bank, blockchain is a type of “distributed ledger technology, ‘DLT’”, which is a data recording and sharing approach that is based on multiple data stores (ledger). As such, blockchain uses cryptographic and algorithmic methods to create and verify the aforementioned data structure (i.e., chain of blocks). WORLD BANK GROUP, DISTRIBUTED LEDGER TECHNOLOGY (DLT) AND BLOCKCHAIN 1 (2017). In this Chapter, the term “blockchain technology” would be mainly used rather than “DLT”.

¹¹⁸ *See, e.g.*, Stefano Battiston et al., *Complexity Theory and Financial Regulation*, 351 SCIENCE 818, 818 (2016); Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 WASH. U. L. REV. 211, 213 (2009); Kathryn Judge, *Fragmentation Nodes: A Study in Financial Innovation, Complexity, and System Risk*, 64 STAN. L. REV. 657,

FinTech be regulated? Why? If so, are traditional financial regulatory approaches suitable? This Chapter focuses on blockchain technology as the example from the perspective of complexity. That is, by looking into the changes in complexity brought by blockchain technology, the questions of whether it should be regulated and whether the traditional financial regulatory approaches are suitable will be answered. The applications of blockchain technology such as cryptocurrency¹¹⁹ and the means of raising capital¹²⁰ will be presented when studying certain scenarios.

The description that financial markets and the whole economy are complex due to the complexities therein could be explained by the narrative that they are the systems in which participants continuously adapt to the pattern they create.¹²¹ Alternatively, the idea that “complexity” exists in financial markets could be explained by the description that it is the state of being complicated.¹²² However, both explanations commonly allude to a driver – innovation. Among other scholars, Arthur argued that technological innovation, which is based on technological change, is one of the drivers that make the economy complex.¹²³ Schwarcz studied the complexity in financial markets by examining financial innovation.¹²⁴ Since FinTech seems to be associated with technological change as described in Chapter 2, complexity might be envisaged and bring challenges.

Because of the application of innovative technology such as blockchain technology, the transformations in the financial markets manifest themselves

658 (2012).

¹¹⁹ Regarding the application of blockchain technology to create cryptocurrency, *see supra* note 117 and accompanying text.

¹²⁰ Regarding the application of blockchain technology to raise capital, *see infra* note 125 and accompanying text.

¹²¹ W. Brian Arthur, *Complexity and the Economy*, 284 SCIENCE 107, 107 (1999).

¹²² Steven L. Schwarcz, *Rethinking the Disclosure Paradigm in a World of Complexity*, 1 U. ILL. L. REV. 1, 2 (2004).

¹²³ W. Brian Arthur, *Complexity Economics: A Different framework for Economic Thought*, in COMPLEXITY AND THE ECONOMY 1, 5, 7 (2015).

¹²⁴ *See* Schwarcz, *supra* note 31, at 19, 37.

in the emergence of innovative financial markets where novelty alters the traditional way of financial transactions such as fundraising methods. Security token offerings (“STOs”), for example, are one of the cases where innovation facilitates capital raising and brings social impacts.¹²⁵ The core idea of STOs is the tokenization of assets with the use of tokens providing financial rights,¹²⁶ which is based on blockchain technology.¹²⁷ As an innovative fundraising method, which is a type of blockchain-based instruments representing the value of, for instance, the partial ownership of the underlying company, it has merited commentators’ attention.¹²⁸ It seems that the blockchain-based financial instruments may be subject to the current financial regulations.¹²⁹ Nonetheless, the debate about the rationales for regulating blockchain-based financial instruments and the possible exemptions still remains.¹³⁰ Before reaching any definitive answers, it is foreseeable that the market participants in innovative finance, the innovation

¹²⁵ The idea of STOs is comparable with ICOs (Initial Coin Offerings, “ICOs”) but in a sense different. The core idea of STOs is the tokenization of assets, whereas ICOs rely on the sale of digital tokens in exchange for cryptocurrencies or fiat money without claims to assets or ownership rights involved. STEVE DAVIES ET AL., STRATEGY& & PwC, 4TH ICO / STO REPORT: A STRATEGIC PERSPECTIVE 1 (Mar., 2019), <https://cryptovalley.swiss/wp-content/uploads/ch-20190308-strategyand-ico-sto-report-q1-2019.pdf>.

¹²⁶ *Id.*

¹²⁷ Chrisjan Pauw, *What Is an STO, Explained*, COINTELEGRAPH (Feb. 21, 2019), <https://cointelegraph.com/explained/what-is-an-sto-explained>.

¹²⁸ See Brian Curran, *What is an STO? A Complete Guide to Security Token Offerings*, BLOCKONOMI (Mar. 1, 2019), <https://blockonomi.com/what-is-an-sto/>; Bobby AHLUWALIA & SAAD IMRAN, SECURITY TOKEN OFFERINGS: THE EVOLUTION OF CAPITAL FORMATION 2 (Nov. 20, 2018), <https://drive.google.com/file/d/1CIwOko6mgw3HM3rsoIkhjdjwi7LuMk-ya/view>.

¹²⁹ In 2017, the SEC released an investigation report to announce that the instruments, which are offered and sold to raise capital, are considered as securities. U.S. SECURITIES AND EXCHANGE COMMISSION, REPORT OF INVESTIGATION PURSUANT TO SECTION 21(A) OF THE SECURITIES EXCHANGE ACT OF 1934: THE DAO 10-11 (25 July 2017), <https://www.sec.gov/litigation/investreport/34-81207.pdf>. The SEC has been continuously engaging in the investigation and the analysis of blockchain and the financial instruments based on that to develop an analytical framework for them. *Framework for “Investment Contract” Analysis of Digital Assets*, U.S. SECURITIES AND EXCHANGE COMMISSION (last modified Apr. 3, 2019), <https://www.sec.gov/corpfin/framework-investment-contract-analysis-digital-assets>.

¹³⁰ In the end of 2018, two representatives introduced the “Token Taxonomy Act” to try to exclude tokens from the definition of a security and enact different regulations for these digital units. H.R. 7356, 115th Cong. (2018).

itself and the current regulation would interact.¹³¹ In such an interaction,¹³² in particular, it is doubtful that traditional financial regulation is suitable in the markets facilitated by innovative technology.¹³³

Theoretically speaking, financial regulation traditionally operates in different financial markets such as the money market and the capital market channeling funds between participants. The way of “money and capital markets” distinguishes financial markets according to the maturity basis of the instruments. Money markets are for short-term debt instruments, whereas capital markets are for longer-term debt and equity instruments.¹³⁴ However, by framing the respective financial regulations operating in these two markets with market participants’ information-related incentives, it is apparent that the regulatory regimes in these two markets differ.¹³⁵ The regulation operating in the money market lies on the establishment of symmetric ignorance, while the regulation functioning in the capital market

¹³¹ See CHARLES GOODHART, PHILIPP HARTMANN, DAVID LLEWELLYN, LILIANA ROJAS-SUÁREZ & STEVEN WEISBROD, *FINANCIAL REGULATION: WHY, HOW AND WHERE NOW?* 44 (1st ed. 1998).

¹³² According to commentators, the analysis of participants’ behavior and the interaction among them could provide some implications for designing regulations. *Id.*

¹³³ In the following, the term “traditional financial regulation” simply refers to the general financial regulation that has been existing and not especially for FinTech. If a specific financial regulation would be the case, I would instead use the name of such regulation such as “banking regulation” or “securities regulation”.

¹³⁴ In addition to “money and capital markets”, other categorizations of financial markets include: debt and equity markets, primary and secondary markets, exchanges and over-the-counter markets, and money and capital markets. The way of “debt and equity markets” illustrates financial markets based on the notion that the instruments used to raise funds are *debt instruments* such as bonds or mortgages, or *equities* such as common stocks. The way of “primary and secondary markets” focuses on whether the securities are firstly issued or resold. The way of “exchanges and over-the-counter markets” divides the secondary markets into the market where participants trade via a central location, and the market where dealers at different locations conduct trades. FREDERIC S. MISHKIN, *THE ECONOMICS OF MONEY, BANKING, AND FINANCIAL MARKETS* 71-73 (11th ed., Global ed., 2016).

¹³⁵ Regarding the detailed analysis of these two distinctive markets based on the informational incentives, see generally Kathryn Judge, *Information Gaps and Shadow Banking*, 103 *VIR. L. REV.* 411 (2017). This Chapter is partly inspired by this study. This Chapter tackles these issues based on the literature associated with the aforementioned characteristics of different financial markets and those of the corresponding regulations.

aims to facilitate symmetric understanding.¹³⁶ This dichotomy, however, seems to be blurred possibly because of the emergence of blockchain-based markets having the distinctive features that are similar to either the money market or the capital market.¹³⁷ In addition, complexities exist in financial markets at different levels such as products, institutions, transactions, and the whole markets.¹³⁸ Even though these complexities have been dealt with by the traditional financial regulation, the introduction of blockchain technology might bring some changes in complexity. Therefore, this Chapter studies the challenges posed by blockchain technology to the traditional financial regulation on the basis of – (1) the distinctive features of these new blockchain-based markets, and (2) the changes in complexity brought by blockchain technology. This Chapter aims to find out if FinTech should be regulated and the reasons for the above analyses. This Chapter will ultimately pave the way for striking a balance between complying with financial regulation and promoting innovation by discovering the potential frictions between regulation and innovation.¹³⁹

The remainder of this Chapter proceeds as follows. Section 2 draws a broad picture of the traditional financial regulation functioning in two distinctive markets – the money market and the capital market. This section illustrates the two markets on the basis of the information-related incentives for the participants in each market,¹⁴⁰ describes the complexities

¹³⁶ See Bengt Holmström, *Understanding the Role of Debt in the Financial System* 4-7 (BIS Working Papers No. 479, Jan. 2015), <https://www.bis.org/publ/work479.pdf>.

¹³⁷ See *infra* Section 3.1.2

¹³⁸ See Schwarcz, *supra* note 118, at 220-36; Lawrence G. Baxter, *Betting Big: Value, Caution and Accountability in an Era of Large Banks and Complex Finance*, 31 REV. BANKING & FIN. L. 765, 861-66 (2012); Manuel A. Utset, *Complex Financial Institutions and System Risk*, 45 GA. L. REV. 779, 801-2 (2011).

¹³⁹ According to Faure et al. (2016), there might be a conflict between regulation and innovation because of the fear of liability. See Michael Faure, Louis Visscher & Franziska Weber, *Liability for Unknown Risks: A Law and Economics Perspective*, 7 J. EUR. TORT L. 198, 211-12 (2016).

¹⁴⁰ Judge and Holmström provided insightful analyses regarding those different financial markets and the corresponding regulations for this Chapter. However, they examine these differences by focusing on the issues about shadow banking, which refers to the

contributing to market failures in each market and how the traditional financial regulation has been dealing with them. This section aims to establish a theoretical foundation of the financial regulation before the emergence of blockchain technology. Section 3 then identifies the changes brought by blockchain technology. This section examines the features of the blockchain-based financial markets that render them distinctive from the traditional money market and the traditional capital market. It also analyzes the changes in complexity resulting from the underlying blockchain technology through examining different sources of complexity in financial markets. This section aims to study the blockchain technology's impacts on the traditional financial markets. On the basis of Section 2 and Section 3, Section 4 studies the relationship between blockchain technology and the current financial regulation, namely the applicability of the traditional financial regulation to the new markets. This section explains why the blockchain-based markets blur the dichotomy between the money market and the capital market. It also explains the differences between the complexities that have been dealt with by the traditional financial regulation and those brought by blockchain technology. This section aims to answer the questions of how the new FinTech markets such as blockchain-based markets emerge, and why the traditional regulatory regimes for both the money market and the capital market may not be compatible with the new markets. Section 5 concludes.

system of “credit intermediation involving entities and activities outside the regular banking system”. FINANCIAL STABILITY BOARD, SHADOW BANKING: STRENGTHENING THE OVERSIGHT AND REGULATION 1 (Oct. 27, 2011), http://www.fsb.org/wp-content/uploads/r_111027a.pdf?page_moved=1. One of the arguments is that the shadow banking system operates in the capital market, while this system is embedded with some characteristics of the money market. Judge, *supra* note 135, at 444. In addition, as shadow banking was recognized as one of the factors contributing to the financial crisis, the reforms established on the understanding of capital market seem not to be suitable. See Holmström, *supra* note 136, at 1. This Chapter is partly based on the theoretical framework established by, among others, these two studies. However, the role played by innovation and technology and the relationship between it and the two distinctive regulatory regimes are focused in this Chapter.

2. A Broad Picture of the Traditional Financial Regulation

According to commentators, financial regulations were suitable for different financial domains because they helped, among other things, to support the functions of information and incentives for the relevant market stakeholders.¹⁴¹ During that time, financial innovation did not seem to be so invasive that the applicability of financial regulations might be influenced.¹⁴² By following the underlying ideas of the claims aforementioned,¹⁴³ this Section tries to explain what are the rationales supporting financial regulations, what are the objectives they aim to achieve, and why the financial regulations functioned well when dealing with market failures. In fact, similar to any other markets, financial markets are sometimes prone to malfunctions as the last financial crisis revealed.¹⁴⁴ However, this Section does not aim to provide a definitive study of the whole financial regulations but rather to establish a theoretical foundation by which the analysis of blockchain technology could be supported.¹⁴⁵

¹⁴¹ Judge, *supra* note 135, at 427; GARY B. GORTON, MISUNDERSTANDING FINANCIAL CRISES: WHY WE DON'T SEE THEM COMING 4, 7-8 (2012).

¹⁴² *See id.* at 133.

¹⁴³ Judge, *supra* note 135, at 427-35.

¹⁴⁴ *See* JOHN ARMOUR, DAN AWREY, PAUL DAVIES, LUCA ENRIQUES, JEFFERY N. GORDON, COLIN MAYER & JENNIFER PAYNE, PRINCIPLES OF FINANCIAL REGULATION 51-52 (2016). Departing from the imagination of a perfect world, deficiencies exist in the real world to hinder the socially optimal state to be achieved in the market system. ROBERT COOTER & THOMAS ULEN, LAW & ECONOMICS 38 (6th ed. 2012). To describe it in a more detailed way, these deficiencies exist in the real world where the market system is not able to advance economic welfare. Put another way, the allocative efficiency could not be achieved. It happens due to the fact that the essential conditions are not hold, and what makes them not hold are described as market failures. *Id.* at 38-42; ANTHONY I. OGUS, REGULATION: LEGAL FORM AND ECONOMIC THEORY 15-16, 23-24 (Hart Publ'g 2004) (1994).

¹⁴⁵ There is a great deal of literature studying the general rationales for financial regulations. What I stress in this Chapter is the changes brought by innovative technology in the modern finance. For instance, Goodhart et al. (1998) discusses three reasons for public sector regulation. These reasons include consumer protection against monopolies, providing protection to smaller and less-informed participants, and financial stability. Sustaining financial stability and providing protection to certain participants were also viewed as the objectives. And regulation takes place where market imperfection and failures exist. *See* GOODHART ET AL., *supra* note 131, at 2-4, 62-67, 190-92. This early literature reviews several reasons for financial regulation but did not explicitly specify the market imperfections and failures.

Section 2.1 illustrates different traditional financial markets and their distinctive features. Section 2.2 and Section 2.3 respectively describe the money market and the capital market through the lens of complexity. The later studies about how blockchain technology brings changes in complexity,¹⁴⁶ and whether the traditional financial regulation fits the new markets that are based on blockchain technology, are based on these two sections.¹⁴⁷ Section 2.4 studies the emergence of blockchain-based financial markets by discussing its features that are distinctive from traditional financial markets. Section 2.5 summarizes.

2.1 A Spectrum of the Financial Instruments and the Traditional Financial Markets before the Emergence of Blockchain Technology

The description of the strategies in financial regulations starts from a broad picture that explains the nature of two types of traditional markets. These two markets are: the money market, where financial intermediaries such as banks play an important role in its functions, and the capital market, where the capital demanders raise funds through different longer-term instruments such as securities.¹⁴⁸ The spectrum before the emergence of

Benston (1998) further examines more justifications for financial regulation and especially pointed out some sources of negative externalities. The justifications included benefits for government, negative externalities, consumer protection, interests of government officials, and benefits to the regulated institutions. The possible negative externalities could happen from imposing costs on non-contracting third parties, solvent financial institutions' runs, failures and collapses of the financial system, imposing costs to taxpayers due to the failure of institutions insured by the government, imposing high information costs of using financial instruments, and poorly served borrowers by the bad financial services providers. GEORGE J. BENSTON, *REGULATING FINANCIAL MARKETS: A CRITIQUES AND SOME PROPOSALS* 28-29, 33-52 (1998). The above negative externalities, in fact, seem to be described on the basis of systemic issues. A recent literature studies the modern regulation by separating rationales and objectives and linking them together. *E.g.*, ARMOUR ET AL., *supra* note 144, at 55-69; ROBERT BALDWIN, MARTIN CAVE & MARTIN LODGE, *UNDERSTANDING REGULATION: THEORY, STRATEGY, AND PRACTICE* 17-24 (1st ed., 2012).

¹⁴⁶ See *infra* Section 3.2.

¹⁴⁷ See *infra* Section 4.2.

¹⁴⁸ MISHKIN, *supra* note 134, at 73, 75.

blockchain is illustrated as the following figure.¹⁴⁹ Firstly, this is based on Mehrling's study in 2012 that distinguished financial instruments in a hierarchal way. In the original setting, the instruments range from gold, which is the safest because of its insensitivity to information, to securities, which are sensitive to information and prone to fluctuation.¹⁵⁰ However, the original setting is adjusted here to a horizontal way in order to emphasize the changes brought by technology. Secondly, two distinctive markets – the money market and the capital market – and their features are sketched by this spectrum in an over-simplified way.¹⁵¹ The money market is characterized as the marketplace where obfuscation might be workable and thereby obviates the need for discovering price.¹⁵² In comparison with that, the capital market such as the stock market, is characterized by the emphasis of the transparency of information about the price.¹⁵³ Those features are based on Holmström's study in 2015.¹⁵⁴

¹⁴⁹ This figure is illustrated on the basis of some studies regarding the nature of money, financial instruments, and the relative financial markets. However, the figure I re-draw is presented in a format of spectrum to lay the foundation for the later analysis with respect to blockchain. See Holmström, *supra* note 136, at 5; Perry Mehrling, *The Inherent Hierarchy of Money* 1 (2012), https://ieor.columbia.edu/files/seasdepts/industrial-engineering-operations-research/pdf-files/Mehrling_P_FESeminar_Sp12-02.pdf.

¹⁵⁰ See *id.*; Hossein Nabilou & André Prüm, *Ignorance, Debt and Cryptocurrencies: The Old and New in the Law and Economics of Concurrent Currencies*, 5 J. FIN. REG. 29, 57 (2019).

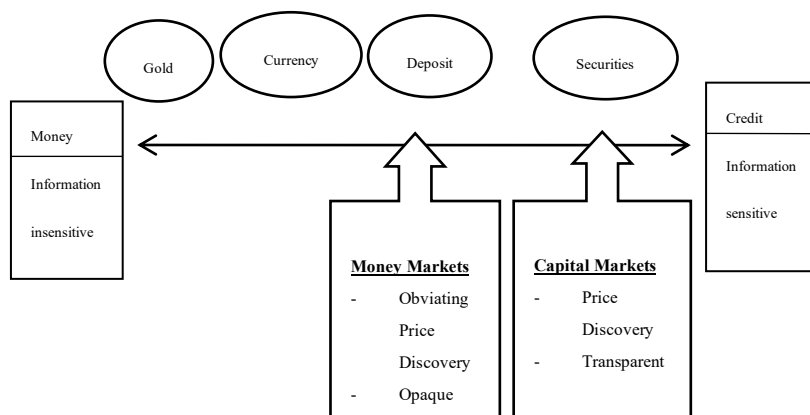
¹⁵¹ Debts are traded in the money market, and deposits exemplify debts as they are considered as the liabilities for banks. In fact, debts encompass different types, and the instruments in the capital market are not only securities. However, my intention of establishing this spectrum is to give an abstract foundation for explaining the role played by blockchain technology in creating new instruments and markets. A similar study which analyzes cryptocurrencies based on the hierarchy established by Mehrling, see generally Nabilou & Prüm, *supra* note 150.

¹⁵² Holmström, *supra* note 136, at 5-6.

¹⁵³ *Id.* at 6-7.

¹⁵⁴ *Id.* at 5-7.

Figure 3: The Spectrum of the Financial Instruments and the Traditional Financial Markets before the Emergence of Blockchain Technology



Source: inspired by and re-illustrated from Holmström, *supra* note 136, at 5; Mehrling, *supra* note 149, at 1.¹⁵⁵

2.2 The Money Market

2.2.1 Theory of Financial Intermediation

The descriptive analysis here departs from the theory of financial intermediation to explain how financial regulation functions in the money market. In the following discussions, banks and the banking regulation are the examples. The financial institutions that participate in the financial intermediation process have been recognized as the intermediaries addressing the informational problems that direct financing markets cannot

¹⁵⁵ This spectrum is inspired by these two studies but modified and re-illustrated by this Author.

resolve.¹⁵⁶ These financial institutions, such as banks, play an important role in matching both lenders' and borrowers' needs for liquidity.¹⁵⁷

In generally, intermediaries are said to be able to satisfy the demand of both lenders and borrowers based on their cost advantage. This advantage is mainly in relation to the intermediaries' ability to collect the information regarding loans and monitoring the loan contracts on behalf of the lenders.¹⁵⁸ To be clear, without financial intermediaries such as banks, the efforts of each lender engaging in collecting information and monitoring would be increased, or there would be a free-rider problem and no lenders would be willing to collect information.¹⁵⁹ The opportunity costs faced by a firm that invests in projects are thus reduced by turning to a financial intermediary because of the cost advantage it has.¹⁶⁰ Furthermore, the process of matching the supply and demand of credits could be seen as an exchange of financial resources. An efficient allocation of financial resources could therefore make the aggregate economy productive.¹⁶¹ By providing liquidity to both lenders and borrowers based on the expertise in collecting information and monitoring activities, banks ultimately help socially valuable functions of the market such as enhancing credit provision and facilitating transactions and liquidity.¹⁶²

These financial intermediaries serve as a vehicle for dealing with information in the money market in the way that suits the informational

¹⁵⁶ See, e.g., Douglas W. Diamond, *Financial Intermediation and Delegated Monitoring*, 51 REV. ECON. STUD. 393, 393 (1984); Douglas W. Diamond & Raghuram G. Rajan, *Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking*, 109 J. POLITICAL ECON. 287, 288-89 (2001); Alessio M. Paces, *Financial Intermediation in the Securities Markets Law and Economics of Conduct of Business Regulation*, 20 INT'L REV. L. & ECON. 479, 481 (2000).

¹⁵⁷ See Diamond & Rajan, *supra* note 156, at 289.

¹⁵⁸ See *id.*

¹⁵⁹ Diamond, *supra* note 156, at 393.

¹⁶⁰ See BENGT HOLMSTRÖM & JEAN TIROLE, INSIDE AND OUTSIDE LIQUIDITY 21-22 (2011).

¹⁶¹ See Paces, *supra* note 156, at 479.

¹⁶² See Diamond & Rajan, *supra* note 156, at 287; Judge, *supra* note 141, at 423.

specialty of this market. The money market has been considered as a market where relevant information is scarce, whereas, for instance, the capital market is rich in information.¹⁶³ It is also stated that this informational characteristic is related to the nature of this market. The instruments in this market are said to be short-term and low-variance, and hence market participants have little incentives to discover and produce private information.¹⁶⁴ Collaterals could also be used to secure the participants.¹⁶⁵ Therefore, it may not be necessary for this market to be totally transparent with respect to information. That is, a state of “symmetric ignorance” where no party has an informational advantage can possibly enable the market to escape from the adverse selection problem.¹⁶⁶ Therefore, the lending market can be explained as a market where circumventing price discovery is desirable.¹⁶⁷ In this sense, financial institutions support the money market by making price discovery unrewarding for market participants.¹⁶⁸ With banks, the money market and the banks themselves are optimally opaque.¹⁶⁹

2.2.2 Complexities in the Money Market

After describing money markets on the basis of the financial intermediation theory and its informational specialties, this Section identifies the complexities in this market. These complexities, more importantly, will be linked with the market failures and the corresponding financial regulation.¹⁷⁰

¹⁶³ E.g., Holmström, *supra* note 136, at 6, 7; Judge, *supra* note 141, at 423-24.

¹⁶⁴ *Id.* at 424; Holmström, *supra* note 136, at 6.

¹⁶⁵ See HOLMSTRÖM & TIROLE, *supra* note 160, at 7.

¹⁶⁶ Holmström, *supra* note 149, at 6. This state, nevertheless, can be broken in the case that some traders can explain public information better and gain an informational advantage that generates adverse selection problems. *Id.*

¹⁶⁷ See *id.* at 5; Gary Gorton, *The Development of Opacity in U.S. Banking*, 31 YALE J. ON REG. 825, 826-27 (2014).

¹⁶⁸ See Judge, *supra* note 135, at 425.

¹⁶⁹ Gorton, *supra* note 167, at 827.

¹⁷⁰ See *infra* Section 2.2.3 and Section 2.2.4.

The concept of complexity has been employed in the field of financial regulation after the financial crisis as it is capable of identifying the risks in the modern finance and helping to monitor them better.¹⁷¹ Complexities in financial markets arise in response to the financial consumers' demand in terms of, for example, their changing preference, an appetite for higher yields, or a gambling motivation.¹⁷² On the supply side, the rise of financial complexities reflects the product and/or service providers' desire for greater profits and their response to the increasing competition in the market to make their price disclosure opaque.¹⁷³ As complexities in the financial markets mirror the needs of different market participants, they are considered to add efficiency and depth to the markets.¹⁷⁴ Lower-cost financing, for example, is offered because more alternative financing ways, which are reputed to be complex, are obtainable.¹⁷⁵

Nevertheless, the darker side of the complexities in financial markets may spoil the markets in several ways.¹⁷⁶ In the money market, complexities manifest themselves as the complexities shown at, but not limited to, a transactional and an institutional level.¹⁷⁷ First, both the greater scale of the financial intermediaries and the large number of transactions which they conduct add complexities of these intermediaries, and the increasing complexities pose potentially negative impacts on the market.¹⁷⁸ For example, while the rise of large banks could bring value to the whole

¹⁷¹ See Battiston, *supra* note 118, at 818.

¹⁷² E.g., Schwarcz, *supra* note 118, at 213-14; Claire Célérier & Boris Vallée, *What Drives Financial Complexity? A Look into the Retail Market for Structured Products 2* (July 1, 2013), <https://ssrn.com/abstract=2082106>; Claire Célérier & Boris Vallée, *The Motives for Financial Complexity: An Empirical Investigation* 28 (Oct. 27, 2014), <http://bogan.dyson.cornell.edu/ibhf/docs/Symposium%20Papers/FinancialComplexity.pdf>.

¹⁷³ See Bruce I. Carlin, *Strategic Price Complexity in Retail Financial Markets*, 91 J. FIN. ECON. 278, 279 (2009).

¹⁷⁴ Schwarcz, *supra* note 118, at 214.

¹⁷⁵ See *id.* at 213-14.

¹⁷⁶ *Id.* at 214.

¹⁷⁷ See Baxter, *supra* note 138, at 861-63; Utset, *supra* note 138, at 799-801.

¹⁷⁸ *Id.* at 801; Baxter, *supra* note 138, at 848.

market,¹⁷⁹ some costs are posed. These costs are associated with the inherent diverse business of these large banks such as their financial products, which are viewed as a source of risks because of their complication that makes it more difficult to identify and monitor risks.¹⁸⁰ Second, the transactions of these large banks are said to be highly complex as multiple counterparties and pools of collaterals are involved, and this makes them difficult to monitor and value.¹⁸¹ Moreover, financial institutions' assets and liabilities are sometimes non-transparent,¹⁸² and often relying on a large number of customers and depositors by using complex contracts.¹⁸³ After identifying the complexities existing in the money market, the next Section describes how market failures result from them.

2.2.3 Complexities Contribute to Market Failures in the Money Market

According to commentators, complexities in financial markets contribute to market failures.¹⁸⁴ In the wake of the financial crisis, the failures of the money market, which are especially associated with negative externality and moral hazard, are considered to arise from the institutional and transactional complexities. In the following discussions, the failures in

¹⁷⁹ According to Baxter, the rise of big banks adds value as they bring positive impacts on the efficiency in terms of financial institution because the larger and more diversified banks are considered to perform better than smaller banks from a profitability perspective. *Id.* at 803. Regarding the history and reasons about the rise of big banks, *see id.* at 788-801.

¹⁸⁰ *See id.* at 838. For example, the structured products, which are investment vehicles based on a pool of underlying assets and utilizing special-purpose vehicles, increase complexity as the underlying assets are too complex to identify and monitor the risks. *See Schwarcz, supra* note 118, at 213-14, 216; MISHKIN, *supra* note 134, at 321. Regarding the explanation for structured finance or securitization, *see generally* Steven L. Schwarcz, *The Alchemy of Asset Securitization*, 1 STAN. J.L. BUS. & FIN. 133 (1994).

¹⁸¹ Baxter, *supra* note 138, at 801.

¹⁸² For instance, financial institutions often possess liabilities that are outside of their financial statements. *Id.* at 800.

¹⁸³ The assets relying on a large number of individual and institutional customers are, for instance, loans. The typical liabilities involving a large number of individuals are deposits. *See id.* at 799-800.

¹⁸⁴ *See generally* Schwarcz, *supra* note 118.

the money market are described, and then how they are caused by the institutional and transactional complexities will be explained.

The market failures in the money market are reflected by the financial crisis. That is, notwithstanding that banks facilitate the liquidity provision in the money market, banks are vulnerable to runs.¹⁸⁵ Hence, it partly justifies the banking regulation.¹⁸⁶ Bank runs can be explained in different ways. For instance, the costs of the opacity of banks contribute to runs. That is, in order to be efficiently traded as money in the market, the short-term debts produced by banks should be traded at par without any suspicion that they would be worth less than the face value; thus, the value of the backing assets should remain secret.¹⁸⁷ However, the cost of this opacity is that the backing assets are not free from risks in the event of a bank run because the holders would become skeptical about the value of the debt when an unexpected event happens to possibly affect the economy.¹⁸⁸ Another way to explain bank runs is the coordination problem. That is, a large number of debt holders would have the incentive to rush to be first when an unexpected event occurs.¹⁸⁹ A panic regarding multiple bank failures results in a disruption of the whole system and a reduction in production.¹⁹⁰

Thus, the fragility of the system and possible externalities affecting the rest of the economy are grounds for regulation. To ensure financial stability should be considered as an imperative goal and never be compromised. The importance of financial stability was accentuated in the wake of the financial

¹⁸⁵ According to Gorton, a defining feature of a bank run is that a great number of customers of a bank demand a large scale of cash at the same time, and thus the banking system is not able to meet such demand. Consequently, the banking system is insolvent and not capable of fulfilling contractual debt obligations for the cash-demanding customers. Gorton, *supra* note 141, at 32.

¹⁸⁶ See, e.g., Gorton, *supra* note 167, at 827.

¹⁸⁷ *Id.*

¹⁸⁸ *Id.*

¹⁸⁹ See Judge, *supra* note 135, at 426; Douglas W. Diamond & Philip H. Dybvig, *Bank Runs, Deposit Insurance, and Liquidity*, J. POLITICAL ECON. 401, 401-2 (1983).

¹⁹⁰ *Id.* at 402.

crisis. To be clear, the reason why externalities have been emphasized in financial regulation literature is that systemic risks, which have been identified especially after the financial crisis, epitomize negative externalities.¹⁹¹ In particular, the problems of negative externalities are associated with a feature of modern financial markets – interconnectedness because of the interconnection of their assets and liabilities.¹⁹² In addition to the negative externalities, financial stability may also be threatened by other market malfunctions caused by the problems stemming from moral hazard.¹⁹³ The systemic issues also arise when moral hazard, which is associated with the protection arrangements provided by the government, happens.¹⁹⁴ In fact, notwithstanding the problems of negative externalities and moral hazard aforementioned, regulation is not sustained. Yet, in the financial market where complex transactions are involved, it was stated that private solutions are not perfect.¹⁹⁵ In a situation such as the financial crisis where a great number of individuals are involved, private solutions through negotiation are said to be expensive or not feasible.¹⁹⁶

¹⁹¹ ARMOUR ET AL., *supra* note 144, at 59. In other words, when the social costs of the failure of banks exceed private costs and these social costs are not incorporated in the banks' decision making, regulation is justified. *See id.* at 57-58.

¹⁹² *See id.* at 76-77.

¹⁹³ *See* ARMOUR ET AL., *supra* note 144, at 59; Lawrence B. Lindsey, *The CRA as a Means to Provide Public Goods*, in REVISITING THE CRA: PERSPECTIVES ON THE FUTURE OF THE COMMUNITY REINVESTMENT ACT 160, 161-62 (2009).

¹⁹⁴ For instance, the safety net arrangements for banks such as lender-of-last-resort (LOLR) would possibly pose serious moral hazard problem that induces "bad" banks to excessive risk-taking behavior in the sense that they would be protected and supported by LOLR. Kevin Dowd, *The Case for Financial Laissez-Faire*, 106 E.J. 679, 683 (1996); GOODHART ET AL., *supra* note 131, at 10-11. Moral hazard happens when both banks and consumers are taking more risky activities. Banks are induced to do so because they are protected by some governmental arrangements; meanwhile, consumers are more likely to choose higher-risks banks in seek of higher returns because they can be protected notwithstanding. *See* Andy Mullineux, *Banking for the public good*, 36 INT'L REV. FIN. ANALYSIS 87, 88 (2014); MISHKIN, *supra* note 134, at 264. Either the externalities or the moral hazard from banks' risk-taking behavior makes it more likely to impose costs on the society.

¹⁹⁵ *See* OGUS, *supra* note 144, at 27-28.

¹⁹⁶ ARMOUR ET AL., *supra* note 144, at 58-59. It is related to the Coase theorem. *See* R. H. Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1, 27 (1959); R. H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 8 (1960); R.H. Coase, *The Nature of the Firm*, 4 ECONOMICA 386, 390 (1937); GEORGE J. STIGLER, *THE THEORY OF PRICE* 120 (4th ed. 1987). There is a great deal of relevant literature discussing and

The market failures described above are relevant to the complexities in this market. Firstly, as the institutional complexities of financial institutions encompass the non-transparency of their assets and liabilities, the interconnectedness among them, and the increasing scale of them, one single failure of an institution could cause cascading failures through a contagion effect.¹⁹⁷ Secondly, the transactional complexities, which are in relation to the financial products and the transactions of them, compound the situation described above. These complex transactions and products worsen adverse selection and moral hazard problems by obfuscating the monitoring and assessment of their risks.¹⁹⁸ To sum up, the excessive complexity in the financial markets may imply instability.¹⁹⁹

2.2.4 Regulating the Complexities in the Money Market

Based on the analysis above, the picture of the money market has been illustrated. That is, the money market is characterized as information sparse, that participants have little incentives to discover information,²⁰⁰ and that the institutional and transactional complexities triggering market failures exist in this market.²⁰¹ This Section explains how the traditional financial

explaining the Coase theorem. For example, Calabresi (1968) argued that the misallocation of resources could be overcome in the market by bargains if the assumptions of rationality and zero transaction costs hold. Guido Calabresi, *Transaction Costs, Resource Allocation, and Liability Rules: A Comment*, 11 J.L. & ECON. 67, 68 (1968). Polinsky (1974) claimed that the structure of law does not matter in the case that transaction costs are zero because efficiency could be achieved. If it could not due to high transaction costs, the law then should be designed to minimize the costs. A. Mitchell Polinsky, *Economic Analysis as a Potentially Defective Product: A Buyer's Guide to Posner's "Economic Analysis of Law"*, 87 HARV. L. REV. 1655, 1665 (1974).

¹⁹⁷ See, e.g., Baxter, *supra* note 138, at 848-49, 858-59.

¹⁹⁸ See, e.g., *id.* at 861-62; Schwarcz, *supra* note 118, at 222-23; MISHKIN, *supra* note 134, at 321.

¹⁹⁹ Andrew G. Haldane & Robert M. May, *Systemic Risk in Banking Ecosystems*, 469 NATURE 351, 351 (2011).

²⁰⁰ See *supra* Section 2.2.1.

²⁰¹ See *supra* Section 2.2.2 and Section 2.2.3.

regulation has dealt with these complexities, and banking regulation is the example.²⁰²

In contrast to the regulatory regime stressing full disclosure such as securities regulation, banking regulators seem inclined to prevent the panics among investors due to adverse information.²⁰³ Therefore, banking regulation can be explained from a perspective related to information – this regulatory system is designed to fit the money market that is characterized as the discovery of information is not of vital importance. According to commentators, banking regulation limits the degree of information production which would be undertaken by the capital providers otherwise.²⁰⁴ Yet, the banking system is tightly regulated by several forms of regulation, which include entry requirements, governance rules, prudential requirements and resolution.²⁰⁵ Through extensive monitoring and supervision, it is the responsibility of banking regulators to gather and analyze information relevant to the risks of banks' activities, but that information is kept confidential.²⁰⁶ Banking regulation, in other words, tries to match the nature of the money market where it is crucial to the obviation of market participants' need to discover prices.²⁰⁷

²⁰² This Section, however, focuses on the conceptual description regarding how the regulatory regimes respond to the complexities in the money market rather than analyzes every single regulatory technique and the effectiveness of them.

²⁰³ See, e.g., Judge, *supra* note 135, at 430-31; John C. Coffee, Jr. & Hillary A. Sale, *Redesigning the SEC: Does the Treasury Have a Better Idea?*, 95 *VIR. L. REV.* 707, 778 (2009); Gorton, *supra* note 167, at 826.

²⁰⁴ Judge, *supra* note 135, at 433.

²⁰⁵ ARMOUR ET AL., *supra* note 144, at 287-88. In brief, entry requirements are employed when financial institutions apply for banking licenses by requiring certain structure of the institution. *Id.* at 287. Governance rules relate to the structures and processes to fit the function of banks. For instance, rules are imposed to seek the good corporate governance of the bank. *Id.* at 288, 370. Prudential rules include capital regulation and liquidity regulation to address the risks stemming from banks' activities. That is, to address the risks of their short-term liabilities but medium- and long-term assets, the higher the level of capital and liquid assets is important. *Id.* at 290-91.

²⁰⁶ Judge, *supra* note 135, at 435.

²⁰⁷ See *id.*; Holmström, *supra* note 149, at 5.

In addition, on the basis of the informational characteristic, the post-crisis regulations applied in the money market are said to be able to respond to the failures stemming from complexities insofar as these regulations incorporate the understanding of the complexities in the financial markets.²⁰⁸ From the perspective of complexity, conventional concepts such as “too big to fail” regarding the scale of financial institutions are not sufficient to describe modern financial markets. Thus, since complexities may undermine the market, the concept “too complex to fail” seems to be so important that it merits regulators’ attention.²⁰⁹ Put another way, complexity has become an important indicator when assessing the risks in the financial markets after the financial crisis.²¹⁰

This Section described how financial regulation such as banking regulation helps the operation of the money market by making the market opaque and responds to the complexities in the market. The issue of how the blockchain-based markets is framed in a similar way that the need for stakeholders to discover the information may be removed, will be studied.²¹¹

²⁰⁸ See Baxter, *supra* note 138, at 852-53. According to commentators, Basel III is an example that the post-crisis financial regulation addresses the failures of the market from a different point of view on the basis of the understanding of complexities. See *id.* These regulations were set to mitigate the systemic risk problem by improving financial institutions’ abilities to absorb shocks from financial and economic stress. BASEL COMM. ON BANKING SUPERVISION, BASEL III: A GLOBAL REGULATORY FRAMEWORK FOR MORE RESILIENT BANKS AND BANKING SYSTEMS 1 (2010), <https://www.bis.org/publ/bcbs189.pdf>. In response to the global financial crisis of 2008, the Basel Committee (Basel Committee on Banking Supervision, “Basel Committee”) developed a regulatory framework aiming to strengthen the supervision of banks in order to ensure and promote the resilience of banking sector. This regulatory framework, Basel III, was introduced in 2010 and revised in 2011 and 2017. In general, Basel III raises the quality and quantity of the regulatory capital bases and enhance the risk coverage of the capital framework. *Id.* at 1-2.

²⁰⁹ See John Kay, *Complexity, not size, is the real danger in banking*, FIN. TIMES (Apr. 12, 2016), <https://www.ft.com/content/5c2a416e-000f-11e6-99cb-83242733f755>.

²¹⁰ For instance, when identifying global systemically important financial institutions (“G-SIFIs”), the level of the complexity of the financial institutions is one of the indicators in Basel Committee’s approach. See Baxter, *supra* note 138, at 852-53; BASEL COMM. ON BANKING SUPERVISION, GLOBAL SYSTEMICALLY IMPORTANT BANKS: UPDATED ASSESSMENT METHODOLOGY AND THE HIGHER LOSS ABSORBENCY REQUIREMENT 5-8 (July 2013), <https://www.bis.org/publ/bcbs255.pdf>.

²¹¹ See *infra* Section 4.1.

2.3 The Capital Market

2.3.1 The Nature of the Capital Market

In addition to the banking system in the money market, another traditional way to channel funds from providers to demanders is through the capital market. In both markets, a socially useful fundraising function of the financial markets could be achieved.²¹² As described in Section 2.2, the money market has been characterized as a system where transparency is not emphasized. By contrast, the capital market relies on disclosure to incentivize the market participants. In the following section, the securities market is the example for discussing the nature of the capital market and the corresponding regulation.

The securities market has been considered as a system to, on the one hand, share and allocate risk in a multilateral setting.²¹³ The first stock market was established in Amsterdam to share the risk involved in the voyages to the Far East.²¹⁴ On the other hand, securities are the instruments for the investors to look forward to future profits. In other words, this type of instruments is treated as an investment. In comparison to the money market, the capital market relies on information to discover the price because the profits are not limited and the risks could be huge.²¹⁵ This nature of capital markets contributes to the market participants' incentives to acquire information and the fact that capital markets are information-rich.²¹⁶ In addition, the instruments such as securities in capital markets are information sensitive, whereas debts such as deposits in the money market are less

²¹² See Judge, *supra* note 135, at 413.

²¹³ Holmström, *supra* note 149, at 6-7.

²¹⁴ *Id.* at 6.

²¹⁵ See *id.* at 3, 6-7; Judge, *supra* note 135, at 420.

²¹⁶ *Id.*; Holmström, *supra* note 149, at 7.

information sensitive.²¹⁷ The fundamental efficiency of the public equity market was explained in a sense that it depends on some informational factors such as the costs of information, the distribution of information, and the costs of trading information.²¹⁸

2.3.2 Complexities in the Capital Market

Complexities exist in the capital market as well. On the basis of the characteristic of the capital market in which participants have the incentive to acquire and analyze information, however, complexities appear to increase the costs incurred by the participants when doing so.²¹⁹ In fact, studies analyzing the complexities in the capital market have focused on the financial instruments and the transactions of them that are beyond money claims.²²⁰ For instance, the complexities of the securitization products such as asset-backed securities (“ABSs”), which are an example of financial innovation, have been discussed.²²¹ Therefore, it seems that the complexities in the capital market have been at, among others, an instrumental level particularly because of these financial products.²²²

²¹⁷ See *id.*; Mehrling, *supra* note 149, at 1-2.

²¹⁸ Ronald J. Gilson & Reinier H. Kraakman, *Market Efficiency after the Financial Crisis: It's Still a Matter of Information Costs*, 100 VIR. L. REV. 313, 317, 329-30 (2014).

²¹⁹ See Dan Awrey, *Complexity, Innovation, and the Regulation of Modern Financial Markets*, 2 HARV. BUS. L. REV. 235, 243 (2012).

²²⁰ See, e.g., *id.* at 255; Judge, *supra* note 135, at 441-42; Judge, *supra* note 118, at 677-80.

²²¹ ABSs are the product of securitization, and they refer to the securities that are backed by assets excluding mortgage loans. Schwarcz, *supra* note 118, at 220. Other securitization products mentioned in the literature include, but not limited to, collateralized debt obligations (“CDOs”) referring to the securities backed by a pool of assets mixed with, for instance, mortgage loans and other financial assets. *Id.* In general, securitization is the idea that financial assets such as mortgages, consumer loans, and account receivables are transferred by the owners to special purpose entities (“SPEs”). Then the SPEs issue financial instruments that are backed by financial assets. COFFEE & SALE, *infra* note 239, at 19.

²²² The term “instrumental level” is used in this Chapter, and it is especially in relation to the financial products. According to commentator, complexities exist at the level of financial products. Baxter, *supra* note 138, at 861-62.

The complexities of the financial products refer to not only the complex structure of the products themselves but also the complex interaction between these products and the markets.²²³ The complexity of the structure of financial products mirrors the features of modern financial markets as these products contribute to the fragmentation of economic interests.²²⁴ This fragmentation could be found as the structure of conventional financial products is transformed from a bilateral arrangement into a complex web where multiple counterparties are involved.²²⁵ While the new arrangement could enable risks to be redistributed, it also increases the information costs for counterparties.²²⁶ It happens when, for example, an additional amount of information is needed to value the financial products with a degree of certainty,²²⁷ or the complexities impair investors' ability to analyze and understand the risks because of the opacity of these financial products.²²⁸

2.3.3 Complexities Contribute to Market Failures in the Capital Market

Similar to the complexities resulting in market failures in the money market,²²⁹ the complexities of financial products are in relation to the malfunctions of the capital market as revealed by the financial crisis.²³⁰ As described above, the complexities in the capital market could be found at an instrumental and a transactional level due, among other factors, to the fragmentation and opacity that are caused by them. Implicit in this notion is that the information pertinent to the assessment of the risks is unknown.²³¹

²²³ *See id.*

²²⁴ Awrey, *supra* note 219, at 255.

²²⁵ *Id.*; Judge, *supra* note 118, at 676-77.

²²⁶ *E.g.*, Awrey, *supra* note 219, at 255; Schwarcz, *supra* note 118, at 221.

²²⁷ *See id.* at 221.

²²⁸ *See id.* at 252, 222.

²²⁹ *See supra* Section 2.2.3.

²³⁰ *See* Schwarcz, *supra* note 118, at 236.

²³¹ According to Awrey, one of the species of the opacity of financial instruments is the "non-availability of information". Awrey, *supra* note 219, at 251-52.

Prior to the crisis, it has been historically shown that when such important information is not possessed by the market participants,²³² friction in market functioning could possibly be caused.²³³ However, one of the lessons learnt from the crisis is that the malfunctions of the modern financial markets stem from incomplete information that is in relation to either a Knightian uncertainty,²³⁴ or something not fully fitting into either Akerlof's or Knight's frames as argued by a scholar.²³⁵ Most importantly, according to commentators, these instrumental and transactional complexities impair the market functioning as they facilitate incomplete information and thereby frauds, moral hazards and financial contagion are possibly caused.²³⁶

Most importantly, the aforementioned insights in the context of traditional financial markets provide implications for this Chapter. The risks stemming from blockchain technology will be assessed by comparing the financial innovations historically existing in the markets and those created by blockchain technology.²³⁷

2.3.4 Regulating the Complexities in the Capital Market

Given that price discovery is the core of the capital market, the corresponding regulation such as securities regulation serves to facilitate this

²³² *Id.*

²³³ See generally Schwarcz, *supra* note 31. According to Judge, incomplete information does not necessarily aggravate market functioning. Judge, *supra* note 135, at 450.

²³⁴ See Viral V. Acharya, Douglas Gale & Tanju Yorulmazer, *Rollover Risk and Market Freezes*, 66 J. FIN. 1177, 1205 (2011); Katharina Pistor, *A Legal Theory of Finance*, 41 J. COMP. ECON. 315, 316-18 (2013). According to Knight, risk is "the distribution of the outcome in a group of instances is known", while it is not the case for uncertainty because "it is impossible to form a group of instances". FRANK H. KNIGHT, *RISK, UNCERTAINTY AND PROFIT* 233 (Reprints of Econ. Classics, 1964).

²³⁵ A scholar generally had this view. Judge, *supra* note 135, at 418, 448-49. In comparison with the Knightian uncertainty, information is asymmetrically distributed in Akerlof's frame. See generally George A. Akerlof, *The Market for "Lemons": Quality Uncertainty and the Market Mechanism*, 84 Q.J. ECON. 488 (1970).

²³⁶ Regarding the detailed analysis of the relationship between the complexities and these consequences, see Schwarcz, *supra* note 118, at 220-36.

²³⁷ See *infra* Section 3.

nature. Meanwhile, on the basis of this notion, post-crisis financial regulation epitomizes the enhancement of a disclosure regime to address complexities.²³⁸ Generally speaking, securities regulation has been historically emphasizing mandatory disclosure in order to reduce the costs that investors would bear otherwise.²³⁹ The strategies of securities regulation are thus on the basis of the presumed investors' incentives. That is, it is assumed that it is the role of these investors to assess the value of the instruments, and they are incentivized to gather and assess the available information.²⁴⁰ Regulatory intervention is thus justified to the extent that the investors might be exploited due to information problems such as inadequate or inaccurate information about their investments, the inability to assess the quality of financial contracts when purchasing, principal-agent problems due to the inability aforementioned, and the under-investment in information.²⁴¹ In the capital market, the perfect situation that participants are fully informed does not exist.²⁴² The outcomes would be further problems such as an aggregate under-investment in the whole market because of the investors' lower willingness to pay.²⁴³

Capital demanders are said to have inadequate incentives to disclose information because of, for instance, the fear of competition.²⁴⁴ It thus justifies mandatory disclosure because the private costs of disclosure may exceed the social costs, and a lower level of disclosure would be the result of a pure private ordering system.²⁴⁵ In fact, securities regulation serves several purposes, which include but are not limited to ensuring investor and

²³⁸ See Awrey, *supra* note 219, at 288.

²³⁹ See, e.g., JOHN C. COFFEE, JR. & HILLARY A. SALE, *SECURITIES REGULATIONS: CASES AND MATERIALS* 5 (12th ed. 2012); Coffee & Sale, *supra* note 203, at 777-78.

²⁴⁰ Judge, *supra* note 135, at 430.

²⁴¹ ARMOUR ET AL., *supra* note 144, at 62; David T. Llewellyn, *Regulation of Retail Investment Services*, 15 *ECON. AFF.* 12, 13 (1995).

²⁴² See George J. Stigler, *Imperfections in the Capital Markets*, 75 *J. POL. ECON.* 287, 289 (1967).

²⁴³ See COFFEE & SALE, *supra* note 239, at 5.

²⁴⁴ *Id.*

²⁴⁵ *Id.*

consumer protection, assuring financial stability and achieving market efficiency, at an aggregate level.²⁴⁶ To discover the price thus facilitates the allocative efficiency of the market and benefits the whole economy.²⁴⁷ In this sense, it was thought that the social benefits of disclosure are greater than its private benefits, so the high costs of disclosure could be balanced.²⁴⁸ However, it is worth considering the question of whether this view still holds in the new markets created by innovative technology to the extent that the introduction of technology could possibly achieve adequate disclosure without regulatory intervention.

Mandatory disclosure obligations are established in different areas within the securities regulation. For instance, extensive obligations are imposed on the company that engages in fund raising by public offerings. These obligations include a detailed disclosure of the operation, finance, and management of the company. In fact, they have been criticized that they result in high compliance costs with respect to both money and time.²⁴⁹ As mentioned before, this regulatory strategy was traditionally considered as a response to the lack of incentives of capital demanders such as managers in the firm seeking funds.²⁵⁰ However, this long-held disclosure paradigm has been criticized.²⁵¹ Theoretically speaking, modern financial innovations are recognized as a type structured in a way to obscure risks and obviate

²⁴⁶ *See id.* at 2-7.

²⁴⁷ *Id.* at 6.

²⁴⁸ *Id.*

²⁴⁹ *See, e.g.*, STEPHEN J. CHOI & A.C. PRITCHARD, *SECURITIES REGULATIONS: CASES AND ANALYSIS* 410-11, 422-23, 439 (3rd ed. 2012); Steven Bradford, *Crowdfunding and the Federal Securities Law*, 2012 COLUM. BUS. L. REV. 1, 27-28 (2012); OMRI BEN-SHAHAR & CARL E. SCHNEIDER, *MORE THAN YOU WANTED TO KNOW: THE FAILURE OF MANDATED DISCLOSURE* 3 (1st ed. 2014).

²⁵⁰ *See* JAMES D. COX, ROBERT W. HILLMAN & DONALD C. LANGEVOORT, *SECURITIES REGULATION: CASES AND MATERIALS* 237 (8th ed. 2016); Judge, *supra* note 135, at 430.

²⁵¹ It is not the intention here to discuss whether the mandatory disclosure is definitely good or not. For a detailed analysis regarding this debate, *see, e.g.*, Omri Ben-Shahar & Carl E. Schneider, *The Failure of Mandated Disclosure*, 159 U. PENN. L. REV. 647, 665-728 (2011); Schwarcz, *supra* note 118, at 238.

investors' need to have high-quality information.²⁵² Therefore, a regulatory strategy exclusively emphasizing disclosure may be imperfect.

In the sphere of addressing complexities in the capital market, according to commentators, post-crisis regulation seems to be on the appropriate path to addressing complexities. For instance, regulation imposes disclosure requirements on the information regarding the quality of backing assets of financial instruments or requires transactions to be registered in order to enable market participants to assess risks.²⁵³ However, it was argued that addressing complexity through regulation appears to be imperfect.²⁵⁴ From a more conceptual perspective, as the financial instruments and transactions that create complexities are evolving overtime, any regulation of financial innovation will have to deal with the problems that are more fundamental such as defining what is being regulated as either being too narrow or too broad.²⁵⁵ Or designing how to regulate in a way that would either over-simplify or add excessive complexities to regulation.²⁵⁶

2.4 Blockchain-based Financial Markets are Distinctive from Traditional Financial Markets

After framing the regulatory regimes historically applied in both the money market and the capital market respectively in Section 2.2 and Section 2.3, a picture of the paradigms of the traditional financial regulation is illustrated. According to scholars, the money market is regulated on the basis

²⁵² See, e.g., Judge, *supra* note 135, at 442-44; Awrey, *supra* note 219, at 275.

²⁵³ See Awrey, *supra* note 219, at 284-85; Schwarcz, *supra* note 118, at 243.

²⁵⁴ In fact, no solutions are perfect. *Id.* at 242.

²⁵⁵ *Id.* at 244.

²⁵⁶ It is thus in relation to regulatory complexity – either excessively simple or complex regulation could be harmful. See generally PRASANNA GAI, MALCOLM KEMP, ANTONIO SÁNCHEZ SERRANO & ISABEL SCHNABEL, ESRB, REPORTS OF THE ADVISORY SCIENTIFIC COMMITTEE: REGULATORY COMPLEXITY AND THE QUEST FOR ROBUST REGULATION 27 (June 2019), https://www.esrb.europa.eu/pub/pdf/asc/esrb.asc190604_8_regulatorycomplexityquestrobustregulation~e63a7136c7.en.pdf.

that capital providers are minimally informed; for instance, banking regulation, which aims to overcome the challenge of moral hazard and to prevent systemic risks, is based on the characteristic of the money market that the participants have little incentives to acquire information.²⁵⁷ This feature of the money market is thus reflected in banking regulation that imposes extensive oversight emphasizing, for instance, the restrictions limiting the risks that banks can assume and the resolution processes in the event of a failure.²⁵⁸ In addition, these regulatory regimes also facilitate regulators' evaluation of banks' operation, risk exposures and the abilities to respond to distress.²⁵⁹ Whereas, the capital market is regulated on the basis of the capital providers' incentives to gather and analyze information. This feature is mirrored in the corresponding regulation. For example, mandatory disclosure is emphasized in securities regulation.²⁶⁰ The table below summarizes the features of these three markets – the traditional money market, the blockchain-based financial market and the traditional capital market. Explanations follow this table.

²⁵⁷ Judge, *supra* note 135, at 424, 432-33. For examples, while there are a large number of depositors of each bank, none of these depositors have the incentives to monitor the bank performance. ARMOUR ET AL., *supra* note 144, at 287.

²⁵⁸ *See id.* at 279-80, 288, 340-41, 390; Judge, *supra* note 135, at 431.

²⁵⁹ *Id.*; ARMOUR ET AL., *supra* note 144, at 287.

²⁶⁰ Judge, *supra* note 135, at 421, 445; *see also* Edward G. Fox, Merritt B. Fox & Ronald G. Gilson, *Economic Crisis and the Integration of Law and Finance: The Impact of Volatility Spikes*, 116 COLUM. L. REV. 325, 326 (2016).

Table 1: The Characteristics of the Three Markets

Money Market	Blockchain-based Market	Capital Market
Obviating price discovery (by, e.g., collaterals)	Truth discovery (by consensus mechanisms)	Price discovery (by, e.g., the risk of losses and the desire to maximize profits)
Participants have few incentives to acquire information	Participants have few incentives to acquire information	Participants have few incentives to acquire information
Opaque (because of the features of the instruments)	Transparent within the system (because of the technology)	Transparent (regulation emphasizes mandatory disclosure)
Information insensitive	(External) information sensitive; (Internal) information transparency	Information sensitive
Centralization	Decentralization	Centralization

Firstly, the technical transparency is considered as the main reason why the blockchain system could be a truth-discoverer.²⁶¹ In other words, this truth-discovery engine helps participants to establish common knowledge.²⁶² The common knowledge between participants within the blockchain system

²⁶¹ See Davidson et al., *supra* note 314, at 5.

²⁶² See Nabilou & Prüm, *supra* note 150, at 43.

ensures that a significant amount of information regarding the price is provided.²⁶³ This truth-discovery mechanism is established by the technical elements creating consensus between the users.²⁶⁴ This feature is distinctive from either the money market, which is characterized by the structure of instruments that obviates the need to discover the price, or the capital market, which is also characterized by the structure of instruments that incentivizes price discovery.²⁶⁵

Secondly, further to the above features of each market, the informational incentives of the participants in each market are different. Given that blockchain technology renders the system transparent by revealing the truth, participants theoretically have few incentives to acquire information.²⁶⁶ This shares the same general characteristic of the money market and its instruments that are structured to obviate the need for participants to acquire and analyze information.²⁶⁷ However, blockchain technology achieves that by creating technical transparency rather than vagueness. This, nevertheless, differs from the participants in the capital market who are incentivized to acquire and analyze information.

Thirdly, the combination of the above two features raises concern about the applicability of the traditional financial regulation to the innovative capital market. For example, the traditional securities regulation has worked well in the capital market because the participants have incentives to acquire

²⁶³ A perfect capital market is characterized as the one in which prices are fundamentally and informationally efficient. Gilson & Kraakman, *supra* note 218, at 318.

²⁶⁴ This consensus mechanisms vary in different blockchain technology application. Bitcoin, for instance, applies “proof-of-work”, which refers to an authentication mechanism that a node producing a block should prove that it has contribute enough computing resources to solve a mathematical puzzle. Michael Crosby, Nachiappan, Pradan Pattanayak, Sanjeev Verma & Vignesh Kalyanaraman, *BlockChain Technology: Beyond Bitcoin*, 2 APPLIED INNOVATION REV. 6, 11 (2016).

²⁶⁵ Regarding the details of these features of the money market and the capital market. *See supra* Section 2.2.1 and Section 2.3.1.

²⁶⁶ *See* Nabilou & Prüm, *supra* note 150, at 45.

²⁶⁷ *See* Judge, *supra* note 135, at 439.

information. Thus, it has emphasized mandatory disclosure on the basis of the rationale that issuers are the lowest cost producers of information.²⁶⁸ However, since the innovative financial markets such as STOs are technically transparent due to the nature of blockchain technology, and participants may have few incentives to acquire and analyze information, these features may impair mandatory disclosure to which the transactions might be subject. In other words, it is possible that blockchain technology could make the price more informationally efficient without regulatory intervention.²⁶⁹

Fourthly, while the innovative capital market shares similar features to the traditional money market with respect to informational incentives, instruments in both the innovative money market and the innovative capital market are considered to be more information sensitive.²⁷⁰ This feature is common in the traditional capital market. This feature reflects that the instruments in the innovative money market need to be less information sensitive in order to be widely accepted.²⁷¹

Lastly, while traditional markets involve central parties, the blockchain-based markets are decentralized. However, it does not mean that there are no intermediaries involved in the blockchain-based markets. Some mediums remain.²⁷² Decentralization together with the truth-discovery mechanism render the blockchain-based financial markets distinctive in a sense that the need for trust is diminished through the authentication processed by decentralized parties rather than one single central party.²⁷³

²⁶⁸ *Id.* at 471.

²⁶⁹ According to commentators, “the prices set in the stock market are ‘efficient’ in the sense that they embody all available information”. Benjamin M. Friedman & David I. Laibson, *Economic Implications of Extraordinary Movements in Stock Prices*, 2 BROOKINGS PAPERS ON ECON. ACTIVITY 137, 138 (1989).

²⁷⁰ See Nabilou & Prüm, *supra* note 150, at 57-58.

²⁷¹ See *id.*

²⁷² Awrey & van Zwieten, *supra* note 298, at 797.

²⁷³ See Zetzsche et al., *supra* note 409, at 1367.

2.5 Summary

This Section illustrated the nature of traditional financial markets and how traditional financial regulation such as banking and securities regulations works in it. Firstly, complexities have existed in both the money market and the capital market. Complexities result in market failures therein, and regulation has historically dealt with them. Secondly, while the money market is deemed to be characterized by the structure of instruments that obviates the need to discover the price, price discovery is stressed when describing capital markets. Regulations in the money market and the capital market are said to be built on the basis of these characteristics and work well within the parameters.

However, the situation described above might be altered due to the application of technology to financial markets such as blockchain technology applications. This Section studied the question of how blockchain-based financial markets are distinctive from traditional markets. The changes in complexity brought by it will be analyzed in Section 3. According to the studies and arguments regarding the technical nature of blockchain technology, the markets based on it would possibly be a truth discovery mechanism.²⁷⁴ Thus, participants might have fewer incentives to acquire information.²⁷⁵ This endogenous information transparency is established by the technology itself. Nonetheless, the instruments based on it are said to be more sensitive to information, and their prices are more volatile.²⁷⁶ In addition, it is likely that the blockchain-based financial markets could operate without a centralized party, but some mediums still remain.²⁷⁷ Therefore, this Section found that blockchain-based financial markets and

²⁷⁴ See Davidson et al., *infra* note 314, at 5.

²⁷⁵ See Nabilou & Prüm, *supra* note 150, at 45.

²⁷⁶ See *id.* at 58.

²⁷⁷ Awrey & van Zwieten, *supra* note 298, at 797.

traditional financial markets share some of the characteristics. From a more theoretical perspective from studies which describe blockchain, the emergence of blockchain-based financial markets seems to blur the boundaries of financial markets. Notwithstanding this possibility, would it bring some complexities that could not be dealt by traditional financial regulation? The next Section will discuss this.

3. A Changed Landscape: Complexities in the Blockchain-based Financial Markets

By juxtaposing the two different financial markets and the respective regulatory systems in Section 2.2 and 2.3, it can be observed that the respective regulations serve well within the boundaries of each market.²⁷⁸ However, will the introduction of technology alter this regulatory landscape and result in a situation that the current regulatory systems are not fully compatible with the new financial sectors?²⁷⁹

Therefore, after establishing the theoretical grounds for traditional financial regulation, this Section then illustrates the possible changes brought by blockchain technology to the financial markets from the perspective of complexity. Further to the spectrum as shown in Figure 1, Section 3.1 shows where to find the new financial sectors created by blockchain technology. This Section also explains why these new financial sectors perform similar functions as a traditional financial market but operate outside their perimeter. Section 3.2 then analyzes the changes in complexity because of blockchain technology in these new financial sectors. Section 3.3 summarizes.

²⁷⁸ See Judge, *supra* note 135, at 427-28.

²⁷⁹ Therefore, the idea of this Chapter that either the regulatory regimes for the money market and the capital market may not be compatible with the new blockchain-based markets is inspired by Judge (2017). Regarding the similar that traditional regulatory regimes are not perfect for innovative markets, *see id.* at 430-45.

3.1 A Path towards More Integrated Financial Markets – New Financial Instruments and Institutions Emerge because of Blockchain Technology

3.1.1 An Overview

The modern financial markets have witnessed the emergence of conglomerates such as the large technology companies involved in financial markets,²⁸⁰ and this integration characterizes the modern financial markets.²⁸¹ However, while this integration increases the level of diversification of, for instance, institutions or instruments, it also feeds the complexity of modern financial markets and thus blurs the conventional distinction between different markets.²⁸² On the basis of this notion, the new institutions and instruments resulting from the integration progress, in which technology plays the role of driver, are identified and described in the following.

Firstly, there are different new instruments that might bring changes to the traditional markets as the following figure indicates.²⁸³ The instrumental examples in the money market influenced by blockchain technology, namely innovative money market, are the instruments such as the financial

²⁸⁰ Those large technology companies, namely “BigTechs”, have recently involved in financial industries to add financial services to their value-chains and became “TechFins”. Typical examples are Alibaba and Tencent in China as they dominate the payment market. See Dirk A. Zetsche, Ross P. Buckley, Douglas W. Arner, Janos N. Barberis, *From Fintech to Techfin: The Regulatory Challenges of Data-Driven Finance*, 14 N.Y.U. J.L. & BUS. 393, 405 (2018); Jon Frost, Leonardo Gambacorta, Yi Huang, Hyun Song Shin & Pablo Zbinden, *BigTech and the Changing Structure of Financial Intermediation 2* (BIS Working Papers No. 779, Apr. 2019), <https://www.bis.org/publ/work779.pdf>.

²⁸¹ See Dan Awrey, *The FSA, Integrated Regulation, and the Curious Case of OTC Derivatives*, 13 U. PENN. J. BUS. L. 1, 8 (2011).

²⁸² See *id.*

²⁸³ However, some instruments in Figure 1 are dropped in the new spectrum affected by blockchain to focus on the new instruments and compare with the existing instruments. To be clear, gold and deposits are dropped. In addition, it is not my intention to comprehensively compare the blockchain-based instruments and the existing ones but indicate where they come into play by constructing Figure 2.

instruments combined with cryptocurrency.²⁸⁴ The instrumental examples in the innovative capital market encompass different fundraising instruments such as coin tokens and securities tokens.²⁸⁵ Secondly, new institutions that deliver the above instruments are the respective exchanges or platforms which are involved in the transactions of the above instruments. These exchanges encompass, for instance, cryptocurrency exchanges for trading cryptocurrencies such as Mt. Gox,²⁸⁶ platforms on which financial instruments combined with cryptocurrency are traded such as Oxygen,²⁸⁷ and STOs exchanges listing security tokens such as tZero.²⁸⁸ Both the innovative money market and the innovative capital market could be considered as new financial sectors in which different instruments and institutions are involved. The features of these new financial sectors are further described in the following Section.

Figure 4: The Spectrum of the Financial Instruments and the New Financial Markets after the Emergence of Blockchain

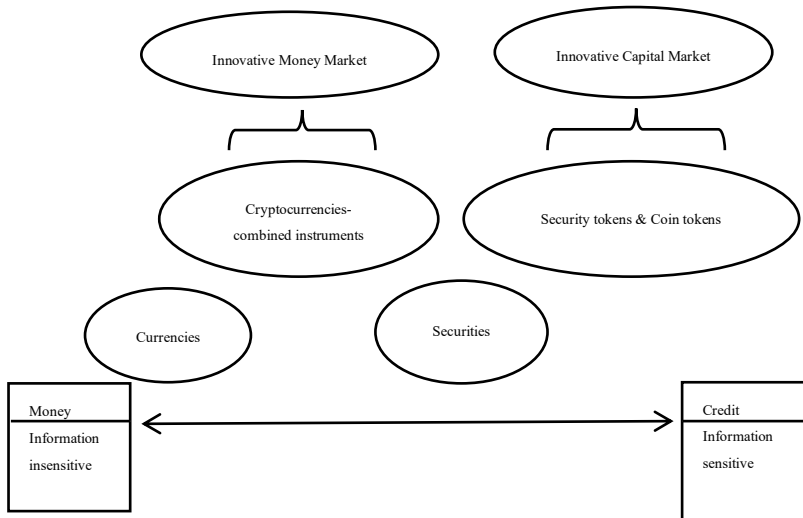
²⁸⁴ Andrew Rossow, *Former Goldman Sachs Banker Brings Cryptocurrency To The Financial Mainstream*, FORBES (Feb. 28, 2018, 09:02 PM), <https://www.forbes.com/sites/andrewrossow/2018/02/28/former-goldman-sachs-banker-brings-cryptocurrency-to-the-financial-mainstream/#637f0be55af2>.

²⁸⁵ Regarding the ideas of coin tokens and securities tokens, *see supra* note 125 and accompanying text.

²⁸⁶ David Gilson, *Mt. Gox bitcoin exchange review*, COINDESK (Oct. 13, 2013, 11:30 AM), <https://www.coindesk.com/mt-gox-bitcoin-exchange-review>.

²⁸⁷ Rossow, *supra* note 284.

²⁸⁸ Jonathan Chester, *Will Security Token Offerings Be The Future of Raising Money?*, FORBES (Feb. 19, 2019, 09:14 AM), <https://www.forbes.com/sites/jonathanchester/2019/02/19/will-security-token-offerings-be-the-future-of-raising-money/#7b4ff4b71826>.



3.1.2 Features of the Instruments and Institutions in the Innovative Money Market and Innovative Capital Market

3.1.2.1 Performing Similar Functions as Traditional Instruments and Institutions

As shown in the figure above, new instruments, which are said to be disruptive in the near future,²⁸⁹ and new institutions facilitating the transactions of these instruments emerge because of the use of blockchain technology. What are the features of these new instruments and institutions? In fact, there seem to be two core features.

Firstly, while they may bring changes in complexity, which will be explained in the next section,²⁹⁰ they perform similar functions as the

²⁸⁹ See Michael Mendelson, *From Initial Coin Offerings to Security Tokens: A U.S. Federal Securities Law Analysis*, 22 STAN. TECH. L. REV. 52, 52-53 (2019).

²⁹⁰ See *infra* Section 3.2.

traditional instruments and institutions. To be clear, with respect to the new instruments, the functions of cryptocurrencies such as bitcoin are similar to fiat money insofar as they could be mediums of exchange.²⁹¹ However, it may not fulfil the other two functions of fiat money – providing units of account and storing value because of the higher price volatility.²⁹² The blockchain-based instruments are recognized as volatile in general.²⁹³ According to commentators, from the perspective of information economics, cryptocurrencies such as bitcoin are more sensitive to exogenous information because of, for instance, the potential security problem in it.²⁹⁴ Nevertheless, it is doubtful that every application of blockchain technology is volatile. While cryptocurrencies and ICOs are considered to be more volatile than fiat money and IPOs (initial public offerings, “IPOs”) and thereby may be harmful to investors, the level of price volatility of STOs seems to be debatable.²⁹⁵ In addition to the cryptocurrencies performing some of the functions of fiat money, the instruments in the capital market such as security tokens perform similar functions to conventional securities such as common stocks – channeling funds and thereby facilitating the allocation of capital.²⁹⁶

²⁹¹ Regarding these functions of fiat money, see MISHKIN, *supra* note 134, at 96-97, 101-102. Thus, bitcoin has the function as fiat money because it lowers transaction costs.

²⁹² The concept that money provides a unit of account means that it can be used to measure value in the economy. The concept that money is a store of value means that it can help save purchasing power from the time it is received as income until it is spent again. Regarding the details of these two functions of money, see *id.* at 97-98.

²⁹³ FINANCIAL CONDUCT AUTHORITY, GUIDANCE ON CRYPTOASSETS 11 (Jan. 2019), <https://www.fca.org.uk/publication/consultation/cp19-03.pdf>.

²⁹⁴ See Nabilou & Prüm, *supra* note 150, at 57-58.

²⁹⁵ For instance, one argued that if on-chain assets are used in STOs, an unwanted price volatility could be caused. Gleb Jout, *NEXT.exchange: Explaining the Difference between ICO's, IEO's, and STO's.*, MEDIUM (Apr. 2, 2019), <https://medium.com/nextexchange/next-and-ico-ieo-and-sto-launches-f6751bf3d433>. Whereas, it is also stated that STOs provide more stable value than ICOs and cryptocurrencies. Ryan Browne, *Apple and Tesla Shares on the Blockchain Could be the Next Big Thing in Crypto*, CNBC (Jan. 8, 2019, 2:00 AM EST), <https://www.cnbc.com/2019/01/07/bitcoin-security-token-and-sto-explained.html>.

²⁹⁶ The financial instruments in the money market and capital market serve to channel funds from lender-savers to borrower-spenders. MISHKIN, *supra* note 134, at 73. Hence, one of the important functions of financial markets is to produce efficient allocation of capital. *Id.* at 70; Merritt B. Fox, *The Social Functions of the Stock Market: A Primer*, THE CLS BLUE SKY BLOG (Apr. 12, 2019), <http://clsbluesky.law.columbia.edu/2019/04/12/the-social-functions-of-the-stock->

These tokens act as the instruments or mechanisms for allocating the capital to those who value it more.²⁹⁷

With respect to the new institutions, they also serve to perform similar functions to conventional institutions. For instance, the cryptocurrency exchanges provide custodial services, transactional storage and liquidity to their customer, and these services are historically offered by conventional banks.²⁹⁸ Moreover, regardless of the assertion that blockchain-based transactions are free from intermediaries,²⁹⁹ the platforms or exchanges engaging in token sales such as STOs are critical to the transactions. The role of these platforms is either engaging in the business of effecting transactions as traditional broker-dealers do, or providing a marketplace to bring the buyers and sellers together as traditional exchanges do.³⁰⁰

[market-a-primer/](#)

²⁹⁷ See Jonathan Rohr & Aaron Wright, *Blockchain-Based Token Sales, Initial Coin Offerings, and the Democratization of Public Capital Markets*, 70 HASTINGS L.J. 463, 504, 524 (2019).

²⁹⁸ Dan Awrey & Kristin van Zwieten, *The Shadow Payment System*, 43 J. CORP. L. 775, 796 (2018).

²⁹⁹ Some commentators asserted that the offer and sale of tokens are conducted without intermediaries. See, e.g., Paul P. Montaz, Kathrin Rennertseeder & Henning Schröder, *Token Offerings: A Revolution in Corporate Finance* 1 (Mar. 5, 2019), <https://ssrn.com/abstract=3346964>. Nevertheless, the implications provided by Lin (2015) are followed in this Chapter. That is, in the modern finance where innovations are employed to achieve elusiveness of financial intermediation, the true disintermediation that no mediums are involved is difficult to be realized. Instead, financial innovations attain a quasi-disintermediation that some mediums are still somehow involved through substituting the traditional intermediaries without excluding the need for their services and establishing layers to weaken the fact that those mediums are actually providing services as the traditional intermediaries do. Tom C.W. Lin, *Infinite Financial Intermediation*, 50 WAKE FOREST L. REV. 643, 655-57 (2015). Therefore, this Chapter emphasizes “partial disintermediation” due to the role played by innovative technology in eliminating some traditional intermediaries, but some mediums may still remain. See Awrey & van Zwieten, *supra* note 298, at 797.

³⁰⁰ Public Statement, U.S. Securities and Exchange Commission, Statement on Digital Asset Securities Issuance and Trading (Nov. 16, 2018), <https://www.sec.gov/news/public-statement/digital-asset-securities-issuance-and-trading>.

3.1.2.2 Not Operating Fully Inside the Perimeter of the Regulated Financial Systems

Secondly, these instruments and institutions do not operate fully inside the perimeter of the financial systems which are regulated.³⁰¹ With respect to the new instruments, the emergence of diversified fundraising methods creates uncertainties regarding the legal status of the fundraising instruments. That is, it is possible that not all the fundraising instruments fall inside the definition of regulated instruments such as securities while their legal status and possible exclusion are still being explored.

With respect to the new institutions, they do not operate fully inside the perimeter of regulated financial systems either. For example, according to commentators, the cryptocurrency exchanges do not directly benefit from the resolution regimes that aim to aid conventional banks in the event of insolvency.³⁰² In addition, the STOs platforms also face an uncertain legal status. That is, the obligations that the platforms have determined according to how the blockchain-based transactions are defined. If these transactions are defined as the offering and sale of securities, it is possible that platforms should register as, for instance, broker-dealers.³⁰³ If any participant should register as a broker-dealer, the obligations set in the public interest, for investor protection, and to ensure the soundness of the whole system such as KYC (know your customer, “KYC”) should be fulfilled.³⁰⁴

³⁰¹ See Awrey & van Zwieten, *supra* note 298, at 796.

³⁰² *Id.*

³⁰³ According to Section 3(a)(4) of the Exchange Act, a broker is defined as “any person engaged in the business of effecting transactions in securities for the account of others.” 15 U.S.C. § 78c(a)(4). A dealer is to an extent different from a broker that it buys and sells securities on their own account. COFFEE & SALE, *supra* note 239, at 633.

³⁰⁴ The obligations include, but not limited to, keeping extensive transaction records, meet capital requirements, not engaging in manipulation, know your security, and know your customer. COFFEE & SALE, *supra* note 239, at 632, 638, 643, 655-56, 665, 671.

On the basis of the above two features, performing similar functions to conventional instruments and institutions outside the perimeter of regulated financial systems, some risks would arise.³⁰⁵ In the following section, these risks are identified through examining the additional complexities brought by these new instruments and institutions. This examination also explains the reasons why current financial regulation may not be capable of dealing with these changes in complexity.

3.2 Changes in Complexity in the Blockchain-based Financial Markets

While modern finance has witnessed several transformations due to technological changes, it is doubtful whether the benefits of these transformations would outweigh their risks.³⁰⁶ A means to study this issue is to examine the complex ecology of the transformations.³⁰⁷ The analysis herein aims to identify the changes in complexity which are posed by blockchain technology and study whether such changes weaken the applicability of the traditional financial regulation.

I follow the relevant studies in order to thoroughly identify the changes in complexity from the following sources – two layers, which are *instruments* and *institutions*, and four drivers, which are *technology*, *opacity*, *fragmentation* and *regulation*.³⁰⁸ Each of these four drivers is relevant to

³⁰⁵ See Awrey & van Zwieten, *supra* note 298, at 796.

³⁰⁶ Some commentators point out that the institutions bringing impacts to the financial markets have transformed from financial intermediaries into data intermediaries, and this transformation may pose negative influence on, for instance, consumer protection because the new institutions are not subject to existing regulations. In this situation, it may be needed to reconsider regulation. Zetsche et al., *supra* note 280, at 430-31.

³⁰⁷ See Baxter, *supra* note 138, at 765.

³⁰⁸ The two layers are inspired by Baxter's study in 2012, which categorizes the layers into products, institutions and the whole market, and Utset's study in 2011, which stresses institutions and transactions as the layers where complexities are generated. See Baxter, *supra* note 138, at 861-62; Utset, *supra* note 138, at 799-801. The four drivers are inspired by Awrey's study in 2012, which identifies the sources of complexities as technology, opacity, interconnectedness, fragmentation, regulation and reflexivity. See Awrey, *supra* note 219, at 245-46. In order to analyze the

both layers, as will be explained in the following analyses. Moreover, in order to thoroughly study blockchain technology, the driver *technology* is further evaluated from four aspects – *decentralization*, *transparency*, *instantaneity* and *automation*.

3.2.1 Technology

3.2.1.1 Four Aspects of the Driver “Technology” – Decentralization, Transparency, Instantaneity and Automation

The first driver of complexity stems from the *technology* itself. The advances in technology were considered to render modern financial markets more complex.³⁰⁹ For instance, as described before,³¹⁰ the emergence of securitization products exemplifies the complex financial products that benefit from the technological advances.³¹¹ Nevertheless, as shown in the financial crisis, these products caused market participants to fail to understand their structures or perceive their risks.³¹² Thus, the contribution of technology toward complexity seems to sometimes lead to undesirable outcomes.³¹³ This Section aims to analyze whether blockchain technology could bring any changes in complexity. Therefore, four spheres of blockchain technology are discussed below – *decentralization*, *transparency*, *instantaneity* and *automation*.

3.2.1.2 Decentralization

complexities posed by blockchain technology from a more technological perspective, four of these drivers are examined in this Chapter. It is also noteworthy to mention that the first driver in Awrey’s work in 2012 – “technology” – is extended to include the different spheres of blockchain technology.

³⁰⁹ *Id.* at 246.

³¹⁰ *See supra* Section 2.3.2 and 2.3.3.

³¹¹ Awrey, *supra* note 219, at 248, 250.

³¹² *Id.* at 250.

³¹³ *See id.*

One of the features of blockchain technology that has been emphasized by commentators is that it brings decentralization. That is, the world where blockchain technology functions as the underlying infrastructure is described as “crypto-economic”, and this mirrors the basic nature of blockchain technology – a decentralized cryptographic protocol or a decentralized solution to ledgers.³¹⁴

Traditionally, a fundraising process involves a central party or intermediaries such as banks, and this fact results in higher costs because of, among other things, the fees paid to them.³¹⁵ Thus, the impact of an extensive use of these mediums on the whole financial markets might not be completely positive.³¹⁶ From a more technological perspective, in the blockchain system, a more efficient and accurate process is expected because blockchain technology entails the digitalization of the process and decouples a number of traditional mediums.³¹⁷ In fact, the emergence of blockchain technology characterizing decentralization could also be explained from an evolutionary point of view.³¹⁸ The development of systems initiates from centralization that is efficient to establish and manage; however, as a centralized system evolves and begins to be vulnerable to exploitation, the costs of such a system manifest as inflation, corruption, and rent seeking.³¹⁹ Therefore, decentralized systems are introduced to bring the new order that

³¹⁴ Sinclair Davidson, Primavera De Filippi & Jason Potts, *Economics of Blockchain* 3-4 (2016), <https://ssrn.com/abstract=2744751>; Vitalik Buterin, *Visions, Part 1: The Value of Blockchain Technology*, ETHEREUM BLOG (Apr. 12, 2015), <https://blog.ethereum.org/2015/04/13/visions-part-1-the-value-of-blockchain-technology/>.

³¹⁵ See Kathryn Judge, *Intermediary Influence*, 82 U. CHI. L. REV. 573, 573, 577-78, 600 (2015); Choi & Pritchard, *supra* note 249, at 439. To be clear, the higher transaction costs include not only the costs associated with the regulatory requirements such as filing and registration but also the fees and costs involved in the whole capital raising process such as the fees paid due to necessary professional services.

³¹⁶ See Judge, *supra* note 315, at 625, 628.

³¹⁷ See Mendelson, *supra* note 289, at 56, 93.

³¹⁸ Davidson et al., *supra* note 314, at 5.

³¹⁹ *Id.*

exemplifies an evolution toward complexity.³²⁰ Moreover, commentators even asserted that the nature of decentralization of blockchain technology renders it a new system competing with markets and firms or an economy when tokens are involved.³²¹

Equally important, as blockchain technology exemplifies the pattern in the complex system that is from centralization to decentralization,³²² it is doubtful whether the traditional financial regulation is suitable or not. It is thus important to rethink what types of mediums are involved in the blockchain system. In fact, the financial systems, where current financial regulations function to deal with complexities, involve conventional institutions such as banks in the money market or stock exchanges in the capital market.³²³ Whereas, the claim that blockchain technology creates a decentralized system does not render the blockchain system purely disintermediated as some mediums are still involved.³²⁴ That is, platforms, rather than conventional institutions, exist to facilitate the transactions of blockchain-based instruments.³²⁵ The rise of these mediums, in fact, reflects that this platform-based business model could lower transaction costs.³²⁶ Conceptually speaking, these platforms do not sell products but focus on reducing transaction costs.³²⁷ To be clear, with the aid of blockchain

³²⁰ *See id.*

³²¹ *Id.* at 6.

³²² *See id.*

³²³ These central parties have been focused by the pre-crisis financial regulatory regimes that are more micro-prudential to safeguard financial firms such as banks, whereas the post-crisis regulation emphasizes a macro-prudential strategy that focuses on the whole system. ARMOUR ET AL., *supra* note 144, at 409.

³²⁴ *See* Awrey & van Zwieten, *supra* note 298, at 797. Regarding the examples of the new mediums, *see supra* Section 3.1.1.

³²⁵ For example, the exchange Mt. Gox for transacting bitcoin matches the buyers and sellers, receive the Bitcoins that are transferred from the sellers and the funds from the buyers, and, once obtain the aforementioned bitcoins and funds, transfer the bitcoin to the buyers and the funds to the sellers. Awrey & van Zwieten, *supra* note 298, at 797-98.

³²⁶ *See* Michael Munger, *Coase and the "Sharing Economy"*, in FOREVER CONTEMPORARY: THE ECONOMICS OF RONALD COASE 187, 189 (Cento Veljanovski ed., 2015).

³²⁷ *See id.* at 194.

technology, these platforms solve the problems regarding (1) information, because they help disseminate information,³²⁸ and (2) trust, because the need for trust is mitigated in this system.³²⁹ These two aspects might render these platforms successful in modern finance.³³⁰

Since platforms seem to dominate the blockchain-based markets and reduce transaction costs, there may not be additional complexities.³³¹ Yet, if regulation is needed, it is worthwhile to rethink which type of regulation is suitable for this decentralized system where platforms are crucial.

3.2.1.3 Transparency

The second characteristic of blockchain is that it originates from the idea of open-source, which means that all the endogenous information is *transparent* to the users within the system.³³² In other words, blockchain technology enables truth discovery by facilitating transparency and consensus among users.³³³ In the following, the influences of the characteristic *transparency* in the blockchain-based financial sectors are discussed. Then, the question of how *transparency* renders current financial regulations not suitable will be analyzed.³³⁴

The first influence of *transparency* is that the advocates' emphasis on it would increase investors' willingness to pay. For example, in the context of STOs, this transparency could be ensured by tokenization based on the blockchain as the advocates claimed.³³⁵ The values of the security tokens

³²⁸ See *infra* Section 3.2.1.3, Section 4.1.1 and Section 4.2.2.

³²⁹ See *infra* Section 4.1.1.

³³⁰ See Munger, *supra* note 71, at 201.

³³¹ It is because complexity could be considered as a function of some variables including transaction costs. Awrey, *supra* note 219, at 241.

³³² See Nabilou & Prüm, *supra* note 150, at 57; Davidson et al., *supra* note 314, at 10.

³³³ See *id.*

³³⁴ Regarding the detailed analysis, see *infra* Section 4.1.2 and 4.2.2.

³³⁵ See, e.g., Mikko Ohtamaa, *What Are Securities and Security Tokens*, TOKENMARKET

are said to be more transparent because the blockchain system helps trace the true value of the underlying assets and ensure that the information of the value is available to all the users.³³⁶ In fact, rather than asserting that the transparency itself would increase investors' willingness to pay, the way that the advocates frame STOs by stressing their novelty of transparency would result in a higher willingness to pay.³³⁷ Hence, the incentive for capital demanders to engage in STOs to raise the fund would be stronger because of the expected framing effect influencing investors' decisions.³³⁸

The second influence of *transparency* is that it may provide a technical method to solve the situation where information is knowable but unknown.³³⁹ Blockchain makes some information which was hidden available without regulatory intervention. For instance, in the general credit market, blockchain technology challenges the previous assumption that the amount of information available to lenders is not variable, helping alleviate the misallocation of credits.³⁴⁰ In the wake of the financial crisis, expanding disclosure requirements may be the cure, but it increases compliance costs. Tracking the underlying credit instruments through the layers where the financial instruments are fragmented seems to be possible to achieve by using blockchain technology that comprehensively records and verifies all the information.³⁴¹ In addition, in the securities market, blockchain also

(Oct. 31, 2018), <https://tokenmarket.net/news/security-tokens/what-are-security-tokens/>.

³³⁶ *The Pros and Cons of Security Token Offerings*, TOKENY (Aug. 21, 2018), <https://tokeny.com/the-pros-and-cons-of-security-token-offerings/>.

³³⁷ See John P. Conley, *Blockchain and the Economics of Crypto-tokens and Initial Coin Offering* 12-13 (Vand. U. Dep't. Econ. Working Papers 17-00008, June 6, 2017), <http://www.accessecon.com/Pubs/VUECON/VUECON-17-00008.pdf>.

³³⁸ The framing effect has been an important issue in behavior economics. *E.g.*, Cass R. Sunstein & Richard H. Thaler, *Libertarian Paternalism Is Not an Oxymoron*, 70 U. CHI L. REV. 1159, 1179-80, 1182 (2003).

³³⁹ It is thus related to Akerlof's work. See Akerlof, *supra* note 235, at 488, 495-96.

³⁴⁰ The inefficient allocation of credits is considered to happen when there are market failures. See Timothy Besley, *How Do Market Failures Justify Interventions in Rural Credit Markets?*, 9 THE WORLD BANK RESEARCH OBSERVER 27, 29 (1994).

³⁴¹ See Andrew Wong, *Security Tokens – What Can We Expect in Asia in 2019?*, MEDIUM (Dec. 20, 2018), <https://medium.com/altcoin-magazine/security-tokens-what-can->

makes important information transparent. All the transactions happening are broadcast to the blockchain network, thus the transaction data such as the changes of ownership are updated and transparent.³⁴² This specialty helps capital providers to more easily understand the information about securities tokens, capital management plans of the company, and the distribution of holdings.³⁴³ Blockchain technology does so by enhancing information collecting and processing. However, the advantages brought by transparency seem to happen after the investments made by capital providers.

Transparency characterizes blockchain-based financial markets as markets distinguished from the money market, where market participants have few incentives to acquire information and a state of opacity appears,³⁴⁴ and the capital market, where price discovery is stressed.³⁴⁵ That is, the blockchain-based financial sectors do not rely on either mutual ignorance or the mutual understanding. Instead, because of the endogenous transparency of blockchain technology, these new financial sectors are on the basis of truth discovery without the need for trust.³⁴⁶ Therefore, in the blockchain-based financial sectors, market participants may be discouraged from acquiring information because of the expected transparency.³⁴⁷ This state mitigates the vagueness in financial markets and thus avoids complexities because that vagueness has been considered as a source of complexities.³⁴⁸ Notwithstanding that additional complexities are not caused, it is still likely that transparency renders current financial regulations unsuitable. In

[we-expect-in-asia-in-2019-eb51905386d6](#). With blockchain, the method of tracking underlying credit instruments through the layers where the financial instruments are fragmented is possible without regulation. This method is proposed by Gilson & Kraakman (2014) as a partial response to the financial crisis. *See* Gilson & Kraakman, *supra* note 218, at 351-54.

³⁴² Ante & Fiedler, *supra* note 377, at 3.

³⁴³ Wong, *supra* note 341.

³⁴⁴ *See supra* Section 2.2.1.

³⁴⁵ *See supra* Section 2.3.1.

³⁴⁶ *See* Davidson et al., *supra* note 314, at 10.

³⁴⁷ *See* Nabilou & Prüm, *supra* note 150, at 57.

³⁴⁸ *See* Awrey, *supra* note 219, at 248, 251.

particular, if the current financial regulations emphasize information disclosure such as securities regulation, it is doubtful that such a regulatory regime is still fit for the new sectors that information asymmetry concern might be alleviated.³⁴⁹

3.2.1.4 Instantaneity and Automation

In addition to the decentralization and transparency, market participants also benefit from *instantaneity* and *automation*. Traditional institutions where instruments are traded such as stock exchanges are limited to their working hours, whereas a blockchain-based system runs online without time constraints and executes agreed contracts.³⁵⁰ Similar to transparency, instantaneity and automation might not cause additional complexities but might alleviate them.

The instantaneity and automation characterizing blockchain are beneficial, not only to both parties of transactions such as capital demanders and capital providers but also the new institutions such as the platforms on which security tokens are offered. It was stated that blockchain technology raises the administrative efficiency of the platforms.³⁵¹ For instance, a blockchain-based platform established by an exchange to offer security tokens at a regulated level could lower the costs of transactions and administrative process.³⁵² In general, the costs of reconciliation and data

³⁴⁹ Recent Guidance, *Securities Regulation – Financial Technology – SEC Provides Analytical Tools for Assessing Digital Assets*. – SEC, *Framework for “Investment Contract” Analysis of Digital Assets (2019)*., 132 HARV. L. REV. 2418, 249 (2019). Regarding the discussion about the suitability of traditional financial regulation in the STOs market, see *infra* Section 4.1.2.

³⁵⁰ Davidson et al., *supra* note 314, at 10; Tracy Trachsler, *Securities Token Offerings: the Differences from Other Fundraising Methods*, CRYPTOHEROES (Feb. 15, 2019), <https://cryptoheroes.ch/security-token-offerings-the-differences-from-other-fundraising-methods/>.

³⁵¹ Ahluwalia & Imran, *supra* note 289, at 11.

³⁵² *Id.* The blockchain-based platform performing at a regulated level was created by the Canadian Securities Exchange (“CSE”). *Id.*

management would be reduced when platforms capitalize on blockchain technology to perform securities trading and settlement because such processes are automated and simplified.³⁵³

The above advantages of blockchain technology with respect to its instantaneity and automation could be explained in a more conceptual way – together with the transparency that characterizes blockchain technology as a mechanism operating without trust, the execution of this mechanism is beneficial to alleviating opportunism as it is enforced by blockchain technology.³⁵⁴ In the blockchain world, trust may not be needed and might be replaced by consensus on the basis of the transparency. Thus, opportunism may be diminished as there would not be an exploitation of trust.³⁵⁵ In comparison, the existence of complexities in financial markets poses regulatory challenges because these complexities render opportunistic behavior more likely.³⁵⁶ For example, the financial instruments, that are structured in the complex way that obscure potential risks, increased the chance of financial intermediaries' opportunistic behavior, thereby contributed to the financial crisis.³⁵⁷ Blockchain technology, however, may be capable of enhancing market transparency and diminishing opportunism. These in fact are the goals of post-crisis regulations.³⁵⁸

3.2.2 Opacity

³⁵³ Emiliios Avgouleas & Aggelos Kiayias, *The Promise of Blockchain Technology for Global Securities and Derivative Markets: The New Financial Ecosystem and the 'Holy Grail' of Systemic Risk Containment*, 20 EUR. BUS. ORG. L. REV. 81, 104 (2019).

³⁵⁴ Davidson et al., *supra* note 314, at 10. Opportunism extends the self-interest seeking to the self-interest seeking with guile. Oliver E. Williamson, *Transaction-Cost Economics: The Governance of Contractual Relations*, 22 J.L. & ECON. 233, 234 (1979).

³⁵⁵ Davidson et al., *supra* note 314, at 10.

³⁵⁶ See Awrey, *supra* note 219, at 248, 275.

³⁵⁷ See *id.*

³⁵⁸ *Id.* at 282.

3.2.2.1 The Sources of Opacity

The second driver of complexity in financial markets is the *opacity* existing in the layers of instruments and institutions.³⁵⁹ A source of this opacity is the non-availability of information.³⁶⁰ In Section 3.2.1.3, it was argued that blockchain technology could help discover some unknown information such as the true value of the underlying assets because its nature of transparency enables this system to be a truth-discovery system. Regardless of the likelihood that unknown but knowable information would be discovered by blockchain technology because of its technical transparency, it is possible that some other unknown information still exists and results in the opacity in the blockchain-based markets.

In the blockchain-based markets, this opacity could be found when (1) the threats to cybersecurity happen, and (2) participants face fraud, cheating, and financial crimes because these threats are caused due to the fact that blockchain technology is still in its earlier stage and the relevant information to assess these concerns is not fully known by participants. This Section describes that how these threats epitomize the outcomes of the opacity because blockchain technology is still in its early stage.

3.2.2.2 Cybersecurity Concerns

As a matter of fact, both blockchain technology and its applications such as cryptocurrencies and STOs are comparatively new ideas. While blockchain technology could be used as the solution for cybersecurity,³⁶¹ cyber-attacks are not completely avoidable in the blockchain applications.³⁶²

³⁵⁹ *Id.* at 251.

³⁶⁰ *Id.*

³⁶¹ Andrew Arnold, *4 Promising Use Cases of Blockchain in Cybersecurity*, FORBES (Jan. 30, 2019, 04:30 AM), <https://www.forbes.com/sites/andrewarnold/2019/01/30/4-promising-use-cases-of-blockchain-in-cybersecurity/#4becaf273ac3>.

³⁶² ERIN ENGLISH, AMY DAVINE KIM & MICHAEL NONAKA, MICROSOFT, ADVANCING

For example, in June 2016, the cryptocurrency system The DAO was attacked, and a large amount of Ether was stolen.³⁶³ Many of the types of cyber-attacks involve human elements and exploit the existing weaknesses of blockchain technology such as improper key management and software coding errors.³⁶⁴ However, as blockchain technology is still developing, new strategies and threats exploiting the vulnerabilities that are not fully known by any parties in the systems are envisioned.³⁶⁵ Thus, these unforeseen concerns feed the opacity and give rise to the complexity in the blockchain-based markets. Commentators argued that this opacity would give rise to classic information asymmetry, not between the blockchain users in the system, but between the attackers and defenders because the attackers could exploit enhanced computational power.³⁶⁶ Moreover, the results of the cybersecurity concerns are not only the monetary losses but also the impeded goals of markets such as capital formation and the resulting fluctuation of the price due to the incident.

Moreover, the willingness of the market players to participate in blockchain-based transactions may be negatively influenced by the cybersecurity concerns. That is, in order to ensure the security of this young market, the costs of any mechanisms adopted tend to be high.³⁶⁷ Therefore, the threat to cybersecurity may directly or indirectly increase the costs of

BLOCKCHAIN CYBERSECURITY: TECHNICAL AND POLICY CONSIDERATIONS FOR THE FINANCIAL SERVICES INDUSTRY 12 (2018).

³⁶³ David Siegel, *Understanding The DAO Attack*, COINDESK (Jun. 25, 2016, 17:52 PM), <https://www.coindesk.com/understanding-dao-hack-journalists>.

³⁶⁴ ENGLISH ET AL., *supra* note 362, at 12-14; DYLAN YAGA, PETER MELL, NIK ROBY & KAREN SCARFONE, NAT'L INST. OF STANDARDS AND TECH., U.S. DEP'T OF COMMERCE, BLOCKCHAIN TECHNOLOGY OVERVIEW 36-37 (2018).

³⁶⁵ ENGLISH ET AL., *supra* note 362, at 14.

³⁶⁶ *See id.*

³⁶⁷ After The DAO was attacked in 2016, a proposal was submitted in response to that. However, the concern about the costs of ensuring security for a blockchain system was raised. U.S. SECURITIES AND EXCHANGE COMMISSION, *supra* note 129, at 9; Stephan Tual, *DAO.Security, A Proposal to Guarantee the Integrity of The DAO*, MEDIUM (May 25, 2016), <https://blog.slock.it/dao-security-a-proposal-to-guarantee-the-integrity-of-the-dao-3473899ace9d>.

fundraising for capital demanders.³⁶⁸ In particular, the cybersecurity concerns would raise the costs for the capital demanders such as SMEs (small- and medium-sized enterprises, “SMEs”) and/or startups which are not sophisticated enough as they lack the security strategies or expertise.³⁶⁹ In addition to the unwillingness of the capital demanders, this threat would also increase the mediums’ costs of doing business because they might be liable for the consumers’ losses due to the attack. According to commentators, an exchange is likely to be at risk in the event of a hack because it directly faces the consumers.³⁷⁰ In this kind of incident, the exchange is considered to be the first target to be sued by consumers.³⁷¹ In fact, the content of the obligations that a platform or an exchange has depended on their legal status. If they should register as broker-dealers, the obligations could be extensive as shown in the discussions above.³⁷² It is possible that a class action could be brought by claiming that the exchange or the platform fails to fulfil the obligations associated with, for instance, financial consumer protection.³⁷³

The fluctuation of the price is relevant to the information sensitivity of the blockchain-based instruments. Despite the direct losses because of an attack, an attack on the blockchain system or the exchange acts as negative information which leads to a fluctuation of the price. In particular, as a young and immature market, the fluctuation is often disproportionate compared to the traditional market.³⁷⁴ According to commentators, in the case of bitcoin, the shocks that cause volatility of the market are often associated with

³⁶⁸ For instance, the advisory fees might be higher because of the security issue. See OECD, INITIAL COIN OFFERINGS (ICOs) FOR SME FINANCING 20 (2019). This issue have been discussed in the context of ICOs. Nevertheless, this issue would possibly be the case in the context of STOs as well because those fundraising methods are in fact similar ideas and both apply blockchain technology.

³⁶⁹ *Id.* at 37.

³⁷⁰ Siegel, *supra* note 363.

³⁷¹ 3.6 million of Ether was stolen, which is equivalent to USD 70 million. *Id.*

³⁷² See *supra* note 304 and accompanying text.

³⁷³ These obligations are similar to the ones that a traditional broker-dealer has. See COFFEE & SALE, *supra* note 239, at 661-80.

³⁷⁴ See Nabilou & Prüm, *supra* note 150, at 57-58.

exogenous information rather than endogenous information about blockchain technology or bitcoin itself.³⁷⁵ If this volatility is expected by capital providers, their incentives to engage in the transactions could be negatively affected. Hence, it is foreseeable that the blockchain-based instruments are generally more exogenously information sensitive than the corresponding traditional instruments (e.g., fiat money vs. cryptocurrency; securities vs. securities tokens). Consequently, this nature influences the potential of blockchain-based instruments to be widely accepted.³⁷⁶

3.2.2.3 Fraud, Cheating and Financial Crimes

Another example of the opacity caused by technology is the likelihood that market participants may face fraud and cheating because the counterparties could exploit signals that especially exist in an immature market.

According to commentators, as blockchain technology is a relatively novel term, some market participants such as capital demanders can cheaply exploit signals about the quality of the company and the investment project to influence investors' decisions even though the market might be regulated.³⁷⁷ In particular, as blockchain technology seems to be promising for most participants in modern finance, non-sophisticated and overly-optimistic investors are likely to suffer from fraud. Currently there is a growing concern that blockchain-based markets may be prone to fraud or crime.³⁷⁸ For instance, in the case of the fundraising methods utilizing

³⁷⁵ *Id.* at 58.

³⁷⁶ *See id.* at 58-60.

³⁷⁷ Lennart Ante & Ingo Fiedler, *Cheap Signals in Security Token Offerings* 1-2, 11 (BRL Working Paper Series No. 1, 2019), <https://ssrn.com/abstract=3356303>.

³⁷⁸ Shane Shifflett & Coulter Jones, *Buyer Beware: Hundreds of Bitcoin Wannabes Show Hallmarks of Fraud*, WALL STREET JOURNAL (May 17, 2018, 12:05 PM), <https://www.wsj.com/Chapters/buyer-beware-hundreds-of-bitcoin-wannabes-show-hallmarks-of-fraud-1526573115>.

blockchain technology, fraudulent activities are likely to exist to harm investors.³⁷⁹ In addition, the harm to investors also stems from the financial crimes committed such as money laundering or financing of terrorism because the anonymity brought by blockchain technology creates chances to do so.³⁸⁰

With respect to the possibility that capital providers might be cheated, the signals exploited by capital demanders are crucial. While the capital demanders would be incentivized to engage in the blockchain-based markets because the cheap utilization of these signals increases the likelihood that the project will be successful, it is empirically shown that the capital providers are not protected enough when the signals involve dishonest information.³⁸¹ That is, as the capital demanders can cheaply exploit signals to influence potential investors' decisions, they are incentivized to exaggerate the information; hence, investor protection would not be ensured.³⁸² This phenomenon reflects that this market is still at an early stage and immature, and practical dangers have not been identified yet.³⁸³ Therefore, investors (especially non-sophisticated investors) are considered to lack precaution and have a fear of monetary losses because of the dishonest investment projects if the cheating is expected.³⁸⁴ In fact, the threat described in this Section stems from the potential information asymmetry before the transactions. It is noteworthy that blockchain technology and its applications have been promoted in the way that the transparency and the eliminated information asymmetry are stressed.³⁸⁵ Notwithstanding, it seems that information asymmetry or deficits still exists and issues regarding investor

³⁷⁹ FINANCIAL CONDUCT AUTHORITY, *supra* note 293, at 12. In particular, ICOs are recognized as the fundraising method prone of fraudulent activities. *See, e.g., id.* at 10, 12; OECD, *supra* note 368, at 34.

³⁸⁰ FINANCIAL CONDUCT AUTHORITY, *supra* note 293, at 13.

³⁸¹ Ante & Fiedler, *supra* note 377, at 13.

³⁸² *Id.* at 12-13.

³⁸³ *Id.* at 13.

³⁸⁴ *See id.* at 11.

³⁸⁵ *See supra* Section 3.2.1.3.

protection would be worth studying by future researchers when this market becomes mature.

3.2.3 Fragmentation

The third driver of complexity in financial markets is *fragmentation*.³⁸⁶ Fragmentation characterizes the operation based on blockchain technology along with decentralization, transparency, instantaneity and automation. With respect to *fragmentation*, blockchain technology increases fragmentation as, for instance, assets could be fragmented by being tokenized and more platforms have been emerging in markets.³⁸⁷

In fact, according to commentators, the fragmentation in the financial markets often creates higher information and coordination costs for the participants and also dilutes the participants' incentives to coordinate and acquire information, thereby contributing to the complexity.³⁸⁸ Most importantly, in the wake of the financial crisis, these informational burdens may result in greater market malfunctions because they form the complexity that pre-crisis financial regulations did not focus upon.³⁸⁹

3.2.4 Regulation

3.2.4.1 Regulatory Complexity Results in Higher Information Costs

³⁸⁶ Awrey, *supra* note 219, at 255; Judge, *supra* note 118, at 690.

³⁸⁷ See, e.g., Alexey Koloskov, *Solving Crypto's Long-Standing Fragmentation Problem*, FORBES (Dec. 12, 2020), <https://www.forbes.com/sites/forbesfinancecouncil/2020/12/10/solving-cryptos-long-standing-fragmentation-problem/?sh=2bd882a545df>; RealtyReturns.io, *How Tokenization is Transforming Real Estate on the Blockchain*, MEDIUM (Oct. 16, 2018), <https://medium.com/@realityreturnsio/how-tokenization-is-transforming-real-estate-on-the-blockchain-7b6dc165f98b>.

³⁸⁸ Awrey, *supra* note 219, at 255.

³⁸⁹ See Judge, *supra* note 118, at 711.

The fourth driver of complexity in financial markets is the *regulation* that might be applicable.³⁹⁰ As discussed before, the modern financial markets are characterized by different transformations which manifest themselves in the emergence of new types of institutions and instruments.³⁹¹ However, as technology is faster than the law, the complexities generated by unclear, burdensome or improperly designed regulation may result in higher information costs for both the potential the regulated and the regulators; consequently, innovation might be impeded by regulation.³⁹² The regulatory complexity is not only related to the volume of regulation but also the legal uncertainty in the innovative financial markets because this legal uncertainty could raise the speed of informational change.³⁹³ In the following pages, the regulatory complexities are described by identifying the higher information costs that the potential regulated face when seeking to understand or comply with them.³⁹⁴ Two situations of the regulatory complexity described in the following are (1) the legal status, the corresponding obligations and the possible exemptions are not settled, and (2) conflicts between existing legal requirements and the technology are presented.

3.2.4.2 Uncertain Legal Status, Obligations and the Exemptions

³⁹⁰ Awrey, *supra* note 219, at 255; Baxter, *supra* note 138, at 863.

³⁹¹ See *supra* Section 3.1.1.

³⁹² See e.g., Mark Fenwick, Wulf A. Kaal & Erik P. M. Vermeulen, *Regulation Tomorrow: What Happens When Technology Is Faster than the Law?*, 6 AM. U. BUS. L. REV. 561, 573 (2017); Patricia H. Lee, *Crowdfunding Capital in the Age of Blockchain Based Tokens*, 92 ST. JOHN'S L. REV. 31, 37(forthcoming 2019) (manuscript at 56), <https://ssrn.com/abstract=3299093>.

³⁹³ See Awrey, *supra* note 219, at 246. In fact, the regulatory complexity is considered to influence the availability or intelligibility of the information itself. *Id.* Nevertheless, this Chapter extends the regulatory complexity to include the phenomenon especially existing in innovative markets, which is the legal uncertainty appearing when technology is faster than the law.

³⁹⁴ See *id.*, at 256. The higher information costs faced by regulators appear when regulators try to coordinate their activities. *Id.* Nevertheless, I focus on the complexities faced by the regulatees such as capital demanders and platforms.

For instance, the innovative capital market such as STOs exemplifies the market where this legal uncertainty appears because the idea of the blockchain-based fundraising method is comparatively new. For example, as Chapter 4 will study, the legal status of the blockchain-based instruments used to raise funds is being discussed in the US.³⁹⁵ Moreover, with respect to the possible exemptions, the Reg CF (Regulation Crowdfunding, “Reg CF”) could possibly be a vehicle for raising capital through blockchain-based tokens, and capital demanders would thus benefit from the exemptions set in the Reg CF such as lighter disclosure requirements.³⁹⁶ Nevertheless, legal issues, which include, but are not limited to, the status of blockchain-based instruments or safe harbor options to avoid obligations if they constitute securities, have not been settled.³⁹⁷ Whether a transaction involves the offer and sale of securities and whether or how securities regulation applies, still depends on the facts and circumstances of each case.³⁹⁸ The DAO report provided an initial framework by which the legal status of tokens can be judged, but further additional issues still remain.³⁹⁹ Similarly, on the other side of the Atlantic Ocean, the uncertainty with respect to securities tokens seems to be more significant at the time of writing.⁴⁰⁰ Whether a token constitutes a security under the EU law similarly depends on the structure of the token.⁴⁰¹

Similarly, new institutions in the innovative markets such as platforms also face legal uncertainties and the associated information costs.⁴⁰² On the one hand, to the extent that one of their incentives is to

³⁹⁵ See *infra* Chapter 4.

³⁹⁶ See Mendelson, *supra* note 289, at 83. Regarding the element of Reg CF, see Regulation Crowdfunding 17 C.F.R. § 227.100 et seq. (2017).

³⁹⁷ See Mendelson, *supra* note 289, at 93.

³⁹⁸ U.S. SECURITIES AND EXCHANGE COMMISSION, *supra* note 129, at 17.

³⁹⁹ See Mendelson, *supra* note 289, at 93.

⁴⁰⁰ Philipp Hacker & Chris Thomale, *Crypto-Securities Regulation: ICOs, Token Sales and Cryptocurrencies under EU Financial Law* 40 (Nov. 22, 2017), <https://ssrn.com/abstract=3075820>.

⁴⁰¹ *Id.*

⁴⁰² See *supra* Section 3.1.2.2.

maximize the profits,⁴⁰³ the uncertain necessity to register as, for instance, broker-dealers and the uncertain compliance costs might hinder them in their efforts to engage in this business. On the other hand, in the digital finance era, it is possible that participants may be exempted from certain obligations in order to promote innovation. For instance, in the U.S., an online portal engaged in equity crowdfunding could be exempted from the broker-dealer registration requirement under Rule 506 in private placements.⁴⁰⁴ As blockchain-based transactions and the involved participants are comparatively new ideas, it is not settled yet that whether this exemption is applicable to the platforms offering security tokens or whether there will be new exemptions set for them in the future.⁴⁰⁵ Hence, similar to capital demanders, platforms also face the legal uncertainty that causes higher costs when seeking to comply with potential regulations.

3.2.4.3 Conflicts between Law and Technology: Data Protection Concerns as the Example

In addition to the legal uncertainty that gives rise to the regulatory complexity, threats to digital privacy epitomize the regulatory complexity in the blockchain-based markets. Studies about privacy issues are one of the streams of the literature regarding blockchain technology and its applications.⁴⁰⁶ Similar to cybersecurity, while blockchain technology could be employed to ensure privacy,⁴⁰⁷ it is not completely immune to privacy

⁴⁰³ See Ajay K. Agrawal, Christian Catalini & Avi Goldfarb, *Some Simple Economics of Crowdfunding*, 14 INNOVATION POL'Y & ECON. 63, 74 (2014).

⁴⁰⁴ Section 201(c) of the JOBS Act (Jumpstart Our Business Startups Act, the "JOBS Act") adds a paragraph to Section 4 of the Securities Act. 15 U.S.C. § 77d(c). Samuel Haggren, *The JOBS Act: Exempting Internet Portals from the Definition of Broker-Dealer*, 90 DENVER U. L. REV. ONLINE 73, 78 (2013).

⁴⁰⁵ Nevertheless, a commentator stated that the JOBS Act seems to fit security tokens issuers' needs. Iliya Zaki, *Security Token Offerings (STOs) – All You Need to Know*, MOONWHALE (Mar. 4, 2019), <https://moonwhale.io/security-token-offerings-stos/>.

⁴⁰⁶ See Christian Catalini & Joshua S. Gans, *Some Simple Economics of Blockchain 4* (NBER Working Paper No. 22952, 2016), <https://www.nber.org/papers/w22952.pdf>.

⁴⁰⁷ Guy Zyskind, Oz Nathan & Alex 'Sandy' Pentland, *Decentralizing Privacy: Using Blockchain to Protect Personal Data 1*, <https://enigma.co/ZNP15.pdf>.

concerns. In particular, this complexity appears when the conflicts between the existing legal requirements regarding privacy and the nature of blockchain technology are presented.

Implicit in these conflicts is the understanding of how the way that information plays a role in the blockchain-based markets is different from that in the world without blockchain technology.⁴⁰⁸ As analyzed in Section 3.2.1, the specialties of blockchain technology, which include decentralization, transparency, instantaneity and automation, enable the blockchain system to become a truth discovery system, which goes beyond the scope of either price discovery or obviating price discovery. In addition to these specialties, *immutability* also features blockchain technology as a mechanism inherently preventing the obliteration of the data which is stored.⁴⁰⁹ The above features render some blockchain technology applications incompatible with some legal requirements that regulators fashion them by supposing that there is a data controller in a centralized system and that data could be erased or changed.⁴¹⁰ One of the examples of those legal requirements is the “right to be forgotten” that individuals have the right to request organizations to erase their personal data.⁴¹¹

Conceptually speaking, as new technologies such as blockchain

⁴⁰⁸ According to Stiglitz (2002), information economics has a great impact on how we think about economic policy. Joseph E. Stiglitz, *Information and the Change in the Paradigm in Economics*, 92 AM. ECON. REV. 460, 460 (2002).

⁴⁰⁹ Dirk A. Zetsche, Ross P. Buckley & Douglas W. Arner, *The Distributed Liability of Distributed Ledgers: Legal Risks of Blockchain*, 2018 U. ILL. L. REV. 1361, 1376 (2018). However, in some cases, transactions are not completely immutable. Yaga et al., *supra* note 364, at 34.

⁴¹⁰ Carlo R.W. De Meijer, *Blockchain versus GDPR and Who Should Adjust Most*, FINEXTRA (Oct. 9, 2018), <https://www.finextra.com/blogposting/16102/blockchain-versus-gdpr-and-who-should-adjust-most>.

⁴¹¹ *Id.*; Zetsche et al., *supra* note 409. The “right to be forgotten” is granted in the EU. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), art. 17.

technology manifest themselves as new methods of processing data to form, for instance, a truth discovery engine, the modern finance employing these technologies is considered as data-driven finance characterized by these transformations.⁴¹² In fact, data is shaping not only modern finance but also the contemporary regulations which are held by, among others, stricter rules about data processing.⁴¹³ In this data-driven finance, however, the emergence of blockchain technology gives rise to complex issues in relation to the compatibility of existing regulations because of its way of processing data. In order to be more compliant with data protection rules, market participants' efforts to mitigate the conflicts between technology and regulation are inevitable and could result in higher costs.

3.3 Summary

This Section studied the question of whether blockchain technology would bring changes in complexity by examining the four drivers of complexity, which include *technology*, *opacity*, *fragmentation* and *regulation*.

Firstly, with respect to *technology*, blockchain technology could help establish a mechanism which is decentralized, internally transparent, instant and automatic. It thus seems that blockchain technology solves some complexities existing in traditional financial markets. Accordingly, in terms of the technology itself, blockchain technology would possibly not bring more but less complexity.

Secondly, with respect to *opacity*, blockchain might cause more

⁴¹² Dirk A. Zetzsche, Douglas W. Arner, Ross P. Buckley & Rolf H. Weber, *The Future of Data-Driven Finance and RegTech: Lessons from EU Big Bang II* 4-5, 7-8 (Eur. Bank. Inst. Working Paper Series 2019/35; UNSW L. Research Paper No. 19-22; U. Lux. L. Working Paper No. 005-2019; U. H.K. Faculty L. Research Paper No. 2019/004), <https://ssrn.com/abstract=3359399>.

⁴¹³ *Id.* at 14-15.

complexities due to the potential fraud, cheating, cyber-attacks and other types of financial crimes that are conducted by exploiting the anonymity of blockchain-based transactions. As blockchain technology is relatively young, the information assessing those concerns may not be obtained by consumers or investors. Information deficits thus exist.

Thirdly, with respect to *fragmentation*, blockchain technology enables fragmentation of the assets, helping to create fragmented instruments and resulting in more complexities. However, the aforementioned advantages of blockchain technology such as transparency, instantaneity and automation may ease the problems brought by fragmentation.

Lastly, with respect to *regulation*, the use of technology would generally result in more different types of instruments or players in markets. Due to the uncertain legal status and applicable regulations regarding these new instruments and players, blockchain technology would bring more complexity. Will the above changes in complexity influence the applicability of traditional financial regulation? What is the root cause of this result? The next Section will answer these questions.

4. Is Traditional Financial Regulation Suitable in the Era of FinTech?

This Section discusses whether traditional financial regulations such as banking regulation and securities regulation is suitable when regulating blockchain technology. Section 4.1 examines this issue from the perspective of complexity by examining how the changes in complexity brought by blockchain technology will affect the applicability of traditional financial regulation. Section 4.2 analyzes the root cause which leads to the situation that traditional financial regulation might be imperfect. That is, technology is faster than regulation in the era of FinTech. Section 4.3 summarizes.

4.1 Changes in Complexity Affect the Applicability of Traditional Financial Regulation

4.1.1 Technology

Firstly, with respect to the driver “*technology*”, blockchain technology does not seem to bring more complexities but renders the financial regulation focusing on the central party or traditional financial intermediaries unsuitable. That is, its *decentralization* enables transactions to be conducted in the system without a central party, which is different from the centralized system where traditional financial regulations operate. For example, the mediums involved in transactions in fact mirror the emergence of platform-based business models reducing transaction costs. In such, traditional financial intermediaries may not be involved. Thus, the financial regulation that centers on the obligations of traditional financial intermediaries may be bypassed. For example, commentators pointed out that such a situation may happen in the context of AML (anti-money laundering, “AML”) regulation as it has imposed requirements on traditional financial intermediaries such as banks.⁴¹⁴ On the other hand, the *transparency*, *instantaneity* and *automation* of blockchain technology further establish an environment in which information asymmetry and opportunism concerns may be eased.⁴¹⁵ Due to the above features of blockchain technology itself, asserting that traditional financial regulation is insufficient is not appropriate. Rather, traditional financial regulation may not be suitable or even not necessary.⁴¹⁶

4.1.2 Opacity

Secondly, with respect to the driver “*opacity*”, blockchain technology

⁴¹⁴ CRISTINA CUERVO, ANASTAIIA MOROZOVA & NOBUYASU SUGIMOTO, INTERNATIONAL MONETARY FUND, REGULATION OF CRYPTO ASSETS 5-6 (2019).

⁴¹⁵ Davidson et al., *supra* note 314, at 10.

⁴¹⁶ See Recent Guidance, *supra* note 349, at 2418-19.

gives rise to the opacity in the markets because of the non-availability of information, and this opacity might generate more complexities that were not dealt with. For example, the opacity is caused when the evolving attack vectors and the likelihood of fraud, cheating and financial crimes are not fully known by the blockchain technology users within the system.⁴¹⁷ The possibility of cyber-attacks weakens the willingness of market players to take part in blockchain-related transactions, thereby impedes the goals of financial markets such as capital formation.⁴¹⁸ Moreover, the cybersecurity concerns contribute to the fluctuation of the price of blockchain-based instruments.⁴¹⁹ The immaturity of these new instruments manifests itself as this price volatility and information sensitivity.⁴²⁰ Another example of the opacity caused by blockchain technology is the possibility that market participants may face fraud, cheating or financial crimes because the counterparties could cheaply exploit signals.⁴²¹ The above threats raise consumer protection concerns.

Therefore, blockchain technology results in the opacity of the markets that brings complexities. Indeed, opacity has existed in traditional markets. As discussed before, the complexities in the traditional money market appear on both the transactional and institutional levels.⁴²² These complexities are recognized as the sources of unclear information regarding the risks in this market.⁴²³ Thus, they also contribute to opacity.⁴²⁴ In the traditional capital market, the complexly structured financial instruments and the corresponding transactions exemplify this sort of complexities in this

⁴¹⁷ ENGLISH ET AL., *supra* note 362, at 14.

⁴¹⁸ *E.g.*, U.S. SECURITIES AND EXCHANGE COMMISSION, *supra* note 129, at 9; Tual, *supra* note 367.

⁴¹⁹ *See* Nabilou & Prüm, *supra* note 150, at 57-60.

⁴²⁰ *See id.*

⁴²¹ *See generally* Ante & Fiedler, *supra* note 377.

⁴²² *See supra* Section 2.2.2.

⁴²³ *See* Awrey, *supra* note 219, at 254-55.

⁴²⁴ *See id.* at 255.

market.⁴²⁵ These instrumental and transactional complexities thus create vagueness of information regarding the potential risks.⁴²⁶ The corresponding regulation thus emphasizes preventing and mitigating the systemic harm to the traditional money market and disclosing important information that is possessed by traditional capital market participants. These two regimes may not be suitable for the blockchain-based markets because of two reasons.

First, the blockchain-based financial markets are distinctive from either the traditional money market or capital market.⁴²⁷ These new markets, however, also have some features that are in common with the traditional money market or the capital market. Due to these similarities and differences, the innovative blockchain-based capital market thus epitomizes a market where the traditional regulatory regimes may not be perfectly suitable.

Second, while the opacity that the traditional financial regulation has dealt with is in relation to unknown but knowable information, the opacity existing in blockchain-based markets and contributing to complexity might differ. That is, this opacity seems to be more relevant to another vein in the literature, in that information is not known nor knowable by any participants in the system. According to commentators, the consensus mechanism established by blockchain technology solves bureaucracy rather than unknown unknowns as shown in the DAO attack incident.⁴²⁸ Unknown unknowns are said to be potentially significant in the blockchain-based

⁴²⁵ See Schwarcz, *supra* note 118, at 220-21.

⁴²⁶ See *id.* at 220-21, 223-24; Awrey, *supra* note 219, at 251-53, 255.

⁴²⁷ See *supra* Section 2.4.

⁴²⁸ Thomas John & Mantri Pam, *Complex Adaptive Blockchain Governance* 13-15 (2018), https://www.matec-conferences.org/Chapters/mateconf/pdf/2018/82/mateconf_icad2018_01010.pdf; Shermin Voshmgir, *Blockchain's Problem with Unknown Unknowns*, MEDIUM (Mar. 12, 2017), <https://medium.com/blockchain-hub/blockchains-problem-with-unknown-unknowns-6837e09ec495>.

markets where assets are tokenized such as in STOs markets.⁴²⁹ In the STOs markets, therefore, it may be doubtful that the traditional securities regulation aiming to reveal knowable information is functionable. In addition, the potential threats are also associated with numerous types of liabilities in securities regulation if these threats and the associated damages happen.⁴³⁰ The previously mentioned uncertainty, and the corresponding dangers and potential liabilities might discourage potential participants from engaging in blockchain-based markets. Consequently, it is doubtful whether innovation could be promoted or not.⁴³¹ Because of the above two reasons, the regulatory challenges impairing the applicability of traditional financial regulations are posed.

4.1.3 Fragmentation

Thirdly, with respect to the driver “*fragmentation*”, blockchain technology causes fragmentation but seems not to result in regulatory inapplicability because of the other technical nature of these fragmented instruments. That is, even though blockchain technology improves the

⁴²⁹ See Volodymyr Babich & Gilles Hilary, *Distributed Ledgers and Operations: What Operations Management Researchers Should Know about Blockchain Technology 7* (2019), <https://ssrn.com/abstract=3131250>.

⁴³⁰ For example, the types of civil liabilities may include the strict liability imposed on issuers for any material misrepresentation or omission in the registration statement and the near strict liability imposed on brokers for not complying with registration or prospectus requirements. COFFEE & SALE, *supra* note 239, at 836-37, 889-90, 896. The types of civil liabilities associated with the issuance of securities and the frauds may be related to the disclosure requirements imposed on issuers regarding expected risks. CF Disclosure Guidance: Topic No. 2, U.S. SECURITIES AND EXCHANGE COMMISSION (Oct. 13, 2011), https://www.sec.gov/divisions/corpfin/guidance/cfguidance-topic2.htm#_edn2. The safeguard adoption requirements imposed on broker-dealers are also relevant. *Regulation S-P*, U.S. SECURITIES AND EXCHANGE COMMISSION, <https://www.sec.gov/spotlight/regulation-s-p.htm> (last visited May 7, 2019). The anti-fraud rules imposed on both issuers and brokers may apply as well. COFFEE & SALE, *supra* note 239, at 652-53, 919, 1132.

⁴³¹ Regarding the liability for unknown risks and relevant discussions, *see generally* Faure et al, *supra* note 139. One of the interesting parts of this paper that will be relevant to this chapter is the discussion about the interaction between unknown risks and innovation. *See id.*, at 211-12.

fragmentation of instruments by fractionalizing the ownership of the underlying assets,⁴³² these instruments benefit from the transparency brought by blockchain technology. In comparison with the fragmented instruments in traditional markets that bring higher information costs because of the vagueness of information,⁴³³ it is likely that the outcome of this driver “*fragmentation*” in the context of blockchain technology would differ if the aforementioned opacity is not considered. Hence, the fragmentation of instruments itself may not incur regulatory challenges.⁴³⁴ Nevertheless, it might be envisaged that as the fragmented instruments in, for instance, STOs, could be transacted across jurisdictions, more ambiguities in the securities regulations in different jurisdictions might be led.⁴³⁵

4.1.4 Regulation

Fourthly, with respect to the driver “*regulation*”, blockchain technology brings complexities because (1) the legal status, the corresponding obligations and the possible exemptions are not settled, and (2) conflicts between existing legal requirements and the technology are presented. Those phenomena arise due to, among other things, the imperfect applicability of traditional financial regulations. The uncertain regulatory responses to STOs in the context of securities regulation exemplify this situation. This phenomenon exists not only in the case of STOs but also when

⁴³² E.g., Curran, *supra* note 128; PHILIP PANG ET AL., REAL ESTATE TOKENIZATION 6 (2020), <https://assets.kpmg/content/dam/kpmg/cn/pdf/en/2020/04/real-estate-tokenization.pdf>.

⁴³³ E.g., Awrey, *supra* note 219, at 252-53. Regarding how financial innovation generates fragmentation and how the financial regulation would be challenged, *see generally* Judge, *supra* note 118.

⁴³⁴ Nonetheless, commentators argued that the regulatory challenge might be the possibility that liabilities may be fragmented and distributed across the nodes in the blockchain-based system. Zetzsche et al., *supra* note 409, at 1406.

⁴³⁵ See Xing Loong Lim, *Security token offerings (STOs): Re-centralizing the blockchain dream in Singapore*, MONDAQ (Sep. 10, 2019), <https://www.mondaq.com/fin-tech/843982/security-token-offerings-stos-re-centralizing-the-blockchain-dream-in-singapore>.

it comes to various FinTech applications. Thus, more complexities in terms of regulation might be the result. Ultimately, the legal uncertainty and conflicts between technology and regulation existing in innovative markets may stifle creativity and innovation and increase the costs of conducting business due to the fact that a thorough legal and technical analysis before engaging in the business becomes necessary.⁴³⁶ The root of the legal uncertainty, conflicts and increasing costs are the regulatory complexity existing especially when technology is faster than the regulation.

4.2 The Root Cause – Technology Is Faster than Regulation

4.2.1 Regulatory Objectives Are Not Be Fulfilled

According to the previous analyses, traditional financial regulation might not be perfect when regulating blockchain technology because it is established based on the nature of traditional financial markets and focused on the other complexities that have existed before.

As for complexities, they are the result of new technology and innovation. They also render regulators and regulations incapable of keeping pace with the changing financial markets.⁴³⁷ In other words, while modern markets are becoming more innovative and complex, there would possibly be a gap between technology and regulation because the governments fail to respond to it in a timely manner.⁴³⁸

⁴³⁶ See Mendelson, *supra* note 289, at 93; Nejc Novak, *A Call for Legal, Ethical and Sustainable Token Offerings*, MEDIUM (Jun. 27, 2018), <https://medium.com/@nejcnovaklaw/a-call-for-legal-ethical-and-sustainable-token-offerings-4d7cd16c64ac>.

⁴³⁷ E.g., Andrew W. Lo, *Regulatory Reform in the Wake of the Financial Crisis of 2007-2008*, 1 J. FIN. ECON. POL'Y 4, 7 (2009).

⁴³⁸ See, e.g., Wulf A. Kaal, *Dynamic Regulation for Innovation 5* (U. of St. Thomas (Minnesota) Legal Studies Research Paper No. 16-22, 2016), <https://ssrn.com/abstract=2831040>; Gary E. Marchant, *The Growing Gap Between Emerging Technologies and the Law*, in THE GROWING GAP BETWEEN EMERGING TECHNOLOGIES AND LEGAL-ETHICAL OVERSIGHT 19, 20-21 (Gary E. Marchant,

Most importantly, if technology moves faster than regulation, what are the consequences? Studies have shown that the consequences are two-fold. Firstly, if regulation is reactive and falling behind, this situation is often regarded as leading to the situation that the regulatory objectives could not be fulfilled.⁴³⁹ Secondly, since technology and innovation are still evolving, the financial regulation that is static and slower would not be able to address the new regulatory issues and challenges posed by that evolution.⁴⁴⁰

4.2.2 The Pacing Issue Matters

FinTech such as blockchain technology would bring changes in complexity and market failures as analyzed above. Besides, traditional regulation tends to be incapable of keeping pace with FinTech. Thus, the issue of how to craft FinTech regulation should be addressed by considering not only the content but also the pacing.⁴⁴¹ After all, both the content and the pacing of regulation are important.⁴⁴² If traditional financial regulation does not fit FinTech, are the current FinTech regulations perfect? If not, do the imperfections manifest themselves as the difficulties of the regulatory pacing? Later chapters will tackle these issues.

4.3 Summary

This Section studied the changes in complexity brought by blockchain technology and whether they result in any influence on the applicability of

Braden R. Allenby & Joseph R. Herkert eds., 2011).

⁴³⁹ ARMOUR ET AL., *supra* note 144, at 563.

⁴⁴⁰ Wulf A. Kaal, *Dynamic Regulation of the Financial Services Industry*, 48 WAKE FOREST L. REV. 791, 800 (2013).

⁴⁴¹ See Marcelo Corrales, Mark Fenwick & Nikolaus Forgó, *Disruptive Technologies Shaping the Law of the Future*, in NEW TECHNOLOGY, BIG DATA AND THE LAW 1, 3 (Marcelo Corrales, Mark Fenwick & Nikolaus Forgó eds., 2017).

⁴⁴² See Jacob E. Gersen & Eric A. Posner, *Timing Rules and Legal Institutions*, 121 HARV. L. REV. 543, 544 (2007).

traditional financial regulation.

Firstly, with respect to the driver *technology*, blockchain technology was not deemed to fit well the regulation that focuses on a central party. On the other hand, due to its transparency, it is doubtful that a regulatory approach aiming to reveal information would be necessary or suitable.

Secondly, with respect to the driver *opacity*, blockchain technology was thought to give rise to some unknown and unknowable information.⁴⁴³ Thus, it results in the situation that traditional financial regulation such as securities regulation aiming to reveal unknown but knowable information might be unsuitable.

Thirdly, with respect to the driver *fragmentation* of the instruments, blockchain technology causes fragmentation but seems not to result in regulatory inapplicability because of the other technical specialties of these fragmented instruments. However, more ambiguities in the securities regulations in different jurisdictions might be led while these fragmented instruments could spread across jurisdictions.⁴⁴⁴ Besides instrumental fragmentation, fragmentation in the markets due to the emergence of more platforms and their regulatory issues were not discussed in this Chapter and left for future research.⁴⁴⁵

Lastly, with respect to the driver *regulation*, blockchain technology might result in the inapplicability of traditional financial regulation while the legal status, the corresponding obligations, and the possible exemptions are not settled. The unfit condition of STOs and the corresponding securities

⁴⁴³ See, e.g., Voshmgir, *supra* note 428; Babich & Hilary, *supra* note 429, at 7.

⁴⁴⁴ See Lim, *supra* note 435.

⁴⁴⁵ For instance, my future research will study the regulatory issues such as anti-competition tendency in the face of the emergence of FinTech companies as platforms in payment markets.

regulation exemplifies it. In fact, this Section briefly argued that the root reason for the above negative influence of complexity on regulation is the pacing issue between technology and regulation. Later chapters will further study this issue.

5. Conclusion

In the innovative financial markets where the introduction of technology brings not only benefits but also challenges, it is envisioned that regulatory challenges would arise. Blockchain technology, which has been employed to provide new types of financial products and/or services, has drawn practitioners', scholars' and regulators' attention. The changes posed by blockchain technology could be overvalued by enthusiasts or undervalued by skeptics.⁴⁴⁶ This Chapter aimed to examine those changes on the basis of the elements which defined modern financial markets in order to identify the regulatory challenges.

It was found that, firstly, as blockchain technology helps create new players and instruments, these blockchain-based financial markets are distinctive from either the traditional money market or the traditional capital market but share some of their characteristics. Secondly, blockchain technology results in the changes in complexity due to its technical features. In order to find a balance between enthusiasm and skepticism, the above distinctive features together with the changes in complexity were also thoroughly examined. Blockchain technology seems to solve the informational problem regarding its dissemination through establishing a decentralized and transparent truth-discovery mechanism to render traditional financial regulation unsuitable or even unnecessary. Similarly,

⁴⁴⁶ See Christian Catalini, *Blockchain Technology and Cryptocurrencies: Implications for the Digital Economy, Cybersecurity, and Government*, 19 *GEORGET. J. INT. AFF.* 36, 36 (2018).

blockchain technology also creates the vagueness due to potential threats such as financial crimes, thereby rendering the traditional financial regulation unsuitable. Notwithstanding the internal transparency, vagueness is also added by blockchain technology, because it is still in its early stage, and information could be exploited to deprive market participants of their understanding. It thus impairs traditional financial regulation particularly when it emphasizes disclosure. In a sense, in the modern finance that is interpreted by complexity,⁴⁴⁷ frictions are found between technology and regulation. Those frictions manifest themselves as legal uncertainties, which are at a more technical level, or the conflicts of their nature, which are at a fundamental level. If regulation is needed, the traditional financial regulation seems to be incomplete as it is not capable of catching the changes of complexity posed by blockchain technology.

Thirdly, the root cause of the above phenomena seems to be the fact that technology is faster than regulation. The difficulties of the pacing are envisaged especially in the era of FinTech in which technology and innovation are rapidly evolving. In fact, there are already some FinTech regulations aiming to solve, for instance, the vagueness resulting in financial crimes such as money laundering. However, are these FinTech regulations capable of capturing the evolution of FinTech? Does the pacing issue still remain? How to craft FinTech regulation in the face of the pacing issue? Later chapters will analyze these issues.

⁴⁴⁷ Awrey, *supra* note 219, at 293.

Chapter 4

Regulatory Approaches to FinTech and the Difficulties: Some Examples of FinTech Regulations in the EU and the US

1. Introduction

Chapter 3 explained how complexities in modern financial markets contribute to market failures and thus merit regulatory intervention in the context of FinTech. Chapter 3 also pointed out that the complexities ultimately result in the pacing issue in the era of FinTech, rendering regulation disconnected with FinTech. In fact, in the face of the rapid development of technology, the questions of *why*, *what*, *when*, and *how* to introduce regulatory interventions become difficult.⁴⁴⁸ The *why* and *what* questions, which are related to identifying the technology that should be regulated and the rationales,⁴⁴⁹ were tackled in Chapter 3 from the perspective of complexity. This Chapter then embarks on legal analyses of FinTech regulations to continuously focus on the following questions – *If regulation is needed, are traditional financial regulatory approaches suitable?* By studying and comparing the regulatory approaches to FinTech in the EU and US, lawmakers' actual reaction to FinTech in jurisdictions could be found. Then, this Chapter will explore the difficulties that might be encountered when regulating FinTech. That is, the pacing issue raised in Chapter 3 will be mirrored by the legal analyses in this Chapter.

As a path to digital financial markets is envisaged due to the employment

⁴⁴⁸ See Mark Fenwick, Wulf A. Kaal & Erik P. M. Vermeulen, *Regulation Tomorrow: What Happens When Technology Is Faster than the Law*, 6 AM. U. BUS. L. REV. 561, 581-82 (2017).

⁴⁴⁹ *Id.* at 571.

of FinTech,⁴⁵⁰ new market participants such as FinTech firms would emerge and co-exist with incumbent players,⁴⁵¹ thereby leading the expansion of FinTech.⁴⁵² If regulation is needed, however, regulation might fail if it is not connected with the facts about technology.⁴⁵³ Even though regulation is tailor-made, it may also result in a “post-fact society” in which the original regulatory landscape no longer matters because this landscape is already altered by the development of technology.⁴⁵⁴ The development of the blockchain technology in recent years is an example. The applications of the blockchain technology have evolved from a record-keeping and authentication means to, for instance, encoding legal arrangements into the so-called smart contracts or supporting innovative business models such as undertaking capital raising through different types of tokens. The associated risks similarly expand from standard risks to new risks such as value transfer risks and smart contract risks.⁴⁵⁵ The changing applications of the blockchain technology result in the changing risks.⁴⁵⁶

However, the regulations in jurisdictions that might be applicable to FinTech and the changing risks seem to be lacking at the time of writing. Since FinTech regulatory issues have been emerging in recent years, the question of what the suitable regulatory approach seems to be is still controversial. The regulatory approaches in jurisdictions are also disparate. For instance, with respect to FinTech, the US regulators have seemed to

⁴⁵⁰ BRAD J. BAILEY, CAIA ASSOCIATION, *FUTURE OF FINTECH IN CAPITAL MARKETS* 32 (2016).

⁴⁵¹ DELOITTE, *THE FUTURE OF POST-TRADE: A GLIMPSE INTO THE FUTURE* 5, 8 (2017), <https://www2.deloitte.com/content/dam/Deloitte/de/Documents/strategy/Future-of-Post-Trade-Glimpse-Paper.pdf>.

⁴⁵² Dirk Zetzsche, Ross Buckley & Douglas Arner, *The Rise of TechFins: Regulatory Challenges*, in *FINTECH: LAW AND REGULATION* 280, 281 (2019).

⁴⁵³ See ROGER BROWNSWORD & MORAG GOODWIN, *LAW AND TECHNOLOGIES OF THE TWENTY-FIRST CENTURY: TEXT AND MATERIALS* 67 (2012).

⁴⁵⁴ See Fenwick et al., *supra* note 448, at 582.

⁴⁵⁵ PRAKASH SANTHANA & ABHISHEK BISWAS, DELOITTE, *BLOCKCHAIN RISK MANAGEMENT: RISK FUNCTIONS NEED TO PLAY AN ACTIVE ROLE IN SHAPING BLOCKCHAIN STRATEGY* 5-7 (2017).

⁴⁵⁶ *Id.* at 8.

emphasize the promotion of innovation and competition by presenting a more wait-and-see attitude rather than rigorously regulating it.⁴⁵⁷ It, nevertheless, does not mean that FinTech is unregulated in the US; instead, the efforts to regulate while fostering FinTech are fragmented in terms of the applicable regulation and the responsible regulator in the US.⁴⁵⁸

In the EU, regulatory responses to FinTech seem to be more explicit and specific because of several directives and regulations enacted to regulate the digital financial markets.⁴⁵⁹ For instance, GDPR (General Data Protection Regulation, “GDPR”), which reflects the emphasis on the importance of data in modern markets, has been discussed by commentators when it comes to regulating FinTech firms because data is critical to their provision of services or products.⁴⁶⁰ Besides, the promotion of FinTech innovation and competition has also been stressed through, for example, PSD2 (the second Payment Services Directive, “PSD2”), which aims to address the issues regarding the involvement of FinTech firms engaging in payment markets as payment services providers.⁴⁶¹ The idea of “open banking” (hereinafter “OB”), which stresses opening of the data pools possessed by financial

⁴⁵⁷ See Hilary J. Allen, *Experimental Strategies for Regulating Fintech*, 3 J.L. & INNOVATION 1, 24-25 (2020); Sviatoslav Rosov, *Regulators Have a “Wait and See” Attitude About Regulating FinTech*, CFA INSTITUTE (Dec. 29, 2016), <https://blogs.cfainstitute.org/marketintegrity/2016/12/29/regulators-have-a-wait-and-see-attitude-about-regulating-fintech/>.

⁴⁵⁸ See Tom Groenfeldt, *U.S. Needs Smarter FinTech Regulation To Compete Globally*, FORBES (Aug. 2, 2018), <https://www.forbes.com/sites/tomgroenfeldt/2018/08/02/u-s-needs-smarter-fintech-regulation-to-compete-globally/#61c351202df3>; Lynn Bromley, *A Seat at the Table – Bringing the Voice of FinTech to the US Regulatory Process*, in THE REGTECH BOOK: THE FINANCIAL TECHNOLOGY HANDBOOK FOR INVESTORS, ENTREPRENEURS AND VISIONARIES IN REGULATION 93, 94-96 (Janos Barberis, Douglas W. Arner, Ross P. Buckley eds., Aug. 2019).

⁴⁵⁹ See Fernando Restoy, BIS, *Regulating Fintech: What is Going On, and Where Are the Challenges?* 3 (Oct. 16, 2019), <https://www.bis.org/speeches/sp191017a.pdf>.

⁴⁶⁰ See Alex Don, *Is GDPR A Competitive Advantage for FinTechs?*, DELOITTE, <https://www2.deloitte.com/uk/en/pages/financial-services/articles/is-gdpr-a-competitive-advantage-for-fintechs.html> (last visited Aug. 21, 2020).

⁴⁶¹ Directive 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC, 2015 O.J. (L 337) 35 [hereinafter Directive 2015/2366].

institutions such as banks to FinTech firms,⁴⁶² is behind PSD2. In addition to GDPR and PSD2, existing regulations have also been extended to address the issues regarding blockchain technology applications.⁴⁶³ For instance, AMLD5 (the fifth Anti-Money Laundering Directive, “AMLD5”) regulates the platforms, exchanges and custodian wallet providers involved in blockchain transactions.⁴⁶⁴ This Chapter, however, will focus on both PSD2 and AMLD5 as examples to study the EU’s FinTech regulatory response as the heart of GDPR – data protection – might go beyond the scope of this Chapter and could be left for future research. The transposition of the EU’s regulatory approach will also be partly mentioned by presenting the UK’s transposition. However, the EU level is what this Chapter will mainly concentrate on.

This Chapter proceeds as follows. Section 2 discusses the EU’s regulatory responses to FinTech by studying both PSD2 and AMLD5 as the examples. Section 3 examines the regulatory responses to FinTech in the US. This section studies its general regulatory approach and several enforcement actions and activities undertaken by the SEC (The U.S. Securities and Exchange Commission, the “SEC”) as examples in chronological order. This section also discusses several recent bills proposed to address blockchain technology issues at the time of this writing. Section 4 embarks on a comparative analysis of the regulatory approaches to FinTech in the EU and US from a higher perspective. This section aims to discover the differences between them and to study their suitability for FinTech, revealing the

⁴⁶² Regarding more details of this concept, *see infra* Section 2.2.1.

⁴⁶³ *See* Simon Lovegrove & Lisa Lee Lewis, *The EU’s Fifth Anti-Money Laundering Directive: A Regulatory Compliance Perspective*, NORTON ROSE FULBRIGHT (Nov. 2019), <https://www.nortonrosefulbright.com/en/knowledge/publications/8f84c163/the-eus-fifth-anti-money-laundering-directive-a-regulatory-compliance-perspective>.

⁴⁶⁴ Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU, 2018 O.J. (L156) 43 [hereinafter Directive 2018/843].

importance of the pacing issue in the era of FinTech. Section 5 concludes.

2. Regulatory Responses to FinTech in the EU

This Section studies the EU's regulatory responses to FinTech by examining several regulations in the light of the regulatory pacing issue. Section 2.1 presents an overview of FinTech regulations in the EU. Section 2.2 studies PSD2 as an example. Section 2.3 studies AMLD5 as another example. Section 2.4 summarizes.

2.1 Overview of FinTech Regulation in the EU

To foster a more competitive and innovative EU financial market by unleashing the opportunities brought by FinTech and addressing the challenges posed by it, has been the EU regulators' target.⁴⁶⁵ EU regulators are known to be faster than US regulators in terms of responding to FinTech as several regulations that could be applied to FinTech have been enacted.⁴⁶⁶ Nevertheless, the EU financial regulation have received criticism as it is deemed to be dispersed and still too slow to adapt and change.⁴⁶⁷ This may be exemplified by the current EU FinTech regulations to the extent that a dedicated regulatory framework is lacking.⁴⁶⁸ Thus, while the rise of FinTech companies has been witnessed, the EU regulations applied to them

⁴⁶⁵ EUROPEAN COMMISSION, FINTECH ACTION PLAN: FOR A MORE COMPETITIVE AND INNOVATIVE EUROPEAN FINANCIAL SECTOR 2 (2018), https://eur-lex.europa.eu/resource.html?uri=cellar:6793c578-22e6-11e8-ac73-01aa75ed71a1.0001.02/DOC_1&format=PDF.

⁴⁶⁶ Alastair Mitchell, *US Regulators Need to Catch Up with Europe on Fintech Innovation*, TECHCRUNCH (Jan. 23, 2020), <https://techcrunch.com/2020/01/23/us-regulators-need-to-catch-up-with-europe-on-fintech-innovation/>.

⁴⁶⁷ See, e.g., Wolf-Georg Ringe & Christopher Ruof, *Regulating Fintech in the EU: The Case for a Guided Sandbox*, 11 EUR. J. OF RISK REG. 604, 604 (2020).

⁴⁶⁸ See BRIAN CHRISTIANSEN, KHALIL MAALOUF, PATRICK BRANDT, MARGOT SEVE, FRANCOIS PIQUET, JOSEPH SANDMAN & GREG SEIDNER, A LOOK AT US AND EU FINTECH REGULATORY FRAMEWORK 3 (Feb. 16, 2018), https://www.skadden.com/-/media/files/publications/2018/02/a_look_at_us_and_eu_fintech_regulatory_frameworks.pdf.

are still fragmented, and thus influence the possibility that the associated risks could be mitigated.⁴⁶⁹ On the basis of the above notions, this Section analyzes whether and why the EU FinTech regulations may not be sufficiently adaptable to keep pace with FinTech.

Several EU directives or regulations have been enacted and promulgated to address FinTech-related issues. Since the rise of FinTech companies has merited regulators' and practitioners' attention due to its structural impact,⁴⁷⁰ the FinTech-related regulatory issues are often associated with the risks which arise (1) when FinTech companies try to enter the markets to co-exist with existing players and (2) when FinTech companies may involve higher operational risks such as money laundering.⁴⁷¹ In the following, two regulatory responses in the EU, which are PSD2 and AMLD5, will be analyzed as they respectively correspond to the two types of risks mentioned above. Specifically, the appraisal of PSD2 and AMLD5 will answer the question of whether EU FinTech regulation keep pace with FinTech.

⁴⁶⁹ JOHN (IANNIS) MOURMOURAS, FIN-REGTECH: REGULATORY CHALLENGES WITH EMPHASIS ON EUROPE 8 (2019), <https://www.bis.org/review/r190318m.pdf>.

⁴⁷⁰ See, e.g., Iris H-Y Chiu, *FinTech and Disruptive Business Models in Financial Products, Intermediation and Markets – Policy Implications for Financial Regulators*, 21 J. TECH. L. & POL'Y 55, 66 (2016). The structural impact can be seen as the structure of the industry is changed by, for instance, the possibility that new players might co-exist or even substitute existing players by solving the pain points that the existing players have. See Dirk A. Zetsche, Ross P. Buckley, Douglas W. Arner & Janos N. Barberis, *From Fintech to Techfin: The Regulatory Challenges of Data-Driven Finance*, 14 N.Y.U. J.L. & BUS. 393, 405-6 (2018)

⁴⁷¹ See MOURMOURAS, *supra* note 469, at 6-7. Operational risks are defined as the risks associated with the imperfect internal processes, people and systems; thus, companies such as financial institutions are often required to enhance their operational risks management to mitigate certain types of operational risks. *Operational Risk*, EUROPEAN BANKING AUTHORITY, <https://eba.europa.eu/regulation-and-policy/operational-risk> (last visited Apr. 15, 2020). For instance, banks are required to enhance its internal processes in order to mitigate money laundering risks. See DELOITTE, THE FUTURE OF OPERATIONAL RISK IN FINANCIAL SERVICES: A NEW APPROACH TO RISK CAPITAL MANAGEMENT 8 (2018), https://www2.deloitte.com/content/dam/Deloitte/cy/Documents/financial-services/CY_FS_The-future-of-operational-risk-in-financial-services_Noexp.pdf.

2.2 PSD2 – Promotion of FinTech through Open Banking

This Section studies PSD2 as an example of the EU’s FinTech regulations.⁴⁷² Section 2.2.1 first illustrates how PSD2 advocates the idea of OB and its rationales. Section 2.2.2 briefly describes its legislative history. Section 2.2.3 studies its toolkits. Section 2.2.4 particularly analyzes the content of it in the light of the pacing issue.

2.2.1 Advocacy of Open Banking

PSD2 is a regulatory response to the emergence of FinTech companies as the new players in payment markets by mandating data sharing between FinTech companies and the existing financial institutions such as banks.⁴⁷³ Those FinTech companies could accordingly gain the data which is needed to do their businesses because their businesses are, for instance, facilitating customers’ transactions, initiating payment orders or integrating customers’ financial data.⁴⁷⁴ Thus, these customers’ financial data which is stored in banks’ data pools are pivotal. The sharing and opening of customers’ data pools held by banks is based on the use of open APIs (application programming interfaces, “APIs”),⁴⁷⁵ enabling other parties to access and use

⁴⁷² Sections 2.2.1, 2.2.2, and 2.2.3 will be part of a book that I co-authored with Prof. Chang-Hsien Tsai and will expectedly be published by Routledge in the end of 2022. However, the scope of the book that will be published is far beyond this Section because this book will comprehensively study and compare OB regulations in the EU, UK, and Taiwan.

⁴⁷³ See, e.g., Christiansen et al., *supra* note 468, at 4.

⁴⁷⁴ Regarding more details about the businesses of the FinTech companies which could gain data, see *infra* note 491.

⁴⁷⁵ EBA WORKING GROUP ON ELECTRONIC ALTERNATIVE PAYMENTS, UNDERSTANDING THE BUSINESS RELEVANCE OF OPEN APIs AND OPEN BANKING FOR BANKS: INFORMATION PAPER 15 (2016). APIs are interfaces where different software applications could communicate with each other when one call upon the functionality of another. However, APIs could be accessed either within or beyond the boundaries of an organization. If an API could be accessed by third parties, it is a public interface to access data based on an open standard. This is the so-called “open APIs”. *Id.* at 7; OPEN BANKING WORKING GROUP, THE OPEN BANKING STANDARD: UNLOCKING THE POTENTIAL OF OPEN BANKING TO IMPROVE COMPETITION, EFFICIENCY AND STIMULATE INNOVATION 3 (2016).

the data. The above descriptions illustrate the core concepts of OB that PSD2 is based on.

Why is sharing and opening data to FinTech companies gaining its momentum nowadays? The reasons are associated with the entry barriers faced by these emerging FinTech companies. These emerging FinTech companies might reshape the modern payment markets because they represent the parties that provide financial services while they are not financial institutions who have historically done so.⁴⁷⁶ The emergence of FinTech companies thus brings financial alternatives and inclusion. However, entry barriers remain where incumbent banks have predominantly controlled the customer data pools,⁴⁷⁷ thereby hindering FinTech companies trying to enter the markets.⁴⁷⁸ In other words, incumbents' market power is at the expense of other smaller players that are facing entry barriers because new players could not obtain the access to data.⁴⁷⁹ In fact, the dominance by

⁴⁷⁶ This is relevant to the aforementioned structural impact brought by FinTech companies, *see supra* note 470 and accompanying text.

⁴⁷⁷ *See* Giuseppe Colangelo & Oscar Borgogno, *Data, Innovation and Transatlantic Competition in Finance: The Case of the Access to Account Rule* 10, 29-30 (European Union Law Working Papers No. 35, 2018), https://www-cdn.law.stanford.edu/wp-content/uploads/2018/09/colangelo_borgogno_eulawwp35.pdf. In addition to the threats posed by incumbent banks, the introduction of BigTechs to the financial markets also poses network effects, possibly threatening the emerging FinTech companies. Those big technology companies, namely "BigTechs", have recently involved in financial industries to add financial services to their value-chains. Typical examples are Alibaba and Tencent in China as they dominate the payment market. *See* Zetsche et al., *supra* note 470, at 405; Jon Frost, Leonardo Gambacorta, Yi Huang, Hyun Song Shin & Pablo Zbinden, *BigTech and the Changing Structure of Financial Intermediation* 2 (BIS Working Papers No. 779, Apr. 2019), <https://www.bis.org/publ/work779.pdf>. Thus, BigTechs are enabled to extract value and to discriminate against other players. *See* Miguel de la Mano & Jorge Padilla, *Big Tech Banking*, 14 J. COMPETITION L. & ECON. 494, 507 (2019). The concerns such as consumer protection, stemming from BigTech's involvement in financial services, thereby called for a proposal in the US to exclude them from financial markets. Pete Schroeder & Ismail Shakil, *U.S. Proposes Barring Big Tech Companies from Offering Financial Services, Digital Currencies*, REUTERS (July 15, 2019), <https://www.reuters.com/article/us-usa-cryptocurrency-bill/u-s-proposes-barring-big-tech-companies-from-offering-financial-services-digital-currencies-idUSKCN1U90NL>.

⁴⁷⁸ Colangelo & Borgogno, *supra* note 477, at 10.

⁴⁷⁹ *See id.* at 14-15; Jens-Uwe Frank & Martin Peitz, *Digital Platforms: Market Definition and Market Power*, OXFORD BUS. L. BLOG (May 29, 2019),

incumbents is associated with the limited competition that historically exists in financial markets and the associated social costs.⁴⁸⁰ The payment markets have historically been intertwined with the traditional banking system;⁴⁸¹ thus, the anti-competitive tendency is exemplified.

According to commentators, those issues arise especially in the era of FinTech because data plays a crucial role therein as the amount of data players hold would determine their competitive strength.⁴⁸² Thus, while FinTech companies are capable of bringing benefits because they, for instance, facilitate payment transactions by integrating financial data, the difficulty in accessing the data precludes the realization of these benefits.⁴⁸³ As a result, regulatory intervention such as PSD2 is presented.

<https://www.law.ox.ac.uk/business-law-blog/blog/2019/05/digital-platforms-market-definition-and-market-power>.

⁴⁸⁰ See Lawrence G. Baxter, *Betting Big: Value, Caution and Accountability in an Era of Large Banks and Complex Finance*, 31 REV. BANKING & FIN. L. 765, 831-33 (2012). Studies showed that the greater influence of large banks that induces banking concentration would limit the access to finance and reduce competition, and accordingly it may cause moral hazard problems that systemically affect financial markets. See *Banking Competition*, THE WORLD BANK, <http://www.worldbank.org/en/publication/gfdr/gfdr-2016/background/banking-competition> (last visited June 7, 2019); Deniz Anginer, Asli Demircug-Kunt & Min Zhu, *How Does Bank Competition Affect Systemic Stability?* 19 (Public Research Working Paper No. 5981, 2012), <http://documents.worldbank.org/curated/en/943621468167965155/pdf/WPS5981.pdf>; Luca Enriques, Alessandro Romano & Thom Wetzer, *Network-Sensitive Financial Regulation* 15-18 (European Corporate Governance Institute (ECGI) - Law Working Paper No. 451/2019; Oxford Legal Studies Research Paper No. 43/2019, 2019), <https://ssrn.com/abstract=3387708>.

⁴⁸¹ Dan Awrey & Kristin van Zwieten, *The Shadow Payment System*, 43 J. CORP. L. 775, 776, 784 (2018).

⁴⁸² Dirk A. Zetsche, Douglas W. Arner, Ross P. Buckley & Rolf H. Weber, *The Future of Data-Driven Finance and RegTech: Lessons from EU Big Bang II* 25 (EBI Working Paper Series No. 35; UNSW L. Research Series No. 19-22, 2019), <https://ssrn.com/abstract=3359399>. Regarding how BigTechs exploit the large amount of customer transactions data they hold, see René M. Stulz, *FinTech, BigTech, and Future of Banks* 19-21 (Fisher College of Bus. Working Paper Series No. 2019-03-020, Sep. 2019), <https://ssrn.com/abstract=3455297>.

⁴⁸³ See Cristina Poncibó & Oscar Borgogno, *Law and Autonomous Systems Series: The Day After Tomorrow of Banking – On FinTech, Data Control and Consumer Empowerment*, OXFORD BUS. L. BLOG (Apr. 5, 2018), <https://www.law.ox.ac.uk/business-law-blog/blog/2018/04/law-and-autonomous-systems-series-day-after-tomorrow-banking-fintech>.

2.2.2 Legislative History

As discussed above, the modern financial markets have witnessed transformations thanks to, among other things, the rise of new market players such as FinTech companies.⁴⁸⁴ Given this phenomenon, the issue of how to re-balance innovation, competition, and safety and soundness in payment markets has merited EU regulators' attention for decades.⁴⁸⁵ According to a study, this issue is partly addressed by the EU regulators' efforts to "re-engineer" the EU-level payment markets.⁴⁸⁶ Examples of their efforts could be facilitating the transactions in which non-bank payment service providers are involved while strengthening consumer protection.⁴⁸⁷ Thus, after first being proposed in June 2013, PSD2 came into force on 12 January 2016 and should be transposed into member states' national laws by 13 January 2018.⁴⁸⁸

PSD2 is in fact based on the success of PSD1 (the first Payment Services Directive, "PSD1"),⁴⁸⁹ which established a framework to harmonize payment transactions and integrate the markets and to address the issues about the technological innovation adopted in the payment sector.⁴⁹⁰ PSD2 aims to further achieve these goals by requiring the coordination between traditional banks where the customers' accounts are housed and the third-party providers ("TPPs") of payment services, which include payment

⁴⁸⁴ See *supra* Section 2.2.1.

⁴⁸⁵ Jane K. Winn, *Reengineering European Payment Law 2* (June 30, 2019), <https://ssrn.com/abstract=3412457>.

⁴⁸⁶ See *id.* at 2-3.

⁴⁸⁷ See *id.* at 4.

⁴⁸⁸ EY, *THE REVISED PAYMENT SERVICES DIRECTIVE (PSD2): WHAT YOU NEED TO KNOW 3* (2018).

⁴⁸⁹ Directive 2007/64/EC of the European Parliament and of the Council of 13 November 2007 on payment services in the internal market, Amending Directives 97/7/EC, 2002/65/EC, 2005/60/EC and 2006/48/EC and repealing Directive 97/5/EC, 2007 O.J. (L 319) 1 [hereinafter Directive 2007/64/EC].

⁴⁹⁰ Directive 2015/2366, *supra* note 461, recital 3; Zetzsche et al., *supra* note 482, at 27; Winn, *supra* note 485, at 4, 22.

initiation services providers (“PISPs”) and account information services providers (“AISPs”).⁴⁹¹

A similar regulatory trajectory also appeared in, for instance, the UK since a report published by the Competition and Markets Authority (“CMA”) identifying the entry barriers in the banking sector; the advocacy of OB was reflected by the regulatory policy of UK’s Open Banking.⁴⁹² For instance, the Payment Services Regulations 2017 (the “PSRs 2017”) was implemented to transpose PSD2 into the UK.⁴⁹³ Therefore, both PSD2 and the UK’s Open Banking aim to enable the new payment means to broaden the market and to increase the efficiency of the payment system; meanwhile consumer protection would be ensured “by means of increasing transparency, efficiency and security of retail payments (e.g., stricter authentication mechanisms) as well as allocating obligations and liabilities to the involved stakeholders.”⁴⁹⁴ The UK’s Open Banking will be examined as an example of the transposition of PSD2.

2.2.3 Main Contents

Studies have discussed regulatory reforms of OB in the EU and the UK

⁴⁹¹ See *id.* at 27-28. Both the PISPs and AISPs are payment service providers furnishing services that enable payment service users to initiate payment orders and to view their financial situation. Colangelo & Borgogno, *supra* note 477, at 8-9. PISPs are the service providers who can transfer the payments between consumers and merchants. The payers can therefore make payments without opening their bank accounts with the PISPs but instruct them to process the debit transactions. Sofort, which is a German FinTech company, and iDeal, which is a collaboration among some Dutch banks, are the examples of PISPs. Winn, *supra* note 485, at 27. AISPs are the account data aggregators who can collect and integrate the data of different banks accounts. Mint in the US and Money Dashboard in the UK exemplify AISPs. *Id.* at 26.

⁴⁹² CMA, RETAIL BANKING MARKET INVESTIGATION: FINAL REPORT xxxi (Aug. 9, 2016), <https://assets.publishing.service.gov.uk/media/57ac9667e5274a0ff6c00007a/retail-banking-market-investigation-full-final-report.pdf>.

⁴⁹³ Explanatory Memorandum to the Payment Services Regulations 2017 No. 752 ¶ 2.1; The Payment Services Regulations 2017, SI 2017/752.

⁴⁹⁴ EY, *supra* note 488, at 3; Directive 2015/2366, *supra* note 461, recital 6.

from different perspectives.⁴⁹⁵ As a matter of fact, those regulatory reforms illustrate a compulsory approach given the potential unwillingness of banks to open the data pools.⁴⁹⁶ The role of regulators thus seems to be important when leading and mandating OB.

Thus, in the following, I will look into the toolkit of PSD2 at both EU and UK levels in seven aspects by focusing on how regulators play an important role in leading and mandating OB. These six aspects are – (1) what is the general regulatory manner or approach? (2) Who should open the data? (3) Who may access the data? (4) What is the scope of the data to be opened? (5) Who may decide on the API standards? (6) Who governs or supervises the TPPs?

2.2.3.1 A Compulsory Approach Led by Regulators

OB in the EU and UK is promoted through an approach on the basis of regulators' orders.⁴⁹⁷ A compulsory approach is thus adopted therein through regulations while OB is promoted on the basis that banks voluntarily open their data pools in other jurisdictions. This compulsory approach will

⁴⁹⁵ For instance, some studies introduced the important rules such as the access to account rule set under PSD2 and other fundamental concepts therein. *E.g.*, Colangelo & Borgogno, *supra* note 477, at 14-18; Fernando Zunzunegui, *Digitalisation of Payment Services* 24-28 (Ibero-American Institute for Law and Finance Working Paper Series 5/2018, 2018), <https://ssrn.com/abstract=3256281>. In addition, other studies discussed PSD2 in terms of its content and further linked it with other concepts; for example, the work of Zetzsche et al. described the idea of PSD2 and explained the impact it brought in the belief that it contributes to the formation of a data-driven finance. Zetzsche et al., *supra* note 482, at 31-32. Other commentators illustrate a so-called “API economy” in relation to the introduction of OB. *See* Markos Zachariadis & Pinar Ozcan, *The API Economy and Digital Transformation in Financial Services: The Case of Open Banking* 2, 4-5 (SWIFT Inst. Working Paper No. 2016-001, 15 June 2017), <https://ssrn.com/abstract=2975199>.

⁴⁹⁶ *E.g.*, Nydia Remolina, *Open Banking: Regulatory Challenges for a New Form of Financial Intermediation in a Data-Driven World* 40-41 (SMU Centre for AI & Data Governance Research Paper No. 2019/05, 2019), <https://ssrn.com/abstract=3475019>; *Open Banking Year One: Insights from the CMA9 and More*, FINEXTRA (Jan. 11, 2019), <https://www.finextra.com/newsarticle/33194/open-banking-year-one-insights-from-the-cma9-and-more>.

⁴⁹⁷ *See* Remolina, *supra* note 496, at 40-41.

be explained below by looking into the UK's Open Banking in terms of the governmental entities involved. The UK's Open Banking, which transplanted PSD2 into its local context, is mandated and regulated by regulators such as the CMA, which has a proactive role in leading OB,⁴⁹⁸ as well as the Financial Conduct Authority (the "FCA"), which regulates the financial services providers who could access the data.⁴⁹⁹ PSD2 is mainly implemented through the PSRs 2017.⁵⁰⁰

Considering the difficulties faced by new market players such as smaller and newer banks and the SMEs providing financial services, the CMA proposed in 2016 to tackle that conundrum by implementing OB to assist them in accessing data.⁵⁰¹ The CMA, in particular, established a company named the Open Banking Implementation Entity (the "OBIE") in 2016 to put OB into practice.⁵⁰² The OBIE operates as an independent entity to fulfill the orders from the CMA.⁵⁰³ In addition, the OBIE is funded by nine financial institutions (known as "CMA9") that are mandated to develop and follow OB under the instructions from the CMA.⁵⁰⁴ The OBIE's

⁴⁹⁸ BNP PARIBAS, WORLD PAYMENTS REPORT 2018 23 (2018), <https://worldpaymentsreport.com/wp-content/uploads/sites/5/2018/10/World-Payments-Report-2018.pdf>.

⁴⁹⁹ *Third Party Providers*, OPEN BANKING, <https://www.openbanking.org.uk/providers/third-party-providers/> (last visited Sep. 3, 2019).

⁵⁰⁰ FCA, THE FCA'S ROLE UNDER THE PAYMENT SERVICES REGULATIONS 2017 AND THE ELECTRONIC MONEY REGULATIONS 2011, at 6 (June 2019).

⁵⁰¹ *About Us*, OPEN BANKING, <https://www.openbanking.org.uk/about-us/> (last visited Jul. 2, 2019); CMA, RETAIL BANKING MARKET INVESTIGATION: FINAL REPORT 441 (Aug. 9, 2016), <https://assets.publishing.service.gov.uk/media/57ac9667e5274a0f6c00007a/retail-banking-market-investigation-full-final-report.pdf>.

⁵⁰² Rebekah Tunstead, *Open Banking Regulators Have Failed to "Pull the Banks to Order"*, BOBSGUIDE (Dec. 13, 2018), <https://www.bobsguide.com/guide/news/2018/Dec/13/open-banking-regulators-have-failed-to-pull-the-banks-to-order/>.

⁵⁰³ *Id.*

⁵⁰⁴ *Open Banking March Highlights*, OPEN BANKING, <https://www.openbanking.org.uk/about-us/news/obie-publishes-open-data-service-quality-indicators/> (last visited July 2, 2019); Simonetta Vezzoso, *A Pro-Competition Data Sandbox for the Digital World* 11 (May 6, 2019), <https://ssrn.com/abstract=3383541>. The CMA9 include Barclays plc, Lloyds Banking

governance, composition and budget, however, are decided by the CMA.⁵⁰⁵ Therefore, the OBIE, which is a non-profit private company limited,⁵⁰⁶ seems to have both private and public characteristics. It is because the OBIE is funded by private entities while largely subject to governmental control. As the governmental body, i.e., the CMA, delegates part of its regulatory power to the OBIE, this private entity seems to acquire a public nature to implement public policies. This novel type of entity seems to exemplify quasi-public regulators that may be suitable for implementing FinTech-related policies.⁵⁰⁷

This compulsory approach is in contrast to the voluntary and self-regulatory approach adopted in other jurisdictions in the Asia-Pacific region

Group plc, Santander, Danske, HSBC, RBS, Bank of Ireland, Nationwide and AIBG. *Open Banking Publishes Version 3.1.1. of the Open Banking Standard*, OPEN BANKING (Mar. 15, 2019), <https://www.openbanking.org.uk/about-us/news-release-archive/open-banking-publishes-version-3-1-1-of-the-open-banking-standard/>.

⁵⁰⁵ *Open Banking March Highlights*, OPEN BANKING, <https://www.openbanking.org.uk/about-us/news/obie-publishes-open-data-service-quality-indicators/> (last visited July 2, 2019).

⁵⁰⁶ *Open Banking Limited*, COMPANIES HOUSE, <https://beta.companieshouse.gov.uk/company/10440081> (last visited Oct. 3, 2019).

⁵⁰⁷ A quasi-public entity is delegated by the government to exercise regulatory power and hence has more public nature. Scholars argued that this might be an appropriate organizational model of financial regulators when implementing financial-innovation-related policies. See Yueh-Ping Yang & Chen-Yun Tsang, *RegTech and the New Era of Financial Regulators: Envisaging More Public-Private-Partnership Models of Financial Regulators*, 21 U. PA. J. BUS. L. 354, 403 (2018).

such as Taiwan⁵⁰⁸, Singapore⁵⁰⁹ and Hong Kong.⁵¹⁰ Specifically, under the

⁵⁰⁸ See Cheng-Yun Tsang (臧正運), *Cong Guo Ji Fa Zhan Qu Shi Lun Wo Guo Tui Dong Kai Fang Yin Hang Ying You Zhi Si Kao* (從國際發展趨勢論我國推動開放銀行應有之思考) [*Rethinking Promoting Open Banking in Taiwan from the Perspective of the International Development Trajectory*], 34 JIN RONG LIAN HE ZHENG XIN (金融聯合徵信) [JOINT CREDIT INFO. CTR.] 4, 10-12 (2019). Since the financial markets in Taiwan nowadays feature the transformation centered on information, this paves the way for the emphasis of OB; thus, the openness of data has been focused by regulators since 2018. See Zhen-Ling Peng (彭禎伶), *Jin Guan Hui: Jin Nian Yan Yi “Kai Fang Yin Hang” Tui Dong Jia Gou* (金管會：今年研議「開放銀行」推動架構) [*The FSC Said That The Framework for Promoting Open Banking Will Be Developed This Year*], GONG SHANG SHI BAO (工商時報) [COMMERCIAL TIMES], (Mar. 13, 2018), <https://ctee.com.tw/news/finance/102117.html>. The main financial regulator in Taiwan, i.e., the FSC (Financial Supervisory Commission, the “FSC”), relies on a private industry association, i.e., the BAROC (Bankers Association of the Republic of China (Taiwan), the “BAROC”) to draft self-regulations in order to promote OB in Taiwan. Zhong Hua Min Guo Yin Hang Gong Hui Hui Yuan Yin Hang Yu Di San Fang Fu Wu Ti Gong Zhe He Zuo Zhi Zi Lu Gui Fan (中華民國銀行公會會員銀行與第三方服務提供者合作之自律規範) [*The Self-Regulation Governing the Cooperation Between Member Banks of the Bankers Association of the Republic of China and Third-Party Services Providers*], art. 1 [hereinafter “OB Self-Regulation”]. The BAROC [Yin Hang Gong Hui (銀行公會)] is assembled mostly by banks, which include 36 commercial banks, 2 industrial banks, 1 export-import banks, and other financial institutions. *History and Functions of the Bankers Association of the Republic of China*, THE BANKERS ASSOCIATION OF THE REPUBLIC OF CHINA, <https://www.ba.org.tw/EnglishVer/Introduction> (last visited Nov. 8, 2019). In addition, the FISC (Financial Information Service Co., Ltd., the “FISC”), which is an institution where one of its majority shareholders is the Ministry of Finance of Taiwan, was required to establish the common API standards. *About Us*, THE FINANCIAL INFORMATION SERVICE CO., LTD., <https://www.fisc.com.tw/EN/ab-history.html> (last visited Jun. 26, 2020); Jing-Yi Li (李靜宜), *Tai Wan Kai Fang Yin Hang Da Jin Zhan! Shou Ban Open API Biao Zhun Chu Lu, 2 Da Zhun Ze 5 Xiang An Kong 13 Jia Yin Hang Xian Zhi Yuan* (臺灣開放銀行大進展！首版 Open API 標準出爐，2 大準則 5 項安控 13 家銀行先支援) [*A Big Improvement in Open Banking in Taiwan! The First Version of Open API Standards Is Released with 2 Main Principles, 5 Safety Controls and 13 Banks’ Support.*], ITHOME, (July 3, 2019), <https://www.ithome.com.tw/news/131648>.

⁵⁰⁹ Tsang, *supra* note 508, at 6-7. Singapore is deemed to be a pioneer of OB as its financial regulator, the MAS (Monetary Authority of Singapore, the “MAS”), published the “API Playbook” in collaboration with the ABS (Association of Banks in Singapore, the “ABS”) in November 2016. See Hakan Eroglu, *The Asia-Pacific Way of Open Banking Regulation*, FINEXTRA (June 20, 2019), <https://www.finextra.com/blogposting/17396/the-asia-pacific-way-of-open-banking-regulation>.

⁵¹⁰ Tsang, *supra* note 508, at 10. Hong Kong, as another financial center next to and a competitor against Singapore in Asia, started to promote OB based on “Open API Framework” published by the HKMA (Hong Kong Monetary Authority, the “HKMA”) in July 2018. *Open Application Programming Interface (API) for the Banking Sector*, HONG KONG MONETARY AUTHORITY, <https://www.hkma.gov.hk/eng/key-functions/international-financial-centre/open-api-for-banking-sector.shtml> (last

UK's "twin-peak" regulatory system,⁵¹¹ the meaning of collaboration of the CMA and the FCA in developing and implementing UK's Open Banking is two-fold. First, in terms of advocating competition, the establishment of the CMA reflects the need of a single powerful voice to promote competition by combining two competition authorities in 2014, which are the OFT (Office of Fair Trading, the "OFT") and the CC (Competition Commission, the "CC").⁵¹² The creation of a single competition authority is expected to bring benefits by its faster and less burdensome operation.⁵¹³ Second, concurrent and overlapping powers between the CMA and FCA over the implementation of UK's Open Banking are leveraged based on the complementary resources of these two authorities, thereby implementing OB more effectively.⁵¹⁴ The collaboration between them is on the basis of, among others, the strong dialogues between them.⁵¹⁵

2.2.3.2 The Parties Who Should Open Data

As defined in PSD2, the parties which should open data pools are

visited Sep. 7, 2019).

⁵¹¹ In the UK, the separation of the PRA (Prudential Regulation Authority, the "PRA") at the Bank of England, which focuses on prudential regulation concerns, and the FCA, which focuses on consumer protection and competition, aims to correct the failures of the pre-global-financial-crisis system where the FSA (Financial Service Authority, the "FSA") had solely regulated. See Elizabeth F. Brown & Edward F. Buckley, *A Preliminary Look at State Structures for Regulating Financial Services*, 87 U. CIN. L. REV. 891, 903-904 (2019); Omar Salem & Jerome Roche, *Individual Accountability in Financial Services – the UK and US Compared*, OXFORD BUS. L. BLOG (Aug. 28, 2019), <https://www.law.ox.ac.uk/BUSINESS-LAW-BLOG/BLOG/2019/08/INDIVIDUAL-ACCOUNTABILITY-FINANCIAL-SERVICES-UK-AND-US-COMPARED>.

⁵¹² CMA, TOWARDS THE CMA: CMA GUIDANCE 4, 8-9 (July 15, 2013), [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/212285/CMA1 - Towards the CMA.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/212285/CMA1_-_Towards_the_CMA.pdf).

⁵¹³ See *id.* at 9.

⁵¹⁴ CMA, ANNUAL REPORT ON CONCURRENCY 27-28 (Apr. 10, 2019), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/811431/ACR_PV2406.pdf.

⁵¹⁵ CMA & FCA, MEMORANDUM OF UNDERSTANDING BETWEEN THE COMPETITION AND MARKETS AUTHORITY AND THE FINANCIAL CONDUCT AUTHORITY – CONCURRENT COMPETITION POWERS 7 (July 2019), <https://www.fca.org.uk/publication/mou/fca-cma-concurrent-competition-powers-mou.pdf>.

mainly the ASPSPs (account servicing payment service providers, the “ASPSPs”), which are the payment service providers providing and maintaining payers’ accounts.⁵¹⁶ The ASPSPs are primarily banks, and the requirements of opening their data pools make them support the business models of FinTech companies.⁵¹⁷ In the UK, the parties who are mandated by the CMA to open their data pools through open APIs are CMA9 while other entities could opt in.⁵¹⁸ As mentioned before, in the UK, those banks are involved in the formation and operation of the entity leading OB, that is, the OBIE.⁵¹⁹ The operation of the OBIE is still largely subject to the CMA.⁵²⁰ The leading role of both the OBIE and the CMA can be seen.

2.2.3.3 The Parties Who May Access Data

The aim of OB in the UK and EU is to grant access to account information to PISPs and AISPs,⁵²¹ which refers to the access to account rule (the “XS2A” rule).⁵²² Thus, for example, FinTech companies could be the beneficiaries of the rule when they serve as PISPs or AISPs.⁵²³ This

⁵¹⁶ Directive 2015/2366, *supra* note 461, art. 4(17).

⁵¹⁷ See Winn, *supra* note 485, at 28-29. In the context of the UK’s Open Banking, it is mentioned that ASPSPs include banks, building societies and payment companies. *Account Providers, OPEN BANKING*, <https://www.openbanking.org.uk/providers/account-providers/> (last visited Dec. 6, 2019).

⁵¹⁸ OPEN BANKING, OPEN BANKING: GUIDELINES FOR OPEN DATA PARTICIPANTS 8 (July 2018), <https://www.openbanking.org.uk/wp-content/uploads/Guidelines-for-Open-Data-Participants.pdf>. Regarding the composition of the CMA9, see *supra* note 504 and accompanying text.

⁵¹⁹ See *supra* Section 2.2.3.1.

⁵²⁰ *Id.*

⁵²¹ See, e.g. Simonetta Vezzoso, *Fintech, Access to Data, and the Role of Competition Policy*, in *COMPETITION AND INNOVATION* 30, 32 (V. Bagnoli ed., 2018); Directive 2015/2366, *supra* note 461, recital 39; *Third Party Providers, OPEN BANKING*, <https://www.openbanking.org.uk/providers/third-party-providers/> (last visited Sep. 3, 2019). Regarding the definition of these two entities, see *supra* note 491 and accompanying text.

⁵²² Vezzoso, *supra* note 521, at 30.

⁵²³ Besides FinTech companies, BigTechs may benefit from OB. Douglas Arner, Ross Buckley, Kuzi Charamba, Artem Sergeev & Dirk Zetsche, *BigTech and Platform Finance: Governing FinTech 4.0 for Sustainable Development* 33 (UNSW Law Research Paper No. 21-57, 2021; University of Hong Kong Faculty of Law Research

access could be achieved by, e.g., the creation and implementation of open common APIs. In addition to the rights to access to data, there are obligations. For instance, it is also required that payment service providers should provide SCA (strong customer authentication, “SCA”).⁵²⁴ In the UK, the access to data is based on the creation of open API specifications and standards by the OBIE.⁵²⁵ Therefore, those mandatory specifications and standards contribute to the higher level of standardization in the UK,⁵²⁶ which is crucial to both spurring innovation and protecting consumers.⁵²⁷

Equally important, the TPPs which wish to enroll with the UK’s Open Banking should follow a process in which the regulators play an important role. First, they should be regulated by the FCA; second, they could choose to enroll in the Open Banking Directory; third, their services could be tested in the Directory Sandbox; fourth, they could launch their services after their regulatory permissions are confirmed by the FCA.⁵²⁸ Apparently, the FCA performs a crucial part in determining whether and how their services fall into the regulatory definitions of UK’s Open Banking.⁵²⁹

2.2.3.4 The Scope of the Data to Be Opened

Paper No. 2021/043), <https://ssrn.com/abstract=3915275>; Dirk Zetsche, William A. Birdthistle, Douglas W. Arner & Ross P. Buckley, *Digital Finance Platforms: Toward A New Regulatory Paradigm*, 23 U. PENN. J. BUS. L. 1, 57-58 (2020).

⁵²⁴ Directive 2015/2366, *supra* note 461, art. 97; EBA published an Opinion on the elements of strong customer authentication under PSD2, EBA (June 21, 2019), <https://eba.europa.eu/eba-publishes-an-opinion-on-the-elements-of-strong-customer-authentication-under-psd2>.

⁵²⁵ See Vezzoso, *supra* note 521, at 12; *About Us*, OPEN BANKING, <https://www.openbanking.org.uk/about-us/> (last visited July 4, 2019).

⁵²⁶ See Vezzoso, *supra* note 521, at 12.

⁵²⁷ PYMNTS, *PSD2’s Elephant In The Room*, PYMNTS.COM (Apr. 2, 2019), <https://www.pymnts.com/bank-regulation/2019/tokenio-limited-psd2-api-standardization-user-data/>.

⁵²⁸ *Third party providers*, OPEN BANKING, <https://www.openbanking.org.uk/providers/third-party-providers/> (last visited May 11, 2021).

⁵²⁹ *Id.*

PSD2 and the UK's Open Banking oblige access to be given to data whereas "sensitive payment data" is excluded.⁵³⁰ For instance, the PISPs shall not store sensitive payment data.⁵³¹ The AISPs shall not request sensitive payment data.⁵³²

Under the regulator-led model of OB in the UK and EU, the details about the data to be opened are determined according to the corresponding regulations and rules.⁵³³ The regulators play an important role in the supervision of regulated parties and the implementation of regulations. For example, in the UK, compliance with the regulations under which sensitive payment data should be excluded largely relies on the supervision of the FCA.⁵³⁴ In the context of PSD2, payment service providers should develop mechanisms mitigating the operational and security risks and provide the assessment of those mechanisms to competent authorities in member states.⁵³⁵ In particular, the EBA (European Banking Authority, the "EBA") also issued guidelines, pointing out that such mechanisms should include the measures dealing with security issues regarding sensitive data.⁵³⁶ Thus, it could be observed that competent authorities play a crucial role in affecting or deciding the scope and type of data to be opened.

⁵³⁰ "Sensitive payment data" is defined in PSD2 as the data which could be exploited to carry out fraud and includes personalized security credentials. Directive 2015/2366, *supra* note 461, art. 4(32).

⁵³¹ Directive 2015/2366, *supra* note 461, art. 66(3)(e).

⁵³² Directive 2015/2366, *supra* note 461, art. 67(2)(e).

⁵³³ See *supra* Section 2.2.3.1 and 2.2.3.4.

⁵³⁴ See FCA, *supra* note 500, at 91-92, 179-80.

⁵³⁵ Directive 2015/2366, *supra* note 461, art. 95(2).

⁵³⁶ EBA, FINAL REPORT: GUIDELINES ON THE SECURITY MEASURES FOR OPERATIONAL AND SECURITY RISKS OF PAYMENT SERVICES UNDER DIRECTIVE (EU) 2015/2366 (PSD2) 5, 19 (2017), [https://eba.europa.eu/sites/default/documents/files/documents/10180/2060117/d53bf08f-990b-47ba-b36f-15c985064d47/Final%20report%20on%20EBA%20Guidelines%20on%20the%20security%20measures%20for%20operational%20and%20security%20risks%20under%20PSD2%20\(EBA-GL-2017-17\).pdf](https://eba.europa.eu/sites/default/documents/files/documents/10180/2060117/d53bf08f-990b-47ba-b36f-15c985064d47/Final%20report%20on%20EBA%20Guidelines%20on%20the%20security%20measures%20for%20operational%20and%20security%20risks%20under%20PSD2%20(EBA-GL-2017-17).pdf).

2.2.3.5 Who May Decide on the API Standards?

The promoting of OB inevitably involves setting some technical standards which could possibly be complex.⁵³⁷ However, standardization of the technical standards is not mandated by PSD2.⁵³⁸ To this extent, PSD2 seems to be flexible as it leaves the details of the technical standards open and does not require the establishment of common API standards.⁵³⁹ The EBA only drafted and established a framework for technical conditions.⁵⁴⁰ On the other hand, Open Banking Standard was established in the UK.⁵⁴¹ Therefore, due to the lack of mandating common API standards, the level of standardization in the EU is lower than that in the UK.⁵⁴²

2.2.3.6 Who Governs or Supervises the Third-party Providers?

In line with the regulator-led approach to OB in the UK and EU, the TPPs who can participate in OB are required to register with or be authorized by competent authorities such as the FCA.⁵⁴³ These differential measures

⁵³⁷ See Vezzoso, *supra* note 521, at 37.

⁵³⁸ E.g., Colangelo & Borgogno, *supra* note 477, at 23; Vezzoso, *supra* note 521, at 36;

⁵³⁹ E.g., Olaf van Gorp, *PSD2 & Open Banking: The Role of API Management*, AKANA (Apr. 4, 2018), <https://www.akana.com/blog/psd2-open-banking-role-api-management>; Hakan Eroglu, *Comparing the Berlin Group and Open Banking UK API Standards for PSD2*, FINEXTRA (Dec. 13, 2017), <https://www.finextra.com/blogposting/14834/comparing-the-berlin-group-and-open-banking-uk-api-standards-for-psd2>.

⁵⁴⁰ Eroglu, *supra* note 539; *EBA Publishes Final Draft Technical Standards on Home-host Cooperation under PSD2*, EBA (July 31, 2018), <https://eba.europa.eu/-/eba-publishes-final-draft-technical-standards-on-home-host-cooperation-under-psd2>.

⁵⁴¹ MARGARET DOYLE, RAHUL SHARMA, CHRISTOPHER ROSS & VISHWANATH SONNAD, DELOITTE, *HOW TO FLOURISH IN AN UNCERTAIN FUTURE: OPEN BANKING 8* (2017).

⁵⁴² Vezzoso, *supra* note 521, at 12; Martin Haering, *Open Banking APIs Need Standards*, FINEXTRA (May 11, 2018), <https://www.finextra.com/blogposting/15350/open-banking-apis-need-standards>.

⁵⁴³ *Guidelines on Authorization and Registration under PSD2*, EBA, <https://eba.europa.eu/regulation-and-policy/payment-services-and-electronic-money/guidelines-on-authorisation-and-registration-under-psd2> (last visited Nov. 4, 2019); *Third Party Providers*, OPEN BANKING, <https://www.openbanking.org.uk/providers/third-party-providers/> (last visited Sep. 3, 2019). For instance, in the UK, it is required that a TPP should register as an AISP or be authorized as a PISP. *Third Party Providers*, OPEN BANKING,

provide more leniency and are expected to bring more participants into OB.⁵⁴⁴

2.2.4 Imperfections in Terms of the Pacing Issue

2.2.4.1 Lack of Regulatory Reciprocity in Terms of Data Sharing

From a higher-level perspective, both PSD2 and UK's Open Banking reflect a compulsory pathway, featuring an emphasis on the importance of the role of regulators.⁵⁴⁵ However, it was argued that it might be too early to deem this top-down approach a success.⁵⁴⁶ For example, it was argued that such a regulatory approach mandates only ASPSPs, which are mainly banks, rather than also requests AISPs and PISPs, which are mainly FinTech companies, to reciprocally open their data pools.⁵⁴⁷ Consequently, it may

<https://www.openbanking.org.uk/providers/third-party-providers/> (last visited Dec. 28, 2020). Even though these two types of entities are required to have professional indemnity insurance, the process to be regulated for AISPs is simpler than for PISPs. For example, PISPs should follow the minimum EUR 50,000 capital requirement, whilst AISPs have no capital requirements. FCA, *Payment Services and Electronic Money – Our Approach: The FCA's Role Under the Payment Services Regulations 2017 and the Electronic Money Regulations 2011*, at 25, 32 (June 2019), <https://www.fca.org.uk/publication/finalised-guidance/fca-approach-payment-services-electronic-money-2017.pdf>; *New Regulated Payment Services: Account Information Services (AIS) and Payment Initiation Services (PIS)*, FCA (Feb. 14, 2018), <https://www.fca.org.uk/firms/new-regulated-payment-services-ais-pis> (last visited Dec. 28, 2020).

⁵⁴⁴ See Peggy Valcke, Niels Vandezande & Nathan Van de Velde, *The Evolution of Third Party Payment Providers and Cryptocurrencies under the EU's Upcoming PSD2 and AMLD4* 17-18 (SWIFT Inst. Working Paper No. 2015-001, 2015), <http://ssrn.com/abstract=2665973>; EBA, FINAL REPORT ON THE EBA GUIDELINES UNDER DIRECTIVE (EU) 2015/2366 (PSD2) ON THE INFORMATION TO BE PROVIDED FOR THE AUTHORISATION OF PAYMENT INSTITUTIONS AND E-MONEY INSTITUTIONS AND FOR THE REGISTRATION OF ACCOUNT INFORMATION SERVICE PROVIDERS 9-10, 90 (2017), [https://eba.europa.eu/sites/default/documents/files/documents/10180/1904583/f0e94433-f59b-4c24-9ccc-2d6a2277b62c/Final%20Guidelines%20on%20Authorisations%20of%20Payment%20Institutions%20\(EBA-GL-2017-09\).pdf](https://eba.europa.eu/sites/default/documents/files/documents/10180/1904583/f0e94433-f59b-4c24-9ccc-2d6a2277b62c/Final%20Guidelines%20on%20Authorisations%20of%20Payment%20Institutions%20(EBA-GL-2017-09).pdf).

⁵⁴⁵ See Winn, *supra* note 485, at 5.

⁵⁴⁶ See *id.* at 31.

⁵⁴⁷ Remolina, *supra* note 496, at 46; BRAD CARR, DANIEL PUJAZON & PABLO URBIOLA, INST. INT'L FIN., RECIPROCITY IN CUSTOMER DATA SHARING FRAMEWORKS 2 (July 2018),

unintentionally leads to a competitive disadvantage for those who are requested to open their data pools or even support the dominance of BigTechs as they also benefited from this compulsory approach in which reciprocity is lacking.⁵⁴⁸

The threats posed by the lack of regulatory reciprocity described above are the result of the network effects presented (1) when FinTech companies grow and (2) when BigTechs are actually the beneficiaries of data opening. That is, at first, commentators argued that FinTech companies will possibly cause network effects in the future by exploiting economies of scale or scope on the basis of their platform-based business models established by technology.⁵⁴⁹ This situation may be compounded by the lack of regulatory reciprocity because they may monopolize data and the associated customers access in the future.⁵⁵⁰ Secondly, pursuant to PSD2, AISPs and PISPs are the beneficiaries of data opening.⁵⁵¹ However, these beneficiaries may be FinTech startups or BigTechs.⁵⁵² It was argued that BigTechs such as Amazon, Facebook or Alibaba would pose threats as they already control customers access based on their established large data pools, thereby causing stiff competition when they begin to engage in financial markets by providing financial services.⁵⁵³

Therefore, it is not difficult to imagine that such threats to competition may be worse if there is a lack of regulatory reciprocity.⁵⁵⁴ These threats

https://www.iif.com/portals/0/Files/private/32370132_reciprocity_in_customer_data_sharing_frameworks_20170730.pdf.

⁵⁴⁸ *Id.*; Remolina, *supra* note 496, at 29-30.

⁵⁴⁹ *E.g.*, Zetzsche et al., *supra* note 470, at 409; Bernado Nicoletti, *The Future: Financial Services as Platforms*, in *THE FUTURE OF FINTECH: INTEGRATING FINANCE AND TECHNOLOGY IN FINANCIAL SERVICES* 261, 267-68 (2017).

⁵⁵⁰ *See* Remolina, *supra* note 496, at 29-30.

⁵⁵¹ *See supra* Section 2.2.3.3.

⁵⁵² Fabiana Di Porto & Gustavo Ghidini, “*I Access Your Data, You Access Mine*”: *Requiring Data Reciprocity in Payment Services*, 51 *INT’L REV. INTELL. PROP. & COMPETITION L.* 307, 319 (2020).

⁵⁵³ Zetzsche et al., *supra* note 470, at 410.

⁵⁵⁴ CARR ET AL., *supra* note 547, at 2; Remolina, *supra* note 496, at 29-30; Di Porto &

seem, in a sense, to mirror that the landscape may be changed in the future and that the regulation would be imperfect in the changed landscape.⁵⁵⁵ That is, PSD2 was on the basis of the fact that new market participants such as FinTech companies are facing entry barriers. However, the pace of technology would possibly render this fact inapplicable in the future. In other words, as commentators argued, it is difficult for regulators to foresee the future and decide the landscape on which the regulation should be based.⁵⁵⁶ In the context of OB, this difficulty may result in the outcome that the regulatory goals such as promoting financial competition and innovation may not be fully achieved.⁵⁵⁷

2.2.4.2 Lack of Adequate Information When Assessing FinTech's Impacts

From another perspective, the above situation that the rules in PSD2 may be obsolete in the future might be because of the lack of adequate information to assess FinTech's impacts when enacting PSD2. Moreover, any attempts to address the obsolescence problem would bring more costs. The above notions will be explained in what follows.

According to commentators, the XS2A rule in PSD2 seems to be one-size-fits-all because it is not proportionate for different types of data recipients. The disproportionate rule, as a result, would possibly pose threats to competition if BigTechs are in fact the data recipients.⁵⁵⁸ The fact that the XS2A rule is not proportionate reveals that the impacts brought by technology were not fully assessed when enacting PSD2. While BigTechs' involvement in payment markets is not a brand-new concept in the US or Asia, a significant growth of them in the EEA (European Economic Area,

Ghidini, *supra* note 552, 319-21.

⁵⁵⁵ See *supra* Chapter 3.

⁵⁵⁶ Fenwick et al., *supra* note 448, at 581.

⁵⁵⁷ See Remolina, *supra* note 496, at 46; Di Porto & Ghidini, *supra* note 552, 319-21.

⁵⁵⁸ *Id.* at 322.

“EEA”) has been observed particularly after the introduction of PSD2.⁵⁵⁹ Thus, it is doubtful that the data opening rules were drafted with adequate information about the impacts that BigTechs would bring in the future. After all, one of the biggest challenges when assessing FinTech’s impacts is said to be the limited availability of information.⁵⁶⁰ Moreover, the situation that XS2A would possibly be obsolete may be compounded if regulators would like to re-introduce the reciprocity through amending it. As suggested by commentators, it would bring more costs when assessing and determining the size of the entities that should share their data with banks.⁵⁶¹ In other words, amending regulation after every change in the regulatory landscape could not guarantee that it will not be obsolete again in the future as technology is still evolving.

2.3 AMLD5 – Extension of the Existing Regulation to Include FinTech

This Section studies AMLD5 as another example of the EU’s regulatory response to FinTech. Section 2.3.1 briefly describes its legislative history and background. Section 2.3.2 studies its content in relation to FinTech. Section 2.3.3 appraises it in the light of the pacing issue.

2.3.1 Legislative History and Background

The EU anti-money laundering and counter terrorist financing (“AML/CFT”) regulation has been existing since 1990.⁵⁶² AMLD5, which

⁵⁵⁹ FSB, BIGTECH IN FINANCE: MARKET DEVELOPMENTS AND POTENTIAL FINANCIAL STABILITY IMPLICATIONS 5-7 (Dec. 9, 2019), <https://www.fsb.org/wp-content/uploads/P091219-1.pdf>.

⁵⁶⁰ FSB, FINANCIAL STABILITY IMPLICATIONS FROM FINTECH: SUPERVISORY AND REGULATORY ISSUES THAT MERIT AUTHORITIES’ ATTENTION 1 (June 27, 2017), <https://www.fsb.org/wp-content/uploads/R270617.pdf>.

⁵⁶¹ That is, if a reciprocal regime is introduced through amending financial regulation, it was argued that defining the size of the entities that should share their data with banks would be difficult. Di Porto & Ghidini, *supra* note 552, at 323-25.

⁵⁶² *EU Legal Framework on Anti-money Laundering and Counter Terrorist Financing*, EUROPEAN UNION, <https://ec.europa.eu/info/business-economy-euro/banking-and->

is an example that the existing regulation extends to include the emerging market players capitalizing on FinTech into the regulatory scope, aims to address the risks raised by anonymity, which is one of the characteristics of blockchain technology.⁵⁶³ This characteristic is deemed to probably contribute to money laundering and the financing of terrorism (“ML/FT”).⁵⁶⁴

In 2014, the concerns regarding the anonymity of the employment of blockchain technology in markets such as virtual currencies⁵⁶⁵ were raised by the EBA and the IMF (International Money Fund, the “IMF”).⁵⁶⁶ In particular, a tailored regulatory design is recommended in order to address the risks of virtual currencies.⁵⁶⁷ For instance, the regulatory regimes especially addressing the anonymity problem include building a governance authority which is accountable to regulators and to implementing customer due diligence requirements.⁵⁶⁸ However, the EBA also pointed out that that a comprehensive regulatory approach would be resource-intensive, thereby suggesting that certain entities engaging in virtual currencies transactions should be included in the current EU AMLD as a regulatory response for the

[finance/financial-supervision-and-risk-management/anti-money-laundering-and-counter-terrorist-financing_en](#) (last visited Apr. 24, 2020).

⁵⁶³ See Directive 2018/843, *supra* note 464, recital 9.

⁵⁶⁴ See *id.*

⁵⁶⁵ According to the EBA, virtual currencies are “a digital representation of value that is neither issued by a central bank or public authority nor necessarily attached to a fiat currency, but is used by natural or legal persons as a means of exchange and can be transferred, stored or traded electronically.” EBA, EBA OPINION ON ‘VIRTUAL CURRENCIES’ 11 (July 4, 2014), <https://eba.europa.eu/sites/default/documents/files/documents/10180/657547/81409b94-4222-45d7-ba3b-7deb5863ab57/EBA-Op-2014-08%20Opinion%20on%20Virtual%20Currencies.pdf?retry=1>.

⁵⁶⁶ *Id.* at 32-33; DONG HE ET AL., IMF, VIRTUAL CURRENCIES AND BEYOND: INITIAL CONSIDERATIONS 27 (2014), <https://www.imf.org/external/pubs/ft/sdn/2016/sdn1603.pdf>.

⁵⁶⁷ ROBBY HOUBEN & ALEXANDER SNYERS, CRYPTOCURRENCIES AND BLOCKCHAIN: LEGAL CONTEXT AND IMPLICATIONS FOR FINANCIAL CRIME, MONEY LAUNDERING AND TAX EVASION 63 (2018), <https://www.europarl.europa.eu/cmsdata/150761/TAX3%20Study%20on%20crypto-currencies%20and%20blockchain.pdf>.

⁵⁶⁸ EBA, *supra* note 565, at 38-40.

short term.⁵⁶⁹ These suggestions, nonetheless, did not fully merit the EU legislator's attention until the terrorist attacks in France in 2015.⁵⁷⁰

In 2016, in the "Impact Assessment" published by the EC (European Commission, the "EC"), amendments to either AMLD4 (the fourth Anti-Money Laundering Directive)⁵⁷¹ or PSD2 were deemed to be necessary in order to regulate the relevant platforms or exchanges engaging in virtual currency transactions.⁵⁷² Eventually, amendments to AMLD4 were preferred as a regulatory approach that concerns certain entities as the "gatekeepers" was adopted.⁵⁷³ Thus, AMLD5 was promulgated in 2018 and entered into force on 9 July 2018, and member states were obliged to transpose that by 10 January 2020.⁵⁷⁴ For instance, in 2019, the UK transposed AMLD5 by amending MLRs (Money Laundering and Terrorist Financing and Transfer of Funds (Information on the Payer) Regulations 2017, the "MLRs").⁵⁷⁵ The amended UK's MLRs will be mentioned as an example of the transposition of AMLD5.

In fact, since certain entities in blockchain-related transactions are

⁵⁶⁹ *Id.* at 43-44.

⁵⁷⁰ HOUBEN & SNYERS, *supra* note 567, at 63.

⁵⁷¹ Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, amending Regulation (EU) No 648/2012 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC, 2015 O.J. (L141) 73 [hereinafter Directive 2015/849].

⁵⁷² HOUBEN & SNYERS, *supra* note 567, at 64-65; EUROPEAN COMMISSION, COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT 29-31 [hereinafter IMPACT ASSESSMENT], <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016SC0223&from=CS>.

⁵⁷³ HOUBEN & SNYERS, *supra* note 567, at 65.

⁵⁷⁴ Directive 2018/843, *supra* note 464, art. 4(1).

⁵⁷⁵ EXPLANATORY MEMORANDUM TO THE MONEY LAUNDERING AND TERRORIST FINANCING (AMENDMENT) REGULATIONS 2019 No. 1511, at 1, https://www.legislation.gov.uk/uksi/2019/1511/pdfs/uksiem_20191511_en.pdf [hereinafter EXPLANATORY MEMORANDUM 2019 No. 1511]; *Transposition of the Fifth Money Laundering Directive*, GOV.UK (Jan. 23, 2020), <https://www.gov.uk/government/consultations/transposition-of-the-fifth-money-laundering-directive>.

regulated through regulations such as AMLD5, a more top-down regulatory approach seems to be reflected. Explanations follow. The FATF (Financial Action Task Force, the “FATF”), which is an inter-governmental body setting international standards and publishing recommendations to combat ML/FT,⁵⁷⁶ pointed out that public regulation is more preferred than a self-regulatory approach.⁵⁷⁷ In 2018, the FATF also clarified its recommendations by suggesting that financial activities involving virtual assets and virtual asset service providers should be included in the relevant regulatory scope.⁵⁷⁸ Furthermore, in 2019, the FATF explicitly pointed out that the risks of ML/FT in virtual assets transactions should be addressed by competent national authorities rather than self-regulatory bodies.⁵⁷⁹ Thus, it seems that a more mandatory and top-down approach to regulate FinTech has been preferred. Both AMLD5 and PSD2 exemplify this approach.

2.3.2 Main Contents

This Section briefly studies the toolkit of AMLD5 with respect to blockchain-based transactions. In particular, this Section also provides the explanations regarding how the toolkit of AMLD5 has been developed on the basis of the characteristics of blockchain-based transactions. The following analyses were undertaken from two aspects – (1) Who is regulated? (2) What are the requirements?

⁵⁷⁶ *About*, FATF, <https://www.fatf-gafi.org/about/> (last visited May 3, 2020).

⁵⁷⁷ *See* FATF, GUIDANCE FOR A RISK-BASED APPROACH: VIRTUAL ASSETS AND VIRTUAL ASSET SERVICE PROVIDERS 5, 24 (June 2019), <https://www.fatf-gafi.org/media/fatf/documents/recommendations/RBA-VA-VASPs.pdf> [hereinafter FATF Guidance].

⁵⁷⁸ *Regulation of Virtual Assets*, FATF (Oct. 19, 2018), <https://www.fatf-gafi.org/publications/fatfrecommendations/documents/regulation-virtual-assets.html>.

⁵⁷⁹ FATF Guidance, *supra* note 577, at 5, 24; *Public Statement on Virtual Assets and Related Providers*, FATF (June 21, 2019), <https://www.fatf-gafi.org/publications/fatfrecommendations/documents/public-statement-virtual-assets.html>.

2.3.2.1 Who Is Regulated?

As mentioned before, AMLD5 aims to address the risks raised by the anonymity of blockchain technology. This anonymity brings concerns that blockchain-based instruments such as virtual currencies would be a medium of money laundering or terrorism financing.⁵⁸⁰ That is, it is said that virtual currencies could possibly be exploited to launder criminal proceeds because criminals could deposit and transfer them anonymously and globally, and financial integrity would be negatively influenced.⁵⁸¹ Therefore, according to AMLD5, the obliged entities are – (1) exchanges or platforms, which are the “providers engaged in the exchange of services between virtual currencies and fiat currencies”,⁵⁸² and (2) “custodian wallet providers”, which are the entities “that provide services to safeguard private cryptographic keys on behalf of their customers, to hold, store and transfer virtual currencies.”⁵⁸³ However, the parties actually involved in virtual currencies include not only these entities but also, for instance, the users⁵⁸⁴ and miners.⁵⁸⁵ The reason why AMLD5 regulates the exchanges, platforms and custodian wallet providers rather than other parties is that it follows the traditional regulatory approach to regulating AML/CFT. More explanations are as follows.

The explanations start from the definition of money laundering. Money laundering is “the process by which criminal proceeds are ‘cleaned’ so that their illegal origins are hidden.”⁵⁸⁶ This process includes – (1) placement,

⁵⁸⁰ HE ET AL., *supra* note 566, at 27.

⁵⁸¹ HE ET AL., *supra* note 566, at 27; EBA, *supra* note 565, at 32-33.

⁵⁸² Directive 2018/843, *supra* note 464, art. 1(1)(c).

⁵⁸³ Directive 2018/843, *supra* note 464, art. 1(2)(d).

⁵⁸⁴ Users are the natural persons or legal entities who use virtual currencies in order to purchase virtual or real services or goods, make payments or invest. HOUBEN & SNYERS, *supra* note 567, at 25.

⁵⁸⁵ Miners are the players involving in transaction validation by solving cryptographic puzzles. *Id.*

⁵⁸⁶ *Money Laundering*, EUROPEAN COMMISSION, https://ec.europa.eu/home-affairs/what-we-do/policies/organized-crime-and-human-trafficking/money-laundering_en (last

which means placing the illegal proceeds into the financial system, (2) layering, which refers to the transfer of the illegal proceeds in order to hide their origins, and (3) integration, which includes the investment, use or withdrawal of the laundered money.⁵⁸⁷ In the EU, the AML regulatory regimes extended to address the financing of terrorism as criminals might hide such financing through money laundering.⁵⁸⁸ The EU AML/CFT regulations have been using a regulatory approach that requires financial institutions such as banks to be the “gatekeepers” in order to detect suspicious transactions or activities.⁵⁸⁹ This regulatory approach is on the basis of the nature of fiat money transactions in which there are central entities such as banks involved. This nature, however, is to a certain extent different from blockchain-related transactions, which are decentralized, so it was argued that adopting the same regulatory approach to regulate blockchain technology might not be easy.⁵⁹⁰ Despite this doubt, AMLD5 still follows this gatekeeper-centered regulatory approach, regulating through imposing requirements on certain entities to make them act like the “nodes” to combat ML/FT.⁵⁹¹ In this way, the anonymity will not be exploited as the users of virtual currencies will be regulated indirectly through directly regulating the intermediate service providers.⁵⁹²

The transposition of AMLD5 in the UK, however, goes beyond it due

visited Oct. 10, 2019).

⁵⁸⁷ Joshua Kirschenbaum & Nicolas Véron, *A better European Union architecture to fight money laundering*, 19 POL’Y CONTRIBUTION 1, 3 (2018).

⁵⁸⁸ *Fight Against the Financing of Terrorism*, EUROPEAN COMMISSION, https://ec.europa.eu/home-affairs/what-we-do/policies/crisis-and-terrorism/financing_en (last visited Oct. 16, 2019).

⁵⁸⁹ Sarah Jane Hughes, “Gatekeepers” Are Vital Participants in Anti-Money- Laundering Laws and Enforcement Regimes as Permission-less Blockchain-Based Transactions Pose Challenges to Current Means to “Follow the Money” 34 (Indiana Legal Studies Research Paper No. 408, 2019), <https://ssrn.com/abstract=3436098>; *Money Laundering*, *supra* note 586.

⁵⁹⁰ See Malcolm Campbell-Verduyn, *Bitcoin, Crypto-coins, and Global Anti-money Laundering Governance*, 69 CRIME, LAW & SOCIAL CHANGE 283, 286-87 (2018).

⁵⁹¹ See *id.* at 293.

⁵⁹² HOUBEN & SNYERS, *supra* note 567, at 65, 76.

to a broader regulatory scope of the activities and entities involved in crypto-asset transactions.⁵⁹³ Firstly, the scope of “virtual currencies” defined in AMLD5 was broadened by UK’s MLRs through regulating “crypto-assets” because a virtual currency is “accepted as a means of exchange” while a crypto-asset has to meet this definition to be a virtual currency.⁵⁹⁴ Secondly, the scope of regulated activities and entities includes – (1) “crypto-asset exchange providers” which are the entities facilitating the exchange between fiat currencies and crypto-assets, (2) the previously mentioned providers facilitating the exchange between crypto-assets, (3) the providers which operate machines utilizing automated processes to exchange between fiat currencies and crypto-assets, (4) “custodian wallet providers”, which are the entities safeguarding crypto-assets or the private keys on behalf of customers, and (5) issuances of crypto-assets such as ICOs.⁵⁹⁵ This scope was deemed to be broader than AMLD5.⁵⁹⁶

2.3.2.2 What Are the Requirements?

The requirements imposed are, but not limited to, firstly, to perform customer due diligence. For instance, the obliged entities need to identify customers, verify the customers’ identity, identify the beneficial owner who ultimately owns or controls the customer, verify the beneficial owner’s identity, assess and obtain the information regarding the business relationship, and conduct ongoing monitoring of the business relationship.⁵⁹⁷

⁵⁹³ Teresa Chambers, *Unstable coins: cryptoassets, financial regulation and preventing financial crime in the emerging market for digital assets*, FCA (Mar. 6, 2020), <https://www.fca.org.uk/news/speeches/unstable-coins>.

⁵⁹⁴ EXPLANATORY MEMORANDUM 2019 No. 1511, *supra* note 575, at 3; *5MLD for crypto assets – The scope of UK gold-plating*, CLIFFORD CHANCE (Jan. 30, 2020), <https://talkingtech.cliffordchance.com/en/industries/fintech/5mld-for-crypto-assets--the-scope-of-uk-gold-plating-.html>.

⁵⁹⁵ EXPLANATORY MEMORANDUM 2019 No. 1511, *supra* note 575, at 3-4; Chambers, *supra* note 593; *Cryptoassets: AML/CFT regime*, FCA, <https://www.fca.org.uk/firms/financial-crime/cryptoassets-aml-ctf-regime> (last visited Aug. 2, 2021).

⁵⁹⁶ *See id.*

⁵⁹⁷ Directive 2015/849, *supra* note 571, art. 13(1); Directive 2018/843, *supra* note 464,

Secondly, the obliged entities need to inform the competent financial intelligence unit (“FIU”) which is established by the member state to combat ML/FT when there are suspicious activities and provide it the relevant information.⁵⁹⁸ Thirdly, the obliged entities should register with the competent authority.⁵⁹⁹ This registration regime, however, seems to be more debatable in terms of its effectiveness. For instance, it was deemed to be less effective in some countries such as the Netherlands and Germany as they once proposed to adopt a licensing regime, which is stricter than the registration regime.⁶⁰⁰ Nonetheless, a registration regime was still adopted in the end in the Netherlands to combat ML/FT,⁶⁰¹ whilst Germany developed a regulatory regime containing a licensing regime.⁶⁰²

In order to implement AMLD5, there are a number of requirements under UK’s MLRs. For instance, firstly, the crypto-asset service providers and custodian wallet providers are required to – (1) perform customer due diligence for all transactions, (2) conduct risk assessment to identify the risks of ML/FT, (3) monitor transactions to identify suspicious transactions, (4) keep all the information used in customer due diligence and transaction monitoring for 5 years after the end of the business relationship, and (5) make

art. 1(8)(a).

⁵⁹⁸ Directive 2015/849, *supra* note 571, art. 33(1); Directive 2018/843, *supra* note 464, art. 1(21).

⁵⁹⁹ Directive 2018/843, *supra* note 464, art. 1(29).

⁶⁰⁰ Yogita Khatri, *Dutch Financial Authorities Plan Licensing Scheme for Crypto Exchanges*, COINDESK (Jan. 22, 2019), <https://www.coindesk.com/dutch-financial-authorities-plan-licensing-scheme-for-crypto-exchanges>; Hans Stamm, Dr. Joachim Kayser, Denise Blessing & Angelo Lercara, Dechert LLP, *AML D5 in Germany: Implementation provides far-reaching licensing requirements for crypto-asset service providers*, LEXOLOGY (Aug. 16, 2019), <https://www.lexology.com/library/detail.aspx?g=8ac13a85-a5b9-4a9d-ac0e-be851766bfa1>.

⁶⁰¹ *Crypto operators should prepare for DNB supervision*, DNB (Sep. 3, 2019), <https://www.dnb.nl/en/news/news-and-archive/Persberichten2019/dnb385424.jsp#>.

⁶⁰² *See New Regulatory Regime for Crypto Assets in Germany*, NORTON ROSE FULBRIGHT (Mar. 2020), <https://www.nortonrosefulbright.com/de-de/wissen/publications/5ee1e37e/new-regulatory-regime-for-crypto-assets-in-germany>.

a suspicious activity report when a suspicious activity is identified.⁶⁰³ Secondly, in line with the registration requirement under AMLD5, all crypto-asset businesses undertaking the activities regulated by UK's MLRs should register with the FCA from 10 January 2020.⁶⁰⁴ The businesses that have already been operating before 10 January 2020 will have a transitional period until 10 January 2021 in which to register with the FCA.⁶⁰⁵ According to the FCA, this registration is for the purpose of combatting ML/FT and is not equal to an authorization to conduct regulated activities.⁶⁰⁶ The FCA, in fact, plays an important role in the context of the implementation of AMLD5 as well as PSD2 as described before.⁶⁰⁷ In addition, the FCA has some other supervisory powers to supervise crypto-asset activities.⁶⁰⁸

2.3.3 Imperfections in Terms of the Pacing Issue

This Section studies why AMLD5 may not be able to adapt to the development of FinTech, especially of blockchain technology. In fact, it was proposed that the EU's AML/CFT regulatory framework should be able to adapt to evolving technology through, for instance, expanding the regulatory scope.⁶⁰⁹ This opinion seems to explain why the UK' MLRs adopts a

⁶⁰³ Chambers, *supra* note 593; EXPLANATORY MEMORANDUM 2019 No. 1511, *supra* note 575, at 3-4.

⁶⁰⁴ *Cryptoassets: AML/CTF regime: Register with the FCA*, FCA (Jan. 10, 2020), <https://www.fca.org.uk/cryptoassets-aml-ctf-regime/register>.

⁶⁰⁵ Barnabas Reynolds, Thomas Donegan & Mathew Orr, Shearman & Sterling LLP, *UK Implements EU's Fifth Anti-Money Laundering Directive*, LEXOLOGY (Jan. 10, 2020), <https://www.lexology.com/library/detail.aspx?g=932b6b49-5f1d-429a-af21-3214cc8a519c>.

⁶⁰⁶ *Id.*; *Cryptoassets: AML / CTF regime*, FCA (Apr. 30, 2020), <https://www.fca.org.uk/firms/financial-crime/cryptoassets-aml-ctf-regime>.

⁶⁰⁷ *See supra* Section 2.2.3.1.

⁶⁰⁸ For instance, the FCA could request information from any entity undertaking the regulated cryptoasset activities. When there is a serious risk of ML/FT, the FCA could immediately stop the business entirely. Chambers, *supra* note 593.

⁶⁰⁹ *See* EUROPEAN COMMISSION, COMMUNICATION FROM THE COMMISSION: ON AN ACTION PLAN FOR A COMPREHENSIVE UNION POLICY ON PREVENTING MONEY LAUNDERING AND TERRORIST FINANCING 5 (2020), <https://www.politico.eu/wp-content/uploads/2020/03/Draft-AML-communication-2.pdf>.

broader scope, which was also recommended by the FATF.⁶¹⁰ The broader regulatory scope of the UK's transposition aims to ensure that evolving global standards could be met and that risks could be fully addressed.⁶¹¹ As technology and innovation are evolving, the regulatory scope of AMLD5 seems to be unable to cover the future development and changes.⁶¹² No matter whether broadening the scope could actually be the remedy, the potential problem of AMLD5 described in this Section shows that regulatory agility is of vital importance in the face of fast-changing technology.⁶¹³

2.4 Summary

This Section examined the EU's regulatory responses to FinTech by focusing on the two regulations that respond to the rise of FinTech and the associated risks, which are PSD2 and AMLD5, as examples. The UK's transpositions of them were also mentioned. Through studying the contents of both PSD2 and AMLD5, it was found that they are both in a more compulsory and top-down approach. While PSD2 exemplifies the regulation encouraging FinTech by removing the entry barriers faced by new market players such as FinTech companies, AMLD5 addresses the risks which are associated with these new players when there are exchanges, platforms, or custodian wallets involved in blockchain-based transactions. However, it was found that there seem to be some imperfections in terms of

⁶¹⁰ See John Salmon & Claire Lipworth, Hogan Lovells, *Crypto: UK Proposes Gold-plating Upcoming AML Rules*, LEXOLOGY (Apr. 26, 2019), <https://www.lexology.com/library/detail.aspx?g=61c09255-15d0-4d3a-a8b5-84fa4db9ab54>; *Cryptoassets: AML / CTF regime*, *supra* note 606.

⁶¹¹ Salmon & Lipworth, *supra* note 610. Similarly, a broader regulatory scope is also adopted in, for instance, Germany when implementing AMLD5. Caroline Herkströter & Michael Born, *Crypto Assets: Germany Introduces New Regulatory Regime*, NORTON ROSE FULBRIGHT (Feb. 17, 2020), <https://www.regulationtomorrow.com/de/crypto-assets-germany-introduces-new-regulatory-regime/>.

⁶¹² See EUROPEAN COMMISSION, *supra* note 609, at 5.

⁶¹³ See *EU's AMLD5 Is Not Enough*, BRÜC + BOND (Jan. 3, 2020), <https://www.brucbond.com/article/eus-amld5-is-not-enough>.

the pacing issue.

With respect to PSD2, it has received criticism that it lacks the regulatory reciprocity in terms of data sharing. The growth and influence of the beneficiaries of data opening including FinTech companies and BigTechs, who receive the data shared by banks without an obligation to reciprocate, are not considered by the regulation.⁶¹⁴ It may result in an undesirable outcome because they could monopolize data and the associated access to customers.⁶¹⁵ The dilemma faced by regulators is epitomized by the above situation. Before PSD2, the development of BigTechs' providing payment services still seems to be at an earlier stage,⁶¹⁶ and it is thus doubtful that the data sharing rules were drafted with the existence of adequate information. However, commentators argued that to address this issue by amending it brings costs.⁶¹⁷ Therefore, this Chapter argued that, the above narratives could be viewed from a different angle. That is, the absence of sufficient information may render the regulation outdated in the future. To resolve this problem through amending regulation after every change in the regulatory landscape could not guarantee that it will not be obsolete again in the future as technology is still evolving. The importance of ensuring regulatory flexibility is thus emphasized.

With respect to AMLD5, it exemplifies an extension of the existing regulation to include FinTech. AMLD5 expands the regulatory scope of the EU's AML/CFT regulations to prevent the anonymity of virtual currency from being exploited. AMLD5 does so by regulating the exchanges, platforms, and custodian wallet providers involved in virtual currency transactions.⁶¹⁸ However, it was argued that the regulatory agility of

⁶¹⁴ *E.g.*, CARR ET AL., *supra* note 547, at 2; Remolina, *supra* note 496, at 29-30; Di Porto & Ghidini, *supra* note 552, 319-21.

⁶¹⁵ *See* Remolina, *supra* note 496, at 29-30.

⁶¹⁶ *See* FSB, *supra* note 559, at 5-7.

⁶¹⁷ Di Porto & Ghidini, *supra* note 552, at 323-25.

⁶¹⁸ Directive 2018/843, *supra* note 464, art. 1(1)(c), art. 1(2)(d).

AMLD5 does not seem to be enough in the face of fast-changing markets. That is, its regulatory scope was deemed to be incapable of including the changes and evolution of blockchain technology applications.⁶¹⁹ These changes could be exemplified by the different entities involved in blockchain transactions which differ from the types currently regulated by AMLD5. Therefore, in the transposition of AMLD5 in some countries such as the UK and Germany, a broader regulatory scope is adopted to include more types of the entities involved in blockchain transactions and meet the global FATF standards.⁶²⁰

3. Regulatory Responses to FinTech in the US

After examining the EU's regulatory responses to FinTech, this Section will study the regulatory responses to FinTech in the US as of the time of this writing. While PSD2 and AMLD5 exemplify the regulation particularly addressing the issues regarding FinTech, US regulators' efforts to regulate and encourage FinTech are said to be fragmented.⁶²¹ This fragmentation is manifested by, among others, the confusion over which regulation should be applicable and which regulator should be responsible.⁶²² Nevertheless, this Section will study how US securities regulations are applied to FinTech as an example. An examination in terms of the pacing issue will also be undertaken.

Section 3.1 illustrates the characteristics of the FinTech regulations in the US from a higher perspective. This Section especially studies the fragmentation and complexity of them. Section 3.2 studies how US securities regulations may be applied to blockchain technology as an example, mirroring the fragmentation and complexity. SEC's enforcement actions are

⁶¹⁹ See EUROPEAN COMMISSION, *supra* note 609, at 4-5.

⁶²⁰ See Salmon & Lipworth, *supra* note 610; Herkströter & Born, *supra* note 611.

⁶²¹ E.g., Groenfeldt, *supra* note 458.

⁶²² See Bromley, *supra* note 458, at 94-96.

mentioned as examples. This section also discusses some recent regulatory developments that aim to remove the uncertainties brought by the fragmentation and complexity. Section 3.3 analyzes the regulatory approach to FinTech in the US and the possible changes of it in the future in the light of the pacing issue. Section 3.4 summarizes.

3.1 Illustration of the FinTech Regulations in the US from a Higher Perspective

3.1.1 Complex and Fragmented Regulations Contribute to Regulatory Complexity

Further to Chapter 3, the complexities existing in modern financial markets may render the traditional financial regulation unsuitable. This situation could be compounded in the face of regulatory complexity, which was also discussed in Chapter 3.⁶²³ Specifically, according to scholars, regulatory complexity might manifest itself as, for instance, a large amount of regulation, different regulatory bodies with overlapping authorities, conflicting agency missions and contradicting regulatory or policy objectives.⁶²⁴ In fact, these phenomena can be observed in the regulatory approach to FinTech in the US, and they seem to be related to the inherent nature of the US financial regulatory structure. The description and explanation are provided in the following section.

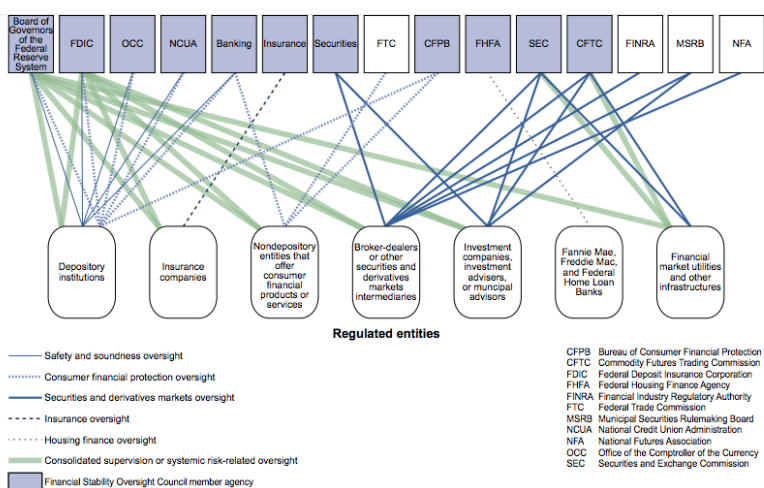
3.1.2 FinTech Regulations in the US Are Also Complex and Fragmented

⁶²³ See *supra* Chapter 3, Section 3.2.4.

⁶²⁴ Baxter, *supra* note 480, at 863-64. Regarding the conflicting agency missions, there might be some internal conflicting missions within one regulator. For instance, asking a prudential regulator which has been focusing on stability issues to simultaneously cope with the development and promotion of innovation and competition may result in mission conflicts. Rory Van Loo, *Making Innovation More Competitive: The Case of FinTech*, 65 UCLA L. REV. 232, 259, 273-75 (2018).

The US financial regulatory structure has been considered to be complex and fragmented.⁶²⁵ That is, while the US financial system is one of the heavily regulated sectors,⁶²⁶ there might be overlapping regulatory authorities and contradicting rules that come from those different regulatory bodies.⁶²⁷ The following figure illustrates this structure in which overlapping authorities exist.

Figure 5: Financial Regulators and Their Responsibilities in the US



Source: UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE, *supra* note 625, at 12.

This situation also seems to exist when it comes to regulating FinTech.⁶²⁸ Commentators argued that FinTech would find it difficult to fit

⁶²⁵ UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE, FINANCIAL REGULATION: COMPLEX AND FRAGMENTED STRUCTURE COULD BE STREAMLINED TO IMPROVE EFFECTIVENESS 9 (Feb. 2016), <https://www.gao.gov/assets/680/675400.pdf>.

⁶²⁶ E.g., FREDERIC S. MISHKIN, THE ECONOMICS OF MONEY, BANKING AND FINANCIAL MARKETS 46 (9th ed. Global Ed. 2016).

⁶²⁷ UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE, *supra* note 625, at 9; Bromley, *supra* note 458, at 93.

⁶²⁸ *Id.* at 93-95.

in to this regulatory structure in the absence of a coordinated federal approach to it.⁶²⁹ For instance, in 2018, the US Government Accountability Office (the “GAO”) released a report studying the benefits and risks of FinTech.⁶³⁰ In particular, it pointed out that the regulatory complexity of US financial regulations bring costs to FinTech companies (1) when FinTech companies investigate to understand the regulation that may apply and (2) when FinTech companies try to navigate the regulatory structure where multiple regulatory bodies exist at both the federal and state level.⁶³¹

To be clear, it was pointed out that the regulatory system in the US is challenging FinTech companies.⁶³² It is because, firstly, FinTech companies are often subject to the overlapping authorities at the federal level, and, secondly, state regulators are also involved with respect to some issues such as licensing.⁶³³ Cryptocurrency or other blockchain-based instruments, for instance, may be subject to multiple federal regulators. They might include – (1) the SEC, if the instruments are considered to be securities,⁶³⁴ (2) the CFTC (the U.S. Commodity Futures Trading Commission, “CFTC”), if the instruments constitutes commodities,⁶³⁵ and (3) the FinCEN (the U.S.

⁶²⁹ *Id.* at 94.

⁶³⁰ *See generally* UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE, FINANCIAL TECHNOLOGY: ADDITIONAL STEPS BY REGULATORS COULD BETTER PROTECT CONSUMERS AND AID REGULATORY OVERSIGHT (Mar. 2018), <https://www.gao.gov/assets/700/690803.pdf>.

⁶³¹ *Id.* at 40-41.

⁶³² Margaux Curie, *FinTech Regulations in the US: Policy, Implementation, and Future Directions*, WHITE & CASE (July 24, 2018), <https://www.whitecase.com/publications/article/fintech-regulation-us-policy-implementation-and-future-directions>.

⁶³³ *Id.*

⁶³⁴ *See infra* Section 3.2.2.

⁶³⁵ In 2015, the CFTC announced that Bitcoin is subject to the CEA (the Commodity Exchange Act, the “CEA”) because it is regarded as commodity. Pete Rizzo, *CFTC Ruling Defines Bitcoin and Digital Currencies as Commodities*, COINDESK (Sep. 17, 2015), <https://www.coindesk.com/cftc-ruling-defines-bitcoin-and-digital-currencies-as-commodities>. In September 2017, the CFTC had its first enforcement action against a fraud involving Bitcoin. Gary DeWaal, Katten Muchin Rosenman LLP, *CFTC Files Charges Alleging Bitcoin Ponzi Scheme Not Involving Derivatives*, LEXOLOGY (Sep. 24, 2017), <https://www.lexology.com/library/detail.aspx?g=46d6a1e5-e2b8-4695-9e4e->

Financial Crimes Enforcement Network, “FinCEN”) as it announced that AML regulations may apply to certain business models involving CVC (convertible virtual currency, “CVC”).⁶³⁶ For instance, persons accepting and transmitting CVC are required to register with the FinCEN and comply with AML regulations.⁶³⁷

Moreover, the costs created by the complex and fragmented regulation are more significant for the FinTech companies which are still at an early stage when they try to comply with the potential regulations.⁶³⁸ According to a study, the US FinTech world is mainly composed of thousands of smaller companies.⁶³⁹ Thus, it is likely that FinTech innovation may be stifled by this complex and fragmented regulatory structure.⁶⁴⁰

3.2 Regulatory Responses to Blockchain Technology in the US

This Section studies the regulatory responses to blockchain technology in the US at the time of writing, as an example of the complex and fragmented FinTech regulatory structure mentioned before. Section 3.2.1 briefly describes that a case-by-case approach is largely adopted in the US. Section 3.2.2 discusses chronologically the SEC’s enforcement actions and other activities that exemplify this case-by-case regulatory approach. Section 3.2.3 studies some new regulatory developments which are expected to

[eb25c8a406c6](#).

⁶³⁶ THE U.S. FINANCIAL CRIMES ENFORCEMENT NETWORK, FINCEN GUIDANCE: APPLICATION OF FINCEN’S REGULATIONS TO CERTAIN BUSINESS MODELS INVOLVING CONVERTIBLE VIRTUAL CURRENCIES 1 (May 9, 2019), <https://www.fincen.gov/sites/default/files/2019-05/FinCEN%20Guidance%20CVC%20FINAL%20508.pdf>. “Convertible virtual currency” is “a type of virtual currency that either has an equivalent value as currency, or acts as a substitute for currency, and is therefore a type of ‘value that substitutes for currency.’” *Id.* at 7.

⁶³⁷ *Id.* at 12.

⁶³⁸ UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE, *supra* note 630, at 41.

⁶³⁹ JIM ECKENRODE & SAM FRIEDMAN, DELOITTE, FINTECH BY THE NUMBERS: INCUMBENTS, STARTUPS, INVESTORS ADAPT TO MATURING SYSTEM 16 (2017).

⁶⁴⁰ *See* Curie, *supra* note 632.

waiver this approach in the future.

3.2.1 A Case-by-case Approach Could be Observed

It seems that the regulatory approach to FinTech in the US differs from the one in the EU. A commentator found that industry consortia could be found in the US, which aim to provide the services that help companies and their third-parties comply with regulation.⁶⁴¹ This phenomenon reflects that while the regulatory oversight in the US becomes more burdensome, those regulated find the regulation difficult to comply with.⁶⁴² In the context of FinTech regulation, the US FinTech regulation and financial regulation are more complex and fragmented as described above.⁶⁴³ And the regulatory responses to FinTech seem to be more on a case-by-case basis. As studied in the following, their regulatory responses to blockchain technology especially epitomize those narratives.

3.2.2 Cases Exemplifying the Case-by-case Approach

3.2.2.1 Are Blockchain-based Instruments Securities?

According to scholars, SEC's enforcement of blockchain-based instruments such as ICOs was more selective before it built its guidance,⁶⁴⁴ reflecting a case-by-case approach. In this approach, the regulatory issues focused on by the SEC were fundamentally related to a question. That is, whether these newly emerging blockchain-based instruments are "securities"?

The definitions of securities could be seen in, among others, Securities

⁶⁴¹ *See id.* at 378, 397.

⁶⁴² *See id.* at 370, 383, 386.

⁶⁴³ *See supra* Section 3.1.

⁶⁴⁴ James J. Parker & Howard H. Park, *Regulation by Selective Enforcement: The SEC and Initial Coin Offerings*, 61 J.L. & POL'Y 99, 101-2 (2020).

Act (Securities Act of 1933, hereinafter “Securities Act”) and Exchange Act (Securities Exchange Act of 1934, hereinafter “Exchange Act”).⁶⁴⁵ If blockchain-based instruments are securities, the regulation of the Securities Act and/or the Exchange Act will apply. In particular, as the definition of securities is broad, the SEC has focused on the examination that determines whether these blockchain-based instruments constitute “investment contracts”, which are deemed securities.⁶⁴⁶ Thus, the “Howey test” applies, measuring whether investment contracts are constituted based on the following conditions. Firstly, there is investment of money; secondly, the investment of money is in a common enterprise; thirdly, there is a reasonable expectation of profits; and fourthly, the profits are derived from the entrepreneurial or managerial efforts of others.⁶⁴⁷

In the following, some of the SEC’s enforcement actions responding to blockchain technology will be examined, illustrating the case-by-case approach. These actions centered on the question of whether the disputed blockchain-based instruments are securities.

3.2.2.2 Early Enforcement Action in 2013: *SEC v. Shavers*

The SEC’s early action responding to blockchain-based instruments can be traced back to 2013 when it charged a man and his company involved in a Ponzi scheme exploiting Bitcoin.⁶⁴⁸ In this case, a man in Texas,

⁶⁴⁵ 15 U.S.C. § 77b(a)(1) (2012); 15 U.S.C. § 78c(3)(a)(10) (2016).

⁶⁴⁶ See *Public Statement, U.S. Securities and Exchange Commission, Statement on “Framework for ‘Investment Contract’ Analysis of Digital Assets”*, U.S. SECURITIES AND EXCHANGE COMMISSION (Apr. 3, 2019), <https://www.sec.gov/news/public-statement/statement-framework-investment-contract-analysis-digital-assets>.

⁶⁴⁷ *SEC v. W.J. Howey Co.*, 328 U.S. 293, 298-99 (1946); JOHN C. COFFEE, JR. & HILLARY A. SALE, *SECURITIES REGULATIONS: CASES AND MATERIALS* 248, 267 (12th ed. 2012).

⁶⁴⁸ *Press Release, U.S. Securities and Exchange Commission, SEC Charges Texas Man With Running Bitcoin-Denominated Ponzi Scheme*, U.S. SECURITIES AND EXCHANGE COMMISSION (July 23, 2013), <https://www.sec.gov/news/press-release/2013-132>; Christopher Conniff & Helen Gugel, *INSIGHT: In the Wake of the DAO Report: A Year in Review*, BLOOMBERG LAW (July 27, 2018), <https://news.bloomberglaw.com/securities-law/insight-in-the-wake-of-the-dao->

Trendon T. Shavers, and his company, Bitcoin Savings and Trust (“BTCST”), were alleged to defraud investors as Shavers promised investors up to 7 percent weekly interest based on BTCST’s activities in the Bitcoin market; nevertheless, this investment was actually a Ponzi scheme because Shavers used the Bitcoin from new investors to pay the interest that he promised to old investors.⁶⁴⁹ In the ruling in 2014, the court held that the BTCST investments were investment contracts under the Howey test that should be regulated; thus, Shavers and BTCST violated the relevant securities regulations such as anti-fraud provisions.⁶⁵⁰

Notably, the case *SEC v. Shavers* explicitly rules that cryptocurrency may constitute an “investment of money” because it could be “used as” money, even though Shavers asserted that Bitcoin is not a currency that could be regulated.⁶⁵¹ The investments were accordingly investment contracts.⁶⁵² The bitcoin itself, however, was not regulated as a security.⁶⁵³ According to a scholar, this case “answers the important question of whether an ‘investment of money’ under Howey needs to take the form of legal tender.”⁶⁵⁴

report-a-year-in-review. According to the SEC, “a Ponzi scheme is an investment fraud that involves the payment of purported returns to existing investors from funds contributed by new investors.” *Ponzi Schemes*, U.S. SECURITIES AND EXCHANGE COMMISSION, <https://www.sec.gov/fast-answers/answersponzihtm.html#PonziWhatIs> (last visited Aug. 4, 2021).

⁶⁴⁹ *Press Release*, *supra* note 648.

⁶⁵⁰ *U.S. Securities and Exchange Commission, Litigation Release No. 23090, Securities and Exchange Commission v. Trendon T. Shavers and Bitcoin Savings and Trust, Civil Action No. Civil Action No. 4:13-CV-416*, U.S. SECURITIES AND EXCHANGE COMMISSION (Sep. 22, 2014), <https://www.sec.gov/litigation/litreleases/2014/lr23090.htm>.

⁶⁵¹ Julianna Debler, *Foreign Initial Coin Offering Issuers Beware: The Securities and Exchange Commission is Watching*, 51 CORNELL INT’L L.J. 245, 256-57 (2018).

⁶⁵² *Id.* at 256.

⁶⁵³ Parker & Park, *supra* note 644, at 111.

⁶⁵⁴ Debler, *supra* note 651, at 257.

3.2.2.3 2014: SEC v. Erik T. Voorhees and SEC v. BTC Corporation & Ethan Burnside

In addition to *SEC v. Shavers*, there are other SEC's enforcement actions responding to blockchain technology while SEC asserted in 2013 its potential authority.⁶⁵⁵ It claimed:

“Whether a virtual currency is a security under the federal securities laws, and therefore subject to our regulation, is dependent on the particular facts and circumstances at issue. Regardless of whether an underlying virtual currency is itself a security, interests issued by entities owning virtual currencies or providing returns based on assets such as virtual currencies likely would be securities and therefore subject to our regulation.”⁶⁵⁶

According to commentators, SEC's actions mainly focused on issuers' registration failures based on securities regulations.⁶⁵⁷ Nevertheless, those actions reaffirmed the notions that some applications of blockchain technology may constitute securities according to the Howey test and that the SEC has the power to regulate them.⁶⁵⁸ The investments involved in *SEC v. Shavers* exemplifies.⁶⁵⁹ In addition, in June 2014, the SEC charged Erik T. Voorhees, who publicly offered shares denominated by Bitcoin but failed to register the offerings with the SEC.⁶⁶⁰ In December 2014, the SEC

⁶⁵⁵ Conniff & Gugel, *supra* note 648; Julie Anderson Hill, *Virtual Currencies & Federal Law*, 18 J. CONSUMER & COM. L. 65, 68 (2014).

⁶⁵⁶ *Id.*; U.S. Securities and Exchange Commission, *The Honorable Thomas R. Carper* (Aug. 30, 2013), <https://online.wsj.com/public/resources/documents/VCurrenty111813.pdf>.

⁶⁵⁷ Conniff & Gugel, *supra* note 648.

⁶⁵⁸ See Debler, *supra* note 651, at 254.

⁶⁵⁹ *Id.* at 256.

⁶⁶⁰ *Press Release, U.S. Securities and Exchange Commission, SEC Charges Bitcoin Entrepreneur With Offering Unregistered Securities*, U.S. SECURITIES AND EXCHANGE COMMISSION (June 3, 2014), <https://www.sec.gov/news/press-release/2014-111>; U.S. SECURITIES AND EXCHANGE COMMISSION, SECURITIES ACT OF 1933 RELEASE NO. 9592 ADMINISTRATIVE PROCEEDING FILE NO. 3-15902, at 1-2 (June 3, 2014),

sanctioned Ethan Burnside, who was a computer programmer operating websites to offer shares and provide venues to trade them on the basis of two types of virtual currencies.⁶⁶¹ It is because he failed to register the offerings and register the venues as broker-dealers or exchanges.⁶⁶² Those two cases, which are *SEC v. Erik T. Voorhees* and *SEC v. BTC Corporation and Ethan Burnside*, similarly confirmed that some applications of Bitcoin could constitute securities, thereby being subject to relevant responsibilities such as the registration requirements pursuant to the Securities Act.⁶⁶³

3.2.2.4 2017: The DAO Investigation Report & *In re Munchee Inc.*

The regulatory trajectory that blockchain applications might constitute securities has also been seen after the above cases. Two SEC's activities in 2017, which were considered to be significant and meaningful by commentators – (1) The DAO investigation report and (2) *In re Munchee Inc.*,⁶⁶⁴ exemplify this regulatory trajectory. As explained in the following, they seem to be mainly on the case-by-case basis, but the scope of the holdings in both cases seems to be expanded.

Firstly, the SEC released “The DAO Investigation Report” in July 2017, which is deemed to have some implications which are significant for the ICOs markets as it explicitly addressed the regulatory issues regarding ICOs.⁶⁶⁵ In this case, The DAO is a virtual organization created by Slock.it,

<https://www.sec.gov/litigation/admin/2014/33-9592.pdf>.

⁶⁶¹ *Press Release, U.S. Securities and Exchange Commission, SEC Sanctions Operator of Bitcoin-Related Stock Exchange for Registration Violations*, U.S. SECURITIES AND EXCHANGE COMMISSION (Dec. 8, 2014), <https://www.sec.gov/news/press-release/2014-273>.

⁶⁶² *Id.*

⁶⁶³ BENJAMIN NAFTALIS ET AL., LATHAM & WATKINS, ENFORCEMENT TRENDS IN CRYPTOCURRENCY 2 (Dec. 9, 2015), <https://m.lw.com/thoughtLeadership/lw-enforcement-trends-cryptocurrency>. Regarding the relevant registration requirements, see 15 U.S.C. § 77e(a) (2012); 15 U.S.C. § 77e(c) (2012).

⁶⁶⁴ Debler, *supra* note 651, at 258; Conniff & Gugel, *supra* note 648.

⁶⁶⁵ *See id.*; Debler, *supra* note 651, at 260.

a German company, and its co-founders.⁶⁶⁶ The DAO tokens were sold to enable the holders of them to share the expected profits from the projects of The DAO, and there was a secondary market established by an online platform on which the investors could monetize their investments.⁶⁶⁷ The SEC has determined and announced that the DAO tokens, which are blockchain-based capital raising instruments, are regarded as securities according to the Howey test, and the relevant securities regulations apply.⁶⁶⁸ For instance, unless there is an exemption, the issuer should register the offer and sale of securities.⁶⁶⁹ This report, which is not an enforcement action, sent signals to the entire digital token markets by warning that failures to comply with securities regulations may lead to SEC's enforcement actions.⁶⁷⁰ However, in this report, the SEC emphasized that:

“the U.S. federal securities law may apply to various activities, including distributed ledger technology, depending on the particular facts and circumstances, without regard to the form of the organization or technology used to effectuate a particular offer or sale.”⁶⁷¹

Therefore, it could be observed that the case-by-case approach was still adopted by the SEC, and, as a commentator pointed out, the SEC also noted that the Howey test is flexible.⁶⁷²

Secondly, in *In re Munchee Inc.*, Munchee Inc. is a California-based company seeking capital to improve its iPhone app centered on restaurant

⁶⁶⁶ U.S. SECURITIES AND EXCHANGE COMMISSION, REPORT OF INVESTIGATION PURSUANT TO SECTION 21(A) OF THE SECURITIES EXCHANGE ACT OF 1934: THE DAO 1 (25 July 2017), <https://www.sec.gov/litigation/investreport/34-81207.pdf> [hereinafter THE DAO INVESTIGATION REPORT].

⁶⁶⁷ *Id.*

⁶⁶⁸ *Id.* at 10-11.

⁶⁶⁹ *Id.* at 15-16.

⁶⁷⁰ Michael Mendelson, *From Initial Coin Offerings to Security Tokens: A U.S. Federal Securities Law Analysis*, 22 STAN. TECH. L. REV. 52, 68-69 (2019).

⁶⁷¹ THE DAO INVESTIGATION REPORT, *supra* note 666, at 10.

⁶⁷² Mendelson, *supra* note 670, at 68.

meal reviews by issuing tokens and planning to create a system where services and goods could be purchased by using tokens.⁶⁷³ The defendant asserted that these tokens are not coins nor securities because they are used for consumption purposes.⁶⁷⁴ This case concerns an ICO and, according to commentators, is meaningful. It is because of the SEC's statement that if there is a secondary market where the tokens could be traded and an expectation of profits coming from the issuer's efforts, the third condition of the Howey test, which is "there is a reasonable expectation of profits", will be met.⁶⁷⁵ In other words, the fulfillment of this condition does not rely on the form of the tokens which was claimed by the issuer at the time of offering.⁶⁷⁶ The tokens involved in this case, therefore, were regarded as securities.⁶⁷⁷ Most importantly, in this case, the SEC referred to The DAO Investigation Report, reaffirming that whether a token is a security depends on the facts and circumstances.⁶⁷⁸ In other words, the case-by-case basis remained.

3.2.3 Some Recent Developments

3.2.3.1 2019: A Framework for 'Investment Contract' Analysis of Digital Tokens

After the cases discussed above, however, it can be observed that the question of would a blockchain application fall within the scope of securities regulations still remains. Thus, the SEC issued a framework in April 2019 to

⁶⁷³ *Press Release, U.S. Securities and Exchange Commission, Company Halts ICO After SEC Raises Registration Concerns*, U.S. SECURITIES AND EXCHANGE COMMISSION (Dec. 11, 2017), <https://www.sec.gov/news/press-release/2017-227>.

⁶⁷⁴ U.S. SECURITIES AND EXCHANGE COMMISSION, SECURITIES ACT OF 1933 RELEASE NO. 10445 ADMINISTRATIVE PROCEEDING FILE NO. 3-18304, at 9 (Dec. 11, 2017), <https://www.sec.gov/litigation/admin/2017/33-10445.pdf> [hereinafter MUNCHEE INC. SEC ORDER].

⁶⁷⁵ Debler, *supra* note 651, at 259.

⁶⁷⁶ *See id.*

⁶⁷⁷ MUNCHEE INC. SEC ORDER, *supra* note 674, at 2.

⁶⁷⁸ *Press Release, supra* note 673.

help market participants assess whether securities regulations apply.⁶⁷⁹ The “Framework for ‘Investment Contract’ Analysis of Digital Tokens” (hereinafter the “ICO Framework”) aims to provide clarity of ICOs regulation by identifying the factors regarding the application of the Howey test on digital tokens.⁶⁸⁰ In addition, this framework revealed that if the tokens are offered and sold for “use or consumption”, instead of profits earning, by purchasers, those tokens might be exempted from securities regulations.⁶⁸¹

Thus, according to a study, the fact that the SEC is open to excluding some blockchain-based digital tokens from securities regulations could be seen.⁶⁸² Nevertheless, commentators argued that this framework seems to be inadequate insofar as it is not binding and uncertainties still remain due to the lack of clear rules.⁶⁸³ Thus, it was argued that judicial intervention is still needed, and this framework was regarded as a guidance for the judges’ analysis in future litigation.⁶⁸⁴

3.2.3.2 Diverse Bills Have Been Introduced in Recent Years

(1) Token Taxonomy Act of 2018

⁶⁷⁹ Bill Hinman & Valerie Szczepanik, *Public Statement, U.S. Securities and Exchange Commission, Statement on “Framework for ‘Investment Contract’ Analysis of Digital Assets”*, U.S. SECURITIES AND EXCHANGE COMMISSION (Apr. 3, 2019), <https://www.sec.gov/news/public-statement/statement-framework-investment-contract-analysis-digital-assets>; *Framework for ‘Investment Contract’ Analysis of Digital Assets*, U.S. SECURITIES AND EXCHANGE COMMISSION, <https://www.sec.gov/corpfin/framework-investment-contract-analysis-digital-assets> (last visited Aug. 5, 2021).

⁶⁸⁰ *Id.*

⁶⁸¹ *Id.*

⁶⁸² Recent Guidance, *Securities Regulation – Financial Technology – SEC Provides Analytical Tools for Assessing Digital Assets. – SEC, Framework for “Investment Contract” Analysis of Digital Assets (2019)*, 132 HARV. L. REV. 2418, 2418, 2422 (2019).

⁶⁸³ *Id.* at 2422.

⁶⁸⁴ *Id.* at 2422, 2426.

In addition to the above cases and reports, legislators and market participants have been engaging in removing the regulatory uncertainties by, for instance, introducing new laws.⁶⁸⁵ In fact, according to a study in 2019, there have been 17 bills introduced, which are related to blockchain technology, and the provisions of those bills are diverse.⁶⁸⁶ This Chapter will not look into all these bills but briefly mention three bills in the following as examples. They focus on different aspects of blockchain-related issues.

First, in December 2018, two house representatives introduced the “Token Taxonomy Act” to try to exclude tokens from the definition of a security and enact different regulations for these digital units.⁶⁸⁷ This bill aims to amend the definition of securities in order to exempt digital tokens from securities regulations.⁶⁸⁸ In April 2019, this bill was updated.⁶⁸⁹ In particular, it was reported that this updated bill aims to provide a clearer definition of digital tokens in order to be more inclusive in the face of the changing technology.⁶⁹⁰ For instance, the definition of digital tokens in the previous version specified that their transaction history “cannot be materially altered”.⁶⁹¹ Nevertheless, in the face of the risks of being attacked, this decisive definition might render the tokens, which were attacked and their transaction history altered, ineligible for the exemption.⁶⁹² Thus, this

⁶⁸⁵ ROBERT A. SCHWINGER, NORTON ROSE FULBRIGHT, CHANGING SECURITIES LAW AND REGULATIONS FOR THE DIGITAL TOKEN AGE 3 (2019), <https://www.nortonrosefulbright.com/en-us/-/media/files/nrf/nrfweb/knowledge-pdfs/changing-securities-laws-and-regulations-pdf.pdf?revision=40337045-7c23-4355-ad00-06987abd30ec>.

⁶⁸⁶ Selam E. Eyassu, *Overview of Blockchain Legislative and Adoption: Status and Challenges*, 20 ISSUES IN INFORMATION SYSTEMS 12, 15, 18 (2019).

⁶⁸⁷ H.R. 7356, 115th Cong. (2018) [hereinafter H.R. 7356].

⁶⁸⁸ SCHWINGER, *supra* note 685, at 2.

⁶⁸⁹ H.R. 2144 116th Cong. (2019) [hereinafter H.R. 2144].

⁶⁹⁰ JD Alois, *Updated Token Taxonomy Act Introduced as Legislation, Bill is Designed to Create Innovation Friendly Rules for Digital Assets Including Non Security Tokens*, CROWDFUND INSIDER (Apr. 9, 2019), <https://www.crowdfundinsider.com/2019/04/146185-updated-token-taxonomy-act-introduced-as-legislation-bill-is-designed-to-create-innovation-friendly-rules-for-digital-assets-including-non-security-tokens/>.

⁶⁹¹ H.R. 7356, *supra* note 687, Section 2(a).

⁶⁹² Daniel Nathan & Andrew Wallach, *The 2019 Token Taxonomy Act: A Path to*

definition was replaced by stating that the transaction history of digital tokens “resists modification or tampering”.⁶⁹³

(2) Blockchain Regulatory Certainty Act of 2019

Second, the bills which were proposed in recent years are relevant to not only securities regulations but also other regulation. For instance, in January 2019, the “Blockchain Regulatory Certainty Act” was introduced.⁶⁹⁴ This bill focused on the blockchain developers and providers of blockchain services by proposing to exempt them from certain licensing or registration requirements which are applicable when regulating traditional financial institutions.⁶⁹⁵

(3) Crypto-Currency Act of 2020

Third, in March 2020, the bill “Crypto-Currency Act of 2020”⁶⁹⁶ was proposed to seek regulatory certainties through not only categorizing cryptocurrency but also clarifying which federal regulator is tasked.⁶⁹⁷ That is, crypto assets are categorized into three types in this bill – (1) crypto

Consumer Protection and Innovation Takes Shape, ORRICK,
<https://blogs.orrick.com/blockchain/the-2019-token-taxonomy-act-a-path-to-consumer-protection-and-innovation-takes-shape/>.

⁶⁹³ H.R. 2144, *supra* note 689, Section 2(a).

⁶⁹⁴ H.R. 528 116th Cong. (2019) [hereinafter H.R. 528].

⁶⁹⁵ H.R. 528, *supra* note 694, Section 2(a).

⁶⁹⁶ H.R. 6154, 116th Cong. (2020) [hereinafter H.R. 6154].

⁶⁹⁷ Steven Lightstone, *Andrew M. Ray & William J. Kraus, Morgan Lewis & Bockius LLP, Bitcoin 101: Halves, Halving, and ‘the Halvening’*, LEXOLOGY (May 11, 2020), <https://www.lexology.com/library/detail.aspx?g=170927b0-b40a-4041-8b75-2b194771658a>.

commodity,⁶⁹⁸ (2) crypto currency,⁶⁹⁹ and (3) crypto security.⁷⁰⁰ This bill particularly proposed that the regulatory oversight for each type of crypto assets should be undertaken by different regulatory bodies – (1) the CFTC regulates crypto commodities,⁷⁰¹ (2) the FinCEN and the OCC (the Office of the Controller of the Currency, “OCC”) regulate crypto currencies,⁷⁰² in which the former is the main regulator with which exchanges should register,⁷⁰³ and (3) the SEC regulates crypto securities.⁷⁰⁴ Even though this bill aims to clarify which regulatory authority should be responsible for regulating different crypto assets and to solve the problems of the fragmented and overlapping regulatory structure mentioned before,⁷⁰⁵ it has received criticism because it actually creates more problems. Those criticism is discussed in the following section.

3.3 Examination of the Regulatory Responses to FinTech and Its Possible Movement in the US

3.3.1 Proposed Bills May Not Adapt to the Real FinTech World

According to the analyses above, it could be observed that (1) the regulatory approach to FinTech has been largely on a case-by-case basis that might leave more room for interpretation but bring uncertainties, and (2)

⁶⁹⁸ Crypto commodities are “economic goods or services, including derivatives, that (A) have full or substantial fungibility; (B) the markets treat with no regard as to who produced the goods or services; and (C) rest on a blockchain or decentralized cryptographic ledger.” H.R. 6154, *supra* note 696, Section 2(1).

⁶⁹⁹ Crypto currencies are “representations of United States currency or synthetic derivatives resting on a blockchain or decentralized cryptographic ledger.” *Id.* Section 2(2).

⁷⁰⁰ Crypto securities are “all debt and equity that rest on a blockchain or decentralized cryptographic ledger.” *Id.* section 2(3).

⁷⁰¹ *Id.* Sections 3(a) and 4(a).

⁷⁰² *Id.* Section 3(b).

⁷⁰³ *Id.* Section 4(b).

⁷⁰⁴ *Id.* Sections 3(c) and 4(c).

⁷⁰⁵ Regarding the description of this fragmented and overlapping regulatory structure, *see supra* Section 3.1.2.

some recent developments such as SEC’s ICO Framework and diverse bills seem to alter this case-by-case approach by seeking more regulatory or legal certainties. While there might be some changes in the future, the imperfections of those developments such as the proposed bills mirror the difficulties in relation to the pacing issue.

For instance, while the Crypto-Currency Act of 2020 suggested that the CFTC regulates the trading of crypto commodities,⁷⁰⁶ commentators pointed out that “the CFTC regulates the trading of derivatives – the ‘commodity futures’ in its name – not the trading of the commodities themselves.”⁷⁰⁷ Besides, the definition of crypto securities in this bill includes some types of assets such as a mortgage debt issued on blockchain.⁷⁰⁸ According to this bill, this blockchain-based mortgage debt should be regulated by the SEC as it is classified as a crypto security.⁷⁰⁹ Nevertheless, a commentator pointed out that mortgages are already regulated by state and federal banking laws rather than the SEC.⁷¹⁰

The imperfections of this bill reflect that a presumptive regulatory approach might fail to cover the actual use cases of blockchain technology and its development in the future.⁷¹¹ Thus, commentators suggested that “we should be nimble right now and define later.”⁷¹² The above narratives seem to explain why a case-by-case approach has been adopted by the SEC as this approach might provide some room for explanation when the technology is

⁷⁰⁶ H.R. 6154, *supra* note 696, Sections 3(a) and 4(a).

⁷⁰⁷ E.g., Robert Kim, *ANALYSIS: A Crypto-Currency Act of 2020? You Cannot Be Serious!*, BLOOMBERG LAW (Jan. 13, 2020), <https://news.bloomberglaw.com/bloomberg-law-analysis/analysis-a-crypto-currency-act-of-2020-you-cannot-be-serious>.

⁷⁰⁸ Daniel Kuhn, *The Cryptocurrency Act of 2020 Is ‘Dead on Arrival,’ Washington Tells Sponsors*, COINDESK (Mar. 11, 2020), <https://www.coindesk.com/the-cryptocurrency-act-of-2020-is-dead-on-arrival-washington-dc-tells-sponsors>.

⁷⁰⁹ H.R. 6154, *supra* note 696, Sections 3(c) and 4(c).

⁷¹⁰ Kuhn, *supra* note 708.

⁷¹¹ *See id.*

⁷¹² *Id.*

still developing.

3.3.2 Movement of FinTech Regulation May be Subject to Interest Groups' Influence

Since the bills above were still being discussed at the time of writing, it might be too early to assert that if the future regulatory approach to FinTech in the US will succeed or fail. While the SEC tends to regard most of the digital tokens as securities based on the flexible Howey test and the case-by-case approach,⁷¹³ some bills proposed recently aim to exempt them from regulation as discussed before.⁷¹⁴ In fact, it was reported that not only FinTech companies but also incumbents such as MasterCard, Ernst & Young and Accenture are lobbying and supporting those bills because they have business lines associated with FinTech.⁷¹⁵ What will the statutory FinTech regulation, if there is one in the US, look like in the face of the pressure from lobbyists? The relevant issues are worth examining in the future. In Chapter 6, the interest groups' influence on FinTech regulation will be mentioned as well by looking into the case of Taiwan.

3.4 Summary

This Section studied the regulatory approach to FinTech in the US. In contrast with the EU approach where several directives were enacted, the US seems to be largely relying on the interpretation of current financial regulations on a case-by-case basis in its case law system. This Section analyzed some of the SEC's enforcements addressing the issues regarding blockchain technology, exemplifying this case-by-case approach. Besides,

⁷¹³ See Mendelson, *supra* note 670, at 82.

⁷¹⁴ See *supra* Section 3.2.3.2.

⁷¹⁵ See, e.g., William Suberg, *80 Firms Including MasterCard, Coinbase Spent \$42 Mln Lobbying Crypto, Fintech Issues in Q1*, COINTELEGRAPH (May 5, 2019), <https://cointelegraph.com/news/80-firms-including-mastercard-coinbase-spent-42-mln-lobbying-crypto-fintech-issues-in-q1>.

this Section also studied the bills proposed to amend the current financial regulation and to exempt blockchain technology applications.

From a higher perspective, firstly, since the US financial regulation has been described as complex and fragmented,⁷¹⁶ it was argued that the application of it to FinTech similarly epitomizes this specialty.⁷¹⁷ When the US FinTech world is mainly composed of thousands of smaller companies,⁷¹⁸ the regulatory costs faced by them are said to be significant as they are often subject to overlapping authorities at the federal level, the concurrent involvement of state regulators, and the complicated regulations implemented by different regulators.⁷¹⁹ For instance, multiple federal regulators including the SEC, the CFTC and the FinCEN are all stepping into regulating cryptocurrency.⁷²⁰ Commentators thus argued that the US financial regulatory structure is challenging FinTech companies when they are navigating themselves through it.⁷²¹

Secondly, as the SEC was deemed to be one of the leading authorities regulating blockchain technology applications,⁷²² this Section analyzed its responses to them in a chronological order. It found that its enforcement actions exemplify the case-by-case approach mentioned above. The earlier SEC's enforcement actions studied in this Section, which include *SEC v. Shavers* in 2013, *SEC v. Erik T. Voorhees* and *SEC v. BTC Corporation and Ethan Burnside* in 2014, focus on the interpretation of the Howey test that determines whether securities are constituted. In those cases, the disputed blockchain applications were regarded as securities, thereby being subject to

⁷¹⁶ UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE, *supra* note 625, at 9

⁷¹⁷ Bromley, *supra* note 458, at 93-95.

⁷¹⁸ Eckenrode & Friedman, *supra* note 639, at 16.

⁷¹⁹ *E.g.*, Curie, *supra* note 632; UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE, *supra* note 630, at 40-41.

⁷²⁰ Debler, *supra* note 651, at 253-54.

⁷²¹ Curie, *supra* note 632; UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE, *supra* note 630, at 40-41.

⁷²² *See* Debler, *supra* note 651, at 252, 254.

securities regulations. Those cases reaffirmed the notions that applications of blockchain technology could be securities based on the facts and circumstances and that the SEC has the authority to regulate them.⁷²³ In 2017, the SEC's activities were still mainly on the case-by-case basis while the scope of the holdings in both cases seemed to be expanded. The DAO Investigation Report and *In re Munchee Inc.* were studied in this Section. The DAO Investigation Report sent signals to the entire digital token markets by warning that failure to comply with securities regulations may lead to SEC's enforcement actions as most of the digital tokens might be securities.⁷²⁴ *In re Munchee Inc.* asserted that the fulfillment of this condition does not rely on the form of the tokens which was claimed by the issuer but on the real facts.⁷²⁵ This case also referred to the The DAO Investigation Report, reaffirming the case-by-case approach.⁷²⁶

However, thirdly, this Section found that the case-by-case approach might be wavered in the future because of the ICO Framework issued by the SEC in 2019 and the bills proposed recently. They all aimed to provide more regulatory certainties. The ICO Framework provided guidance for market participants regarding whether a digital asset may constitute a security.⁷²⁷ This framework also explained that some tokens might be exempted.⁷²⁸ However, the ICO Framework was deemed to be inadequate insofar as it is not binding and uncertainties still remain due to the lack of clear rules.⁷²⁹ The bills studied in this Section as examples include the Token Taxonomy Act proposed in 2018 and updated in 2019, the Blockchain Regulatory Certainty Act introduced in 2019, and the Crypto-Currency Act of 2020. Even though those bills aim to clarify the applications of current regulations

⁷²³ *See id.* at 254.

⁷²⁴ *See* Mendelson, *supra* note 670, at 68-69, 82.

⁷²⁵ *See id.*

⁷²⁶ *Press Release*, *supra* note 673.

⁷²⁷ *Framework for 'Investment Contract' Analysis of Digital Assets*, *supra* note 679.

⁷²⁸ *Id.*

⁷²⁹ *Recent Guidance*, *supra* note 682, at 2422.

and the responsibilities of overlapping authorities, they still received criticism as they are presumptive and fail to cover the actual use cases and development of blockchain technology.⁷³⁰ This criticism mirrors the pacing issue when regulating. This notion seems to explain why the case-by-case approach has been adopted as it might provide more room for explanation when technology is still developing.

In addition, this Section also found that the FinTech regulatory movement in the US may be influenced by interest groups. Not only FinTech companies but also incumbent financial institutions are lobbying and supporting these bills to exempt FinTech.⁷³¹ How will the future FinTech regulation look like in the face of interest groups' influence? It is worth further examination in the future.

4. Comparison of the Regulatory Approaches to FinTech in the EU and US

This Chapter has already studied the regulatory approaches to FinTech in the EU and US by looking into various regulations, the regulator's responses and some regulatory developments. Next, this Section will explore the differences between those approaches. Moreover, this Section will also analyze these different approaches with respect to their suitability for the fast-paced FinTech era and in the face of the pacing issue. Section 4.1 describes that regulatory flexibility has been commonly emphasized in jurisdictions. Section 4.2 then studies if the regulatory flexibility has been fully achieved by the EU's and US's regulatory approaches to FinTech from a higher perspective. This section also identifies the differences in their approaches. Section 4.3 briefly studies the potential changes in UK's FinTech regulatory approach due to Brexit. Section 4.4 summarizes.

⁷³⁰ *E.g.*, Kuhn, *supra* note 708.

⁷³¹ *See, e.g.*, Suberg, *supra* note 715.

4.1 Regulatory Flexibility

When it comes to regulating FinTech, ensuring the regulatory flexibility has been commonly emphasized in jurisdictions as a principle. In the EU, the EC mentioned in its “FinTech Action Plan” in 2018 that national authorities’ efforts to apply regulatory flexibility when regulating FinTech firms should be examined.⁷³² The UK’s FCA has also been engaged in developing its strategies to flexibly supervise or regulate FinTech. For example, the UK’s regulatory sandbox regime which was established in 2016 has been regarded as the pioneer in the world.⁷³³ Regulatory flexibility is one of its key elements.⁷³⁴ While there is currently a lack of an experimental regime at the EU level promoting FinTech, the enhancement of coordination and cooperation between Member States’ regimes is the current goal.⁷³⁵ Besides, a greater flexibility when reacting to FinTech is also the focus of the US government to compete with other jurisdictions while it was deemed to fall behind in terms of providing a clear regulatory framework for FinTech.⁷³⁶

This regulatory flexibility could be explained and defined in different ways. However, the root cause of the regulatory challenges brought by FinTech was found in Chapter 3, which is the pacing issue; this Chapter

⁷³² EUROPEAN COMMISSION, FINTECH ACTION PLAN: FOR A MORE COMPETITIVE AND INNOVATIVE EUROPEAN FINANCIAL SECTOR 6 (2018).

⁷³³ *E.g.*, ANDREW MOYLE & FIONA MACLEAN, LATHAM & WATKINS, WORLD-FIRST REGULATORY SANDBOX OPEN FOR PLAY IN THE UK 1 (May 9, 2016), <https://www.lw.com/thoughtLeadership/LW-world-first-regulatory-sandbox-open-for-play-in-UK>.

⁷³⁴ *See* DAVID STRACHAN ET AL., DELOITTE, A JOURNEY THROUGH THE FCA REGULATORY SANDBOX: THE BENEFITS, CHALLENGES, AND NEXT STEPS 5 (2018), <https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/financial-services/deloitte-uk-fca-regulatory-sandbox-project-innovate-finance-journey.pdf>.

⁷³⁵ EUROPEAN SECURITIES AND MARKETS AUTHORITY, EUROPEAN BANKING AUTHORITY & EUROPEAN INSURANCE AND OCCUPATIONAL PENSIONS AUTHORITY, REPORT – FINTECH: REGULATORY SANDBOXES AND INNOVATION HUBS 37 (2018).

⁷³⁶ Groenfeldt, *supra* note 458.

stresses that regulatory flexibility means the ability of regulation to adapt to FinTech's development.⁷³⁷ Consequently, this Chapter will study if the FinTech regulatory approaches in the EU and the US reflect this regulatory flexibility. The differences in the EU's and US's FinTech regulatory approaches will also be identified.

4.2 Differences in the Regulatory Approaches to FinTech

In the EU, the institutional arrangements of financial regulators in each member state may vary as they are often left to member states.⁷³⁸ As such, member states could have some room for arranging the regulators. The rules relating to the competent authorities in PSD2 prescribe, for instance, the designation and the independence of them rather than that an organization like the UK's OBIE should be established.⁷³⁹ However, the EU's regulatory approach to FinTech generally places emphasis on the coordination at the EU level and on the role of the governments in leading the FinTech regulation.⁷⁴⁰

Therefore, regardless of the possible variation in regulating FinTech with respect to the arrangements, a more compulsory and top-down approach that is led by regulators was found in this Chapter.⁷⁴¹ The UK's transposition also mirrors this approach.⁷⁴² In this approach, however, some imperfections

⁷³⁷ See, e.g., Andrew W. Lo, *Regulatory Reform in the Wake of the Financial Crisis of 2007-2008*, 1 J. FIN. ECON. POL'Y 4, 7 (2009); Mark Fenwick & Stefan Wrбка, *The Flexibility of Law and Its Limits in Contemporary Business Regulation*, in FLEXIBILITY IN MODERN BUSINESS LAW: A COMPARATIVE ASSESSMENT 1, 2 (2016).

⁷³⁸ Eddy Wymeersch, *The Structure of Financial Supervision in Europe: About Single Financial Supervisors, Twin Peaks and Multiple Financial Supervisors*, 8 EUR. BUS. ORG. L. REV. 237, 288 (2007).

⁷³⁹ Regarding the rules relating to the competent authorities with respect to the designation of them, their duties and powers in PSD2, see Directive 2015/2366, *supra* note 461, Section 3.

⁷⁴⁰ See Winn, *supra* note 485, at 5-6.

⁷⁴¹ See *supra* Section 2.

⁷⁴² See, e.g., *supra* Section 2.2.3.1.

in terms of the pacing issue remain as studied before.⁷⁴³ In spite of the fact that the UK has a regulatory sandbox for FinTech, at the EU level, those imperfections regarding the pacing issue seem to reveal the importance of considering having a parallel regulatory sandbox at a wider level besides the existing FinTech regulations.⁷⁴⁴ However, what are the contents of a regulatory sandbox for FinTech to enhance regulatory adaptability? How is it operating in other jurisdictions? What are the implications? I will deal with these issues in later chapters.

In fact, at the time of writing, some legislative proposals in the EU focusing on blockchain applications could be seen. For instance, MiCA (the Regulation on Markets in Crypto-Assets, “MiCA”) was proposed in September 2020 to include certain types of crypto assets in the EU’s regulatory scope.⁷⁴⁵ MiCA, specifically, proposed to clarify the definition of financial instruments in MiFID II (the second Markets in Financial Instruments Directive⁷⁴⁶).⁷⁴⁷ MiCA may thus mitigate the regulatory vagueness when it comes to the question of whether some blockchain applications need to be regulated as “financial instruments” pursuant to MiFID II. This regulatory vagueness, in fact, has been criticized.⁷⁴⁸ Even though MiCA is still in progress,⁷⁴⁹ it could be observed that the EU seems

⁷⁴³ See *supra* Sections 2.2.4 and 2.3.3.

⁷⁴⁴ See generally Wolf-Georg Ringe & Christopher Ruof, *Regulating Fintech in the EU: The Case for a Guided Sandbox*, 11 EUR. J. RISK REGUL. 604 (2020).

⁷⁴⁵ *Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937 (2020)*, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020PC0593> [hereinafter *MiCA Proposal*].

⁷⁴⁶ Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on n markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU, 2014 O.J. (L 173) 349 [hereinafter Directive 2014/65/EU].

⁷⁴⁷ *MiCA Proposal*, *supra* note 745; Brian Hunt & Ronan Daly Jermyn, *Bringing Crypto-Assets into its Regulatory Web: Draft EU Markets in Crypto-Assets Regulation*, LEXOLOGY (July 5, 2021), <https://www.lexology.com/library/detail.aspx?g=26d5d8fb-95fe-4e0d-858d-b14d662c3a58>.

⁷⁴⁸ See, e.g., Philipp Maume & Mathias Fromberger, *Regulation of Initial Coin Offerings: Reconciling U.S. and E.U. Securities Law*, 19 CHI. J. INT’L L. 548, 566, 571 (2019).

⁷⁴⁹ See Lucy Frost, *PRIMER: Markets in Crypto-Assets Regulation (MiCA)*, IFLR (Feb.

intent on drafting some directives to regulate FinTech.

In contrast, in the context of the US, it was found that the fragmented regulatory system remains in the context of regulating FinTech and that the regulatory strategies have been relying on a case-by-case basis, which is exemplified by SEC's enforcements.⁷⁵⁰ This lack of a coordinated regulatory approach renders the approaches in the US and EU disparate. Moreover, the above fragmentation appears not only at the federal level but also between the federal government and the states. For instance, while there is no explicit coordinated federal approach, as of the time of writing, to blockchain technology in the context of securities regulations, some states have their own regulations.⁷⁵¹ Thus, in comparison with the case-by-case approach mainly adopted in the US when facing blockchain technology in the context of securities regulations studied before,⁷⁵² the EU's approach illustrated by recent regulatory developments such as MiCA seems to be more concentrated. A more concentrated approach may be observed in the future in the US if the bills studied before are passed.⁷⁵³ If they are, however, the pacing issue may still matter as analyzed before.⁷⁵⁴

4.3 Potential Influences of Brexit

Due to Brexit, there might be some changes whilst somethings remain the same after the transition period, which ended on 31 December 2020. This Section briefly mentions some possible influence. Detailed analysis should

11, 2022), <https://www.iflr.com/article/b1wq8hcyrmfywv/primer-markets-in-cryptoassets-regulation-mica>.

⁷⁵⁰ See *supra* Section 3.2.1.

⁷⁵¹ Joe Dewey, Holland & Knight LLP, *Blockchain & Cryptocurrency Regulation 2021 | USA*, GLOBAL LEGAL INSIGHTS, <https://www.globallegalinsights.com/practice-areas/blockchain-laws-and-regulations/usa#chaptercontent3> (last visited Aug. 6, 2021).

⁷⁵² See *supra* Section 3.2.1.

⁷⁵³ See *supra* Section 3.2.3.2.

⁷⁵⁴ See *supra* Section 3.3.1.

be left for future study.

Firstly, with respect to PSD2, commentators pointed out that some changes are envisaged. For instance, with respect to the payment markets in general, a UK payment service provider could not provide its services in the EU through passporting, which is a mechanism applied when a payment service provider which is already authorized in a member state wishes to provide its services in another.⁷⁵⁵ This might affect the development of the payment markets in the UK as the payment service providers would lose the chance to conduct business in the EU. However, in the case that the SCA requirements in PSD2 apply also to a “one-leg-out transaction”, which means one of the payment services providers is outside of the EU, such requirements still apply after Brexit.⁷⁵⁶ Secondly, with respect to AMLD5, commentators argued that the UK’s resolution to combat ML/FT and its membership of the FATF render it unlikely that the UK would reduce its AML/CFT measures.⁷⁵⁷

Beyond these “technical” influences, however, it is worth studying in the future the divergence of the UK’s and the EU’s regulatory approaches to FinTech. According to commentators, since the FinTech markets are still developing and changing rapidly, such a regulatory divergence might bring broader impacts on FinTech.⁷⁵⁸ Further changes in the approaches might also intensify the jurisdictional competition between them. It was also

⁷⁵⁵ Kai Zhang, Bryan Cave Leighton Paisner LLP, *Brexit: Changes Afoot for UK Payment Services?*, LEXOLOGY (Apr. 21, 2020), <https://www.lexology.com/library/detail.aspx?g=18709c6f-f0ed-46a6-8d83-c01b8f433abf>.

⁷⁵⁶ Christian McDermott, Jagveen Tyndall & Amy Smyth, Latham & Watkins LLP, *PSD2 & Brexit: EU Card Issuers Must Apply SCA to UK Website Purchases Post-Brexit*, LEXOLOGY (Oct. 2, 2019), <https://www.lexology.com/library/detail.aspx?g=23461c0a-ca0c-46b3-8b61-ae27ccd6e76d>.

⁷⁵⁷ *Id.*

⁷⁵⁸ Rebecca Christie & Thomas Wieser, *The European Union’s Post-Brexit Reckoning with Financial Markets*, 8 POL’Y CONTRIBUTION 1, 8 (May 2020).

reported that, after Brexit, there would be chances that the UK could embrace a more flexible regulatory approach by diverging from some burdensome EU financial regulations, and this situation would especially benefit the FinTech markets in the UK.⁷⁵⁹

4.4 Summary

This Section studied the differences of the regulatory approaches to FinTech in the EU and US and the imperfections in terms of the pacing issue. It was found that the approaches adopted in the EU and US differ in spite of the common emphasis on the regulatory flexibility for FinTech. Firstly, the regulatory approaches in the EU and UK's transpositions seem to place emphasis on the role of governments, being a more top-down approach. In this approach, however, some imperfections in terms of the pacing issue remain. Secondly, there have recently been some developments in the EU such as MiCA, addressing FinTech. MiCA aims to, among other aspects, include certain types of blockchain applications into the regulatory scope and mitigate the regulatory vagueness in MiFID II in terms of the definition of financial instruments. Even though MiCA is still in progress as at the time of writing, it could be observed that the EU seems to tend to regulate FinTech by drafting new laws, mirroring a more concentrated approach. In contrast, thirdly, it was found that a case-by-case approach has been preferred in the US when facing blockchain in the context of securities regulations. This approach might provide more room when regulating the changing FinTech. Fourthly, a more concentrated approach may be observed in the future in the US if the bills studied before are passed. If they are, however, the pacing issue will possibly still matter. Fifthly, this Section also found that Brexit would possibly bring changes while some things might remain the same.

⁷⁵⁹ *Britain's Regulatory-Divergence Dilemma*, THE ECONOMIST (Feb. 1, 2020), <https://www.economist.com/britain/2020/02/01/britains-regulatory-divergence-dilemma>.

Further changes of regulation might intensify the jurisdictional competition between them. The relevant issues, however, are left for future research.

5. Conclusion

By looking into the regulatory responses to FinTech in the EU, the UK's transpositions, and the US, this Chapter found that there are some differences and imperfections in these approaches. The imperfections are specifically in relation to the pacing issue that was analyzed in Chapter 3. Thus, a parallel regulatory regime that introduces more flexibility and adaptability might be needed. Regulatory sandboxes will be analyzed in more detail in Chapters 5 and 6. In fact, regulatory sandboxes exist in some EU member states, the UK, and some states in the US.⁷⁶⁰ However, the imperfections found in this Chapter seem to reveal the importance of having a parallel regulatory sandbox at a wider level besides the existing FinTech regulations. What are the contents of this dynamic and flexible regulatory regime, namely regulatory sandboxes, for FinTech? How are they operating in other jurisdictions? What are the implications? I will tackle these topics in later chapters.

⁷⁶⁰ See Chapter 6, Section 2.1.1.

Chapter 5

Adaptive Financial Regulation of FinTech: Enabling Regulation to Keep Pace with Technology

1. Introduction

FinTech such as blockchain technology applications has been a comparatively novel term which attracts both enthusiasts' and skeptics' attention.⁷⁶¹ While the transformative potential of the new technology applied in financial markets has been considered as bringing benefits, from a more technical point of view, the challenges posed by these transformations also merit attention.⁷⁶² The applications of new technology in financial markets raised the questions of whether they should be regulated and whether they fit the existing regulatory landscape.⁷⁶³ These are the issues I studied in Chapters 3 and 4. Moving on from these chapters that both ultimately reveal the regulatory challenges in terms of the pacing issue, this Chapter explores how FinTech regulation could be crafted by considering the time dimension. While the question of how to resist the possible obsolescence of laws has been tackled in literature by scholars,⁷⁶⁴ this Chapter aims to study the content of the regulatory solution that fits FinTech. This solution, namely “adaptive financial regulation” (hereinafter “AFR”),

⁷⁶¹ See Christian Catalini, *Blockchain Technology and Cryptocurrencies: Implications for the Digital Economy, Cybersecurity, and Government*, 19 GEORGET. J. INT. AFF. 36, 36 (2018).

⁷⁶² See, e.g., Dirk A. Zetzsche, Ross P. Buckley, János N. Barberis & Douglas W. Arner, *Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation*, 23 FORDHAM J. CORP. & FIN. L. 31, 34 (2017).

⁷⁶³ Lyria Bennett Moses, *How to Think about Law, Regulation and Technology: Problems with Technology as a Regulatory Target*, 5 LAW INNOVATION & TECH. 1, 18 (2013).

⁷⁶⁴ See GUIDO CALABRESI, A COMMON LAW FOR THE AGE OF STATUTES 3 (1982). Similar discussions could be seen in the field of, for instance, banking regulation. See Donald C. Langevoort, *Statutory Obsolescence and the Judicial Process: The Revisionist Role of the Courts in Federal Banking Regulation*, 85 MICH. L. REV. 672 (1987).

would help FinTech regulation to keep pace with technology. As a matter of fact, the regulatory timing and pacing issues have been tackled in both schools of law and economics and law and technology. The former focuses on the optimal timing of intervention by considering some factors such as the amount of information possessed by regulators and those who are regulated.⁷⁶⁵ The latter studies this pacing issue by especially considering the nature of technology.⁷⁶⁶ The analyses of this Chapter are based on the concepts from both schools.

The perspective from which the examination of the design of FinTech regulation is undertaken relates to the core ideas in the previous two chapters. These core ideas include the notions that complexity exists in modern financial markets and that the pacing issue matters therein. Moreover, complexities would not only add efficiency and depth but also result in market failures.⁷⁶⁷ As innovation plays a crucial role in shaping the modern financial markets, it has been considered as a double-edged sword because it causes “welfare indeterminacy”.⁷⁶⁸ This illustrates the likelihood that innovation could bring not only improvement but also the changes that may lead to undesirable consequences.⁷⁶⁹ In fact, the notion that financial markets and the whole economy are complex could be explained by the narrative that they are the systems in which participants continuously adapt to the pattern they create.⁷⁷⁰ Or the complexity simply refers to the state of being complex in modern financial markets.⁷⁷¹ The dynamism of financial

⁷⁶⁵ See, e.g., Steven Shavell, *The Optimal Structure of Law Enforcement*, 36 J.L. & ECON. 255, 264-65 (1993). Regarding other law and economics studies which discussed this issue, see *infra* Section 2.2.1.

⁷⁶⁶ See *infra* Section 2.1.1.

⁷⁶⁷ E.g., Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 WASH. U. L. REV. 211, 214 (2009); Dan Awrey, *Complexity, Innovation, and the Regulation of Modern Financial Markets*, 2 HARV. BUS. L. REV. 235, 243-44 (2012).

⁷⁶⁸ *Id.*; Iris H-Y Chiu, *FinTech and Disruptive Business Models in Financial Products, Intermediation and Markets – Policy Implications for Financial Regulators*, 21 J. TECH. L. & POL’Y 55, 63 (2016).

⁷⁶⁹ Awrey, *supra* note 767, at 259, 276-77.

⁷⁷⁰ W. Brian Arthur, *Complexity and the Economy*, 284 SCIENCE 107, 107 (1999).

⁷⁷¹ Steven L. Schwarcz, *Rethinking the Disclosure Paradigm in a World of Complexity*,

markets is thus driven by, among other things, this adaptation.⁷⁷² Therefore, the whole financial system is deemed to be an ecosystem of living organisms.⁷⁷³ This description indicates that the management of this ecosystem and the strategies that should be adopted when failures happen ought to differ. It is because, among other reasons, a traditional regulatory approach might not keep pace with the evolution of technology as shown in the previous two chapters. Therefore, what are the solutions? How can we move from the traditional regulatory approach that indicates “regulate and forget”⁷⁷⁴ to a different one? This Chapter will study these topics, answering the research question – *how to regulate FinTech adaptively to deal with the pacing issue?*

When technology is a target of regulation, it was pointed out that, among other things, considering the dimension of time is challenging but crucial.⁷⁷⁵ In fact, one of the solutions that have been discussed in literature is a regulatory approach with the features enabling regulation to adapt to, and synchronize with, the market reality.⁷⁷⁶ Lo argued that the regulation of modern financial markets which are characterized by the complexities therein should be adaptive:

“The complexity of financial markets is straining the capacity of regulators to keep up with its innovations, many of which were not contemplated when the existing regulatory bodies were first formed.

2004 U. ILL. L. REV. 1, 2 (2004).

⁷⁷² ANDREW W. LO, ADAPTIVE MARKETS: FINANCIAL REVOLUTION AT THE SPEED OF THOUGHT 188 (2017).

⁷⁷³ *Id.* at 366.

⁷⁷⁴ WILLIAM D. EGGERS, MIKE TURLEY & PANKAJ KISHNANI, DELOITTE, THE FUTURE OF REGULATION: PRINCIPLES FOR REGULATING EMERGING TECHNOLOGIES 11 (2018). Regarding the explanation of this notion, *see infra* Section 2.1.1.

⁷⁷⁵ *See* Moses, *supra* note 763, at 17-19.

⁷⁷⁶ E.g., LO, *supra* note 772, at 368-70; Lawrence G. Baxter, *Adaptive Financial Regulation and RegTech: A Concept Article on Realistic Protection for Victims of Bank Failures*, 66 DUKE L.J. 567, 575 (2016); Jonathan B. Wiener, *Better Regulation in Europe*, 59 CURRENT L. PROBS. 447, 449, 513-14 (2006).

New regulations should be adaptive and focused on financial functions rather than institutions, making them more flexible and dynamic.”⁷⁷⁷

However, as the idea of AFR is comparatively new,⁷⁷⁸ there seems to be a lack of comprehensive analyses of it in terms of, for instance, its instruments, its potential costs, and its implementation. Most importantly, the application of this approach on FinTech-related issues is what this Chapter will focus on by studying the content of AFR of FinTech. This Chapter also aims to study how AFR would address the challenges brought by FinTech while unleashing its advantages.

The remainder of this Chapter proceeds as follows. Section 2 firstly elaborates on the pacing issue when regulating FinTech. Even though this pacing issue was mentioned in both Chapters 3 and 4, this Chapter will explain it in more detail from the angle of law and technology. This section then discusses the applications of different regulatory approaches to the pacing issue. These regulatory approaches include responsive regulation, self-regulation and smart regulation. This section will describe the rise of AFR due to the imperfections of the above regulatory approaches. Section 3 studies the definition and implementation of AFR of FinTech. Despite the fact that the relevant literature does not seem to be rich, this section aims to comprehensively explore its contents. With respect to the implementation, this section focuses on its approach and the utilization of various regulatory instruments. Besides, this section will explain how this solution is more preferable in the face of complexities and the pacing issue when regulating FinTech. Section 4 studies the limitation of AFR of FinTech. Specifically, this section explores its downside and the factors contributing to its limitation. Section 5 concludes.

⁷⁷⁷ Andrew W. Lo, *Regulatory Reform in the Wake of the Financial Crisis of 2007-2008*, 1 J. FIN. ECON. POL'Y 4, 7 (2009).

⁷⁷⁸ See Baxter, *supra* note 776, at 594; Lawrence G. Baxter, *Adaptive Regulation in the Amoral Bazaar*, 128 S. AFR. L.J. 253, 271-72 (2011).

2. Regulatory Approaches to FinTech in the Face of Complexities and the Pacing Issue

This Section studies the application of different regulatory approaches to FinTech in the face of complexities and the pacing issue. Based on the concepts of both schools of law and technology and of law and economics, Section 2.1 elaborates on how the pacing issue in the context of FinTech arises due to technological change and complexity. Section 2.2 then identifies the factors in regulating FinTech in the face of the aforementioned complexities and the pacing issue. This section establishes the basis on which the analyses of the applications of different regulatory approaches are based. The existing regulatory approaches that may be used are, for instance, responsive regulation, self-regulation, and smart regulation. Sections 2.3, 2.4, and 2.5 respectively analyze the applications of them. Section 2.6 describes that due to the imperfections of the above approaches, an alternative approach might be needed. The rise of AFR is thus described here, and the detailed content of it will be analyzed later in Section 3. Section 2.7 summarizes.

2.1 Pacing Issue Arises When Regulating FinTech

2.1.1 Technology Is Faster Than Regulation – A Law and Technology Perspective

A regulatory approach is considered to be unadaptable when the changes in the regulatory landscape, happening after the establishment of regulation, are largely ignored.⁷⁷⁹ Within the school studying the relationship between law and technology, this issue has been discussed through the lens of, for instance, technological change. This viewpoint was

⁷⁷⁹ See, e.g., EGGERS ET AL., *supra* note 774, at 11.

also adopted in Chapter 2 which studied what FinTech is.

According to commentators, the Fourth Industrial Revolution has been witnessed in recent years due to the emergence of new technologies or mechanisms such as blockchain technology.⁷⁸⁰ As such, the pace of technological change is said to be faster than the time before the Fourth Industrial Revolution, thereby possibly influencing the effectiveness of regulation because regulation may be more easily outdated.⁷⁸¹ From the perspective of technological change, the innovation cycle is said to be shorter than before.⁷⁸² It could be exemplified by the fact that technologies could be obsolete in six months now, and the two-year cycle they had before is thus replaced.⁷⁸³ Therefore, it seems that it is more likely that the regulatory landscape on which regulation was built would be altered because technology tends to be faster than regulation in the era of FinTech.⁷⁸⁴ In other words, a growing gap between technology and regulation has been perceived as technology evolves at an accelerating rate while governments respond to these developments at a decelerating rate.⁷⁸⁵

⁷⁸⁰ *The Fourth Industrial Revolution*, by Klaus Schwab, WORLD ECONOMIC FORUM, <https://www.weforum.org/about/the-fourth-industrial-revolution-by-klaus-schwab> (last visited Aug. 10, 2021); Darryn Pollock, *The Fourth Industrial Revolution Built On Blockchain And Advanced With AI*, FORBES (Nov. 30, 2018), <https://www.forbes.com/sites/darrynpollock/2018/11/30/the-fourth-industrial-revolution-built-on-blockchain-and-advanced-with-ai/#5edd8dfe4242>.

⁷⁸¹ See, e.g., DANIEL MALAN, WORLD ECONOMIC FORUM, VALUES AND THE FOURTH INDUSTRIAL REVOLUTION: CONNECTING THE DOTS BETWEEN VALUE, VALUES, PROFIT AND PURPOSE 6 (Sep. 2016), http://www3.weforum.org/docs/WEF_Values_and_the_Fourth_Industrial_Revolution_WHITEPAPER.pdf.

⁷⁸² Mark D. Fenwick, Wulf A. Kaal & Erik P.M. Vermeulen, *Regulation Tomorrow: What Happens When Technology Is Faster than the Law?*, 6 AM. UNI. BUS. L. REV. 561, 576 (2017).

⁷⁸³ SHRUPTI SHAH, RACHEL BRODY & NICK OLSON, DELOITTE, THE REGULATOR OF TOMORROW: RULEMAKING AND ENFORCEMENT IN AN ERA OF EXPONENTIAL CHANGE 3 (2015), https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/public-sector/Regulator-of-tomorrow_vFINAL.pdf.

⁷⁸⁴ E.g., Fenwick et al., *supra* note 782, at 572; Kaal, *supra* note 785, at 7-8; MALAN, *supra* note 781, at 6.

⁷⁸⁵ E.g., Wulf A. Kaal, *Dynamic Regulation for Innovation* 5 (U. of St. Thomas (Minnesota) Legal Studies Research Paper No. 16-22, 2016), <https://ssrn.com/abstract=2831040>; Gary E. Marchant, *The Growing Gap Between*

Moreover, the above regulatory pacing issue has been studied by examining the role of regulators in the face of new technologies. Theoretically speaking, scholars associated the situation with the “Collingridge dilemma” or the “pacing problem” faced by financial regulators when addressing innovation-related issues.⁷⁸⁶ That is, (1) regulators are said to be faced with information asymmetry if they intervene in the early stage of innovation or technology as they lack the information which is necessary for assessing it to discover the potential risks, and (2) it becomes more costly to regulate when innovation or technology is entrenched at a later stage.⁷⁸⁷ As a result, studies suggested that regulators would rather intervene in the early stage because there is more room to flexibly interpret technology and the situation is more changeable, even though they have to face the absence of reliable information.⁷⁸⁸

In addition, the above narratives could also be explained from the viewpoint of complexity. The modern financial markets have been perceived to be in a state of flux as market participants adapt to the pattern they create, thereby rendering the modern financial markets complex.⁷⁸⁹ The complexity, most importantly, also results from the innovative technology applied in the

Emerging Technologies and the Law, in THE GROWING GAP BETWEEN EMERGING TECHNOLOGIES AND LEGAL-ETHICAL OVERSIGHT 19, 20-21 (Gary E. Marchant, Braden R. Allenby & Joseph R. Herkert eds., 2011).

⁷⁸⁶ E.g., Kaal, *supra* note 785, at 8; Moses, *supra* note 763, at 8-9.

⁷⁸⁷ E.g., *id.* at 8; Audley Genus & Andy Stirling, *Collingridge and the Dilemma of Control: Towards Responsible and Accountable Innovation*, 47 RES. POL'Y 61, 63 (2018). The studies discussing Collingridge dilemma cited a book authored by David Collingridge in 1980 – “The Social Control of Technology”. DAVID COLLINGRIDGE, SOCIAL CONTROL OF TECHNOLOGY (1980). Nevertheless, I could not get access to this book.

⁷⁸⁸ E.g., Bert-Jaap Koops, *Ten Dimensions of Technology Regulation. Finding Your Bearings in the Research Space of An Emerging Discipline*, in DIMENSIONS OF TECHNOLOGY REGULATION 311, 317 (Morag Goodwin, Bert-Jaap Koops & Ronald Leenes eds., 2010); Moses, *supra* note 763, at 8.

⁷⁸⁹ W. Brian Arthur, *Complexity and the Economy*, 284 SCIENCE 107, 107 (1999); ANDREW W. LO, ADAPTIVE MARKETS: FINANCIAL REVOLUTION AT THE SPEED OF THOUGHT 188 (2017).

markets, rendering regulators and regulations incapable of keeping pace with the changing financial markets.⁷⁹⁰ As analyzed in Chapter 3, the modern financial markets have been more complex, thereby rendering traditional financial regulation unsuitable. The underlying view of the complexity science has been more popular not only when commentators described the modern economy but also when they studied the design of the corresponding regulatory approaches.⁷⁹¹ According to scholars, the complexity science provides the lens through which a rethinking of the regulatory design is undertaken.⁷⁹² This is also the case when designing modern financial regulation for FinTech.⁷⁹³

2.1.2 Consequences

If technology tends to be faster than regulation in the era of FinTech, what are the consequences? As mentioned before, the difficulties of regulatory timing are associated with, for instance, stable and presumptive regulations, reactive regulatory approaches or the regulations enacted in the absence of necessary and sufficient information. The potential problems of these results are named as, for instance, pacing problems,⁷⁹⁴ Collingridge dilemma,⁷⁹⁵ or the disconnection between regulation and technology.⁷⁹⁶ Notwithstanding the various ways to identify the problems, the consequences do not seem to differ. I explain in the following.

⁷⁹⁰ E.g., Andrew W. Lo, *Regulatory Reform in the Wake of the Financial Crisis of 2007-2008*, 1 J. FIN. ECON. POL'Y 4, 7 (2009);

⁷⁹¹ See Alan Kirman, *Complexity and Economic Policy: A Paradigm Shift or a Change in Perspective? A Review Essay on David Colander and Roland Kupers's Complexity and the Art of Public Policy*, 54 J. ECON. LIT. 534, 537, 566 (2016).

⁷⁹² DAVID COLANDER & ROLAND KUPERS, *COMPLEXITY AND THE ART OF PUBLIC POLICY: SOLVING SOCIETY'S PROBLEMS FROM THE BOTTOM UP* 8 (2014).

⁷⁹³ See Baxter, *supra* note 776, at 573-74.

⁷⁹⁴ E.g., Marchant, *supra* note 785, at 23; Moses, *supra* note 763, at 8; Fenwick et al., *supra* note 782, at 568; Kaal, *supra* note 785, at 7-8.

⁷⁹⁵ E.g., *id.* at 8; Moses, *supra* note 763, at 7.

⁷⁹⁶ E.g., *id.*; ROGER BROWNSWORD & MORAG GOODWIN, *LAW AND TECHNOLOGIES OF THE TWENTY-FIRST CENTURY: TEXT AND MATERIALS* 65 (2012).

Historically, if financial regulation is reactive, it is often regarded as leading to regulatory failures as the regulatory objectives may not be fulfilled.⁷⁹⁷ Similarly, the financial regulation of technology which falls behind the development of technology is deemed to be undesirable or ineffective.⁷⁹⁸ That is, regulation might be thus unable to address future challenges posed by the evolution of technology.⁷⁹⁹ It has also been argued that contemporary regulation might be ineffective if it still relies on a traditional regulatory approach that is static and not able to adapt to the changes in markets.⁸⁰⁰ Therefore, the above discussions regarding the different paces of technology and regulation from either the lens of technological change or of complexity commonly allude to something. That is, making a choice among different regulatory approaches to address this question might be needed when regulation could be outdated and thus ineffective.

2.2 Factors in Regulating FinTech

2.2.1 Law and Economics Perspective

The law and technology studies reveal the regulatory pacing and complexity issues as shown before. Despite this, it seems that there is lack of discussion that explicitly and comprehensively studies the factors which should be considered when addressing those issues. Thus, before studying

⁷⁹⁷ JOHN ARMOUR, DAN AWREY, PAUL DAVIES, LUCA ENRIQUES, JEFFERY N. GORDON, COLIN MAYER & JENNIFER PAYNE, *PRINCIPLES OF FINANCIAL REGULATION* 563 (2016).

⁷⁹⁸ *See, e.g.*, BROWNSWORD & GOODWIN, *supra* note 796, at 67; Moses, *supra* note 763, at 12; Kaal, *supra* note 785, at 19; Fenwick et al., *supra* note 782, at 572.

⁷⁹⁹ Wulf A. Kaal, *Dynamic Regulation of the Financial Services Industry*, 48 *WAKE FOREST L. REV.* 791, 800 (2013).

⁸⁰⁰ *See* Schwarcz, *supra* note 767, at 264-65; Baxter, *supra* note 776, at 574, 588, 593. *See also* Simon Deakin, *The Evolution of Theory and Method in Law and Finance*, in *THE OXFORD HANDBOOK OF FINANCIAL REGULATION* 13, 36 (Niamh Moloney et al. eds., 2015). Besides, it was argued that, from the aspect of the regulatees, the traditional disclosure strategy does not fit the financial markets featuring complexities because, among others, complexities weaken investors' ability in understanding the disclosed information. Schwarcz, *supra* note 771, at 15, 18, 19.

the applications of different regulatory approaches to deal with that issue in later sections, it would be worthwhile establishing the basis on which such a study is undertaken. Resorting to the studies from the perspective of law and economics might help by finding out such factors. It is because, as shown in the following, these studies analyzed the question of how to find an optimal timing of regulatory intervention by revealing the costs and benefits that are crucial and should be considered. Therefore, they provide insights for this Chapter when addressing the regulatory pacing issue when regulating FinTech. Some of the ideas from the perspective of law and economics that are relevant to this Chapter are summarized in the following.

Firstly, Parisi, Fon and Ghei argued that beyond comparing the benefits and costs of intervention, delaying intervention has its own benefits, namely the “value of waiting”, and it is one of the costs of acting now.⁸⁰¹ Luppi and Parisi also pointed out that to enact regulations that are in effect immediately might lead to an obsolescence problem, and keeping these regulations brings costs.⁸⁰² In their study, other timing rules were also studied, and the obsolescence costs are one of the factors that affect whether the value of another timing rule is higher than the immediate one.⁸⁰³ For example, they particularly mentioned that a regulatory approach that allows revisions could avoid the costs generated from outdated regulation.⁸⁰⁴ Secondly, Parisi and Ghei further pointed out that, among other costs and benefits, the obsolescence costs are crucial since the costs occurred when the regulation is enacted are irreversible.⁸⁰⁵ Moreover, if the evolution of the regulatory

⁸⁰¹ Francesco Parisi, Vincy Fon & Nita Ghei, *The Value of Waiting in Lawmaking*, 18 EUR. J. L. ECON. 131, 132-33 (2004).

⁸⁰² Barbara Luppi & Francesco Parisi, *Optimal Timing of Legal Intervention: The Role of Timing Rules*, 122 HARV. L. REV. F. 18, 22-23 (2009).

⁸⁰³ According to their study, in addition to the delayed rule, the value of other timing rules is higher than acting immediately when the costs of obsolete laws incurred by the latter are higher. *Id.* at 28. This factor influences the delayed rule and immediate rule in the same way. *Id.* at 26.

⁸⁰⁴ *Id.* at 27.

⁸⁰⁵ Francesco Parisi & Nita Ghei, *Legislate Today or Wait Until Tomorrow? An Investment Approach to Lawmaking* 8 (Minn. L. Stud. Res. Paper No. 07-11, 2007),

environment is taken into account, it seems that regulators would face a situation. That is, thirdly, as Luppi and Parisi argued, if regulation happens later, the costs of enacting it may be higher due to the rising complexity in spite of higher benefits gained from regulators' better ability to intervene.⁸⁰⁶ For instance, Gersen and Posner mentioned that a more informed decision could be made as more information would be collected.⁸⁰⁷ Besides, costs of regulatory intervention may be lower in the future as uncertainty is diminished.⁸⁰⁸ The question of will the costs of enacting regulation be higher or lower thus matters.⁸⁰⁹ These notions seem to be parallel to the dilemma faced by regulators discussed in law and technology literature.⁸¹⁰

2.2.2 Identifying the Factors

The above studies thus provide some insights for this Chapter to study factors in regulating FinTech adaptively. The factors are identified and explained in the following by integrating the insights from the studies in both law and technology and law and economics schools. It seems that these critical factors are, among others, (1) the obsolescence costs, (2) the costs of enacting and implementing regulation, and (3) the possibility to collect information in the face of complexities.

Firstly, even though obsolescence costs seem to exist in every type of regulatory timing, is there a regulatory approach that might be less subject to

<https://ssrn.com/abstract=981275>; Luppi & Parisi, *supra* note 802, at 21, 28.

⁸⁰⁶ *Id.* at 29.

⁸⁰⁷ Jacob E. Gersen & Eric A. Posner, *Timing Rules and Legal Institutions*, 121 HARV. L. REV. 543, 569 (2007).

⁸⁰⁸ Luppi & Parisi, *supra* note 802, at 29.

⁸⁰⁹ *See id.*

⁸¹⁰ That is, it seems that the so-called "Collingridge dilemma" partly reflects the notions in law and economics literature because the former seems to indicate the lawmaking costs may be lower as more information is gainable at a later stage. Moreover, the ideas of Collingridge dilemma seem to in a sense supplement the latter by arguing that the implementation costs might be higher at a later stage. Regarding the description about the "Collingridge dilemma", *see supra* Section 2.1.1.

such obsolescence? For instance, is it possible that we can gain benefits from the experimentation of intervening now while resisting the corresponding obsolescence costs?

Secondly, the factor regarding the costs of enacting and implementing regulation is related to the question of whether the challenges such as complexities brought by new technology could be addressed over time and thus the costs of enacting and implementing regulation could be lower later. Complexity theorists suggested that technological change is not an incident that novel technologies separately emerge from but an on-going process where a novel technology contributes to the emergence of another novel technology.⁸¹¹ They also argued that complexity tends to grow in general with only some random chances that a decrease of it may happen.⁸¹² Therefore, it seems that to intervene later might not be perfect. This notion is also supported by the law and technology literature studied before.

That is, as suggested by the relevant literature, to take action at an earlier stage is more preferable because it would be more difficult to do so when the technology is more mature at a later stage.⁸¹³ It was thus suggested that such an action at the early stage could be in the form of governance rather than command-and-control regulation.⁸¹⁴ A scholar explained that the term “governance” here is “to describe more collaborative, flexible, multi-stakeholder regulatory processes and development, often contrasted with conventional top-down, 'command and control' regulation.”⁸¹⁵ Specifically, the above recommended governance is a system in which different

⁸¹¹ W. BRIAN ARTHUR, COMPLEXITY AND THE ECONOMY 6-7 (2015).

⁸¹² *Id.* at 156.

⁸¹³ *E.g.*, Koops, *supra* note 788, at 317.

⁸¹⁴ Gregory N. Mandel, *Regulating Emerging Technologies*, 1 L. INNOVATION & TECH. 75, 76 (2009).

⁸¹⁵ *Id.* at 75. In this sense, governance is deemed to be different from regulation to a certain degree. See John Braithwaite, Cary Coglianese & David Levi-Faur, *Can Regulation and Governance Make a Difference?*, 1 REGUL. & GOV. 1, 3 (2007).

stakeholders such as regulators, those who are regulated, experts and other relevant organizations or individuals collaborate in order to explore the information critical to advancing the understanding of new technology and adapting to the changes of it.⁸¹⁶ Building on these notions, this Chapter argues that the core value and the goal of acting at an early stage, regardless of what form it takes is, to respond to FinTech should be collecting and exploring information to deal with complexities. Thus, as I will describe, the implementation of the corresponding regulation should center on collecting and exploring information.⁸¹⁷ In particular, the mechanism applied at the early stage, namely experimentation, is aligned with the above notions which are from the angle of law and technology to the degree that command-and-control regulation is not emphasized at this stage.⁸¹⁸ Instead, collecting and exploring the information needed in the face of complexity through collaboration between regulators and those regulated in experiments are stressed.

However, the challenges associated with intervening earlier need to be addressed. The challenges that may be encountered include, for instance, (1) the previously mentioned obsolescence and its costs at the early stage, (2) the likelihood that the technology might be impeded by regulatory intervention because the technology is still at an early stage,⁸¹⁹ and (3) if the early-stage intervention has the nature of experimentation to collect information, what are the later mechanisms for?

Thirdly, even though it was suggested that more information may be

⁸¹⁶ See Mandel, *supra* note 814, at 82-84. Therefore, the emphasis of the involvement of various stakeholders is one of the reasons why the proposed governance is distinguished from command-and-control regulation. See Julia Black, *Constructing and Contesting Legitimacy and Accountability in Polycentric Regulatory Regimes*, 2 REGUL. & GOV. 137, 141 (2008).

⁸¹⁷ See *infra* Section 3.2.

⁸¹⁸ See *infra* Section 3.2.2.1.

⁸¹⁹ See, e.g., Fenwick et al., *supra* note 782, at 571-72.

collected if intervening later,⁸²⁰ is it possible that information could be collect if intervening earlier? In the case of regulating FinTech in the manner that regulation could better keep pace with technology, to collect information is of vital importance. Collecting information benefits not only regulators as they could be more familiar with the tested technology but also those who are regulated as they could access the markets.

Therefore, from a higher perspective, the question of how to adaptively regulate FinTech to keep pace with technology could be reframed to – *how to design a regulatory approach imposed at an earlier stage that could better resist the potential obsolescence while collecting information and not impeding technological innovation? What are the mechanisms afterwards at a later stage?* This Chapter aims to propose a more complete solution by tackling these issues. In the following, the applications of the existing regulatory approaches will be analyzed based on the above notions. The regulatory approaches of which the application will be analyzed include responsive regulation, self-regulation, smart regulation and AFR. The reason why they were chosen to be studied is that, among others, the applications of them have been more or less discussed or mentioned in literature when it comes to making regulation more dynamic and enabling regulation to learn and adapt to reality by advancing information collection.⁸²¹

⁸²⁰ Gersen & Posner, *supra* note 807, at 569.

⁸²¹ I found that when it comes to the topic about establishing dynamic regulation and enabling it adaptive, the ideas of adaptive regulation, self-regulation and responsive regulation were mentioned as they have been deemed to be overlapped to a certain degree. See Lori S. Bennear & Jonathan B. Wiener, *Adaptive Regulation: Instrument Choice for Policy Learning over Time* 6, 8-9, 11 (Feb. 12, 2019), <https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/files/Regulation%20-%20adaptive%20reg%20-%20Bennear%20Wiener%20on%20Adaptive%20Reg%20Instrum%20Choice%20019%2002%2012%20clean.pdf>. Similarly, the idea of smart regulation in the context of FinTech was studied by emphasizing pairing regulatory experimentation with other instruments. See Zetsche et al., *supra* note 762, at 79, 91. Nevertheless, the discussions about the direct applications of self-regulation, responsive regulation and smart regulation to enable regulation dynamic seem not to be explicit. Thus, I chose them to discuss here. Besides, as I will explain in Section 3.1.3, the solution studied in this Chapter, namely AFR of FinTech, seems to be in a sense built on the concepts

2.3 Application of Responsive Regulation

2.3.1 Basic Concepts

This Section first analyzes the application of responsive regulation on FinTech. While the aim of this Chapter is to find a regulatory approach that could flexibly react to the evolution of technology, responsive regulation has been regarded as an important development in terms of providing regulatory flexibility.⁸²² Moreover, while a cooperative relationship between regulators and those regulated is regarded as a possible approach to regulating financial innovation,⁸²³ responsive regulation is capable of realizing this relationship. The application of responsive regulation on FinTech is thus worth examining. In fact, the idea that regulation should be “responsive” could be found in some studies about FinTech regulation or innovative technology. Nonetheless, they seem to emphasize that regulation should be responsive to the elements of the regulated technology rather than conduct a targeted study on the responsive regulation developed by Ayres and Braithwaite.⁸²⁴ This Section, however, analyzes the latter.

The basic concepts of responsive regulation are briefly summarized below. Since responsive regulation is established on the responsiveness to, for instance, industry structure, industry conduct and how effectively

of responsive regulation.

⁸²² Mark Fenwick & Stefan Wrška, *The Flexibility of Law and Its Limits in Contemporary Business Regulation*, in FLEXIBILITY IN MODERN BUSINESS LAW: A COMPARATIVE ASSESSMENT 1, 2 (2016).

⁸²³ See Hilary J. Allen, *Regulatory Sandboxes*, 87 GEO. WASH. L. REV. 579, 600 (2019).

⁸²⁴ See, e.g., Fenwick et al., *supra* note 782; Saule T. Omarova, *Dealing with Disruption: Emerging Approaches to Fintech Regulation*, 61 J.L. & POL’Y 25 (2020); Lyn M. Gaudet & Gary E. Marchant, *Administrative Law Tools for More Adaptive and Responsive Regulation*, in THE GROWING GAP BETWEEN EMERGING TECHNOLOGIES AND LEGAL-ETHICAL OVERSIGHT 167 (Gary E. Marchant, Braden R. Allenby & Joseph R. Herkert eds., 2011).

industry's private regulation works,⁸²⁵ a tit-for-tat strategy that compliance strategies apply before escalating to more punitive and deterrent ones is emphasized.⁸²⁶ The pyramid of regulatory strategies, starting from self-regulation to other strategies that regulators are given more capacity to enforce, was proposed.⁸²⁷ In other words, the question of whether a response should be more or less interventionist is associated with the conduct of the regulated and the regulatory environment.⁸²⁸ The idea of responsive regulation has been influential,⁸²⁹ but it has also received criticism.⁸³⁰ Most importantly, responsive regulation features being dynamic rather than static.⁸³¹

Even though the above descriptions about responsive regulation are more in relation to the enforcement aspect, it may still be worth examining the application of it when talking about the design of laws or regulatory approaches in this Chapter because of the following reasons. Firstly, even though, as described in Chapter 3, the existing regulatory approach may not be applicable to FinTech, regulators may react based on it by re-interpreting and enforcing it. Thus, the question of whether reacting responsively is suitable, is worth examining. Another situation is the case where a certain FinTech regulation is already there as described in Chapter 4. In this case, the question of whether regulators responsively react and enforce the

⁸²⁵ IAN AYRES & JOHN BRAITHWAITE, *RESPONSIVE REGULATION: TRANSCENDING THE DEREGULATION DEBATE* 4 (1992).

⁸²⁶ *Id.* at 5, 35.

⁸²⁷ *Id.* at 38.

⁸²⁸ *Id.* at 38-39. The idea of responsive regulation is expanded to, for instance, apply to developing countries by adding the escalation of the state networking with non-state actors such as NGOs (non-governmental organizations, "NGOs"). John Braithwaite, *Responsive Regulation and Developing Economies*, 34 *WORLD DEVELOPMENT* 884, 890 (2006).

⁸²⁹ Robert Baldwin & Julia Black, *Really Responsive Regulation*, 71 *MOD. L. REV.* 59, 62 (2008).

⁸³⁰ *E.g.*, Neil Gunningham & Darren Sinclair, *Smart Regulation*, in *REGULATORY THEORY: FOUNDATIONS AND APPLICATIONS* 133, 135, 138 (Peter Drahos ed., 2017).

⁸³¹ *See* John Braithwaite, *Types of Responsiveness*, in *REGULATORY THEORY: FOUNDATIONS AND APPLICATIONS* 117, 118 (Peter Drahos ed., 2017); Baxter, *supra* note 776, at 589, 595.

regulation in the face of the fast-paced FinTech is a suitable matter again. Secondly, the ideas of responsive regulation are in fact associated with the legislation aspect to a certain degree. This is, it was argued that in order to make regulation responsive, it might be necessary that laws should be crafted correspondingly to provide the instruments needed.⁸³² I am thus curious to learn whether, if laws are crafted in this way, they are suitable in the era of FinTech. In addition, some of the ideas of responsive regulation were also applied to legislation. For instance, the participation of third parties is one of the elements of the expanded responsive regulation.⁸³³ Similarly, such a participation was also emphasized to improve the legislative decision-making process to enhance transparency.⁸³⁴ It seems to mirror that, as Braithwaite himself mentioned, the dialogues in responsive regulation happen not only when enforcing but also when people doubt that the law itself is, for instance, just.⁸³⁵ In other words, I observed that the concepts of responsive regulation have been shown in the context of not only enforcement but also the design of laws or regulatory approaches.

2.3.2 Application

Since responsive regulation was deemed to be dynamic, is it suitable for regulating FinTech in the face of complexities and the pacing issue? To answer this question, it might be helpful to look into, among others, the dynamism of responsive regulation to study whether this dynamism could address those issues in the context of FinTech.

The analysis starts from examining this dynamism in terms of how it manifests itself. In fact, one of the goals of introducing dynamism to

⁸³² See Baldwin & Black, *supra* note 829, at 84

⁸³³ Braithwaite, *supra* note 828, at 890.

⁸³⁴ See Benjamin J. Richardson & Jona Razzaque, *Public Participation in Environmental Decision-making*, in ENVIRONMENTAL LAW FOR SUSTAINABILITY 165, 171-72 (B. Richardson & S. Wood eds., 2006).

⁸³⁵ See Braithwaite, *supra* note 828, at 886.

regulation is to help regulation respond flexibly to different factors in the regulatory environment such as the conduct of those regulated,⁸³⁶ their demands,⁸³⁷ or new situations.⁸³⁸ In this sense, responsive regulation reflects a dynamic model in which an escalation or a de-escalation would happen depending on the previously mentioned responses.⁸³⁹ In other words, the dynamism of responsive regulation seems to manifest itself as escalation or de-escalation, which are associated with the above factors.⁸⁴⁰ While the escalation or de-escalation could better realize the cooperation between regulators and those regulated,⁸⁴¹ do they contain a dimension of time? In the following section, this issue will be explored by both resorting to the studies discussing responsive regulation and looking into the factors found before.⁸⁴²

While responsive regulation encompasses the strategies that could be exploited flexibly, could these modifications and adjustments help keep pace with technology? In other words, further to the factors found before, could the introduction of responsive regulation at an earlier stage of technology's development help to (1) resist the potential obsolescence, (2) collect information for both regulators and those regulated, and (3) avoid impeding innovation? In fact, Ayres and Braithwaite argued that in the situation that technology evolves too fast to be kept pace with, starting from persuasion and self-regulation would be more preferable.⁸⁴³ The reason seems to be that responsive regulation allows regulatory adjustments.⁸⁴⁴ However, Baldwin and Black argued that the original ideas of responsive regulation developed

⁸³⁶ AYRES & BRAITHWAITE, *supra* note 825, at 4.

⁸³⁷ See PHILIPPE NONET & PHILIP SELZNICK, *LAW AND SOCIETY IN TRANSITION: TOWARD RESPONSIVE LAW* 72 (2009).

⁸³⁸ Bennis & Wiener, *supra* note 821, at 7.

⁸³⁹ Braithwaite, *supra* note 908, at 117-18.

⁸⁴⁰ See AYRES & BRAITHWAITE, *supra* note 825, at 54.

⁸⁴¹ See *id.* at 36.

⁸⁴² See *supra* Section 2.2.2.

⁸⁴³ AYRES & BRAITHWAITE, *supra* note 825, at 26, 110-11, 129-30.

⁸⁴⁴ See *id.* at 129.

by Ayres and Braithwaite may be really responsive if it could respond to “changes” such as technology evolution. According to Baldwin and Black, “in order to be really responsive, responsive regulatory strategies have to adapt to movements in regulatory priorities, circumstances and objectives.”⁸⁴⁵ In particular, the changes that should be responsive are due to, among other factors, the developments of industry and technology.⁸⁴⁶ The idea of really responsive regulation could also be applied to legislation as it might be needed to realize this idea by providing certain tools.⁸⁴⁷ They especially argued that there is still imperfection of responsive regulation in terms of responding to changes by claiming that “what it does not offer is an explanation of how the need for such escalation is to be assessed and how escalation is to be managed in a world of change.”⁸⁴⁸

In the case of regulating FinTech, the imperfections of responsive regulation might be in the form of the lack of a regime in which regulatory strategies could be systematically adjusted. That is, it seems that the criteria by which the regulatory adjustments are introduced are not clear. For instance, whether and when would those regulated confront stricter regulatory strategies and the corresponding heavier responsibilities? It was suggested that escalation in responsive regulation depends on, among other things, whether those regulated comply or not.⁸⁴⁹ By contrast, scholars pointed out that the need for moving to stricter regulatory strategies in the case of FinTech should be contingent on various factors such as the risk levels and the maturity of those regulated, which might change along with the development of the technology itself.⁸⁵⁰ Along with these changes, the regulatory objectives might be different as well. For instance, when the FinTech grows in terms of size and complexity, the emphasis of the

⁸⁴⁵ Baldwin & Black, *supra* note 829, at 73.

⁸⁴⁶ *Id.*

⁸⁴⁷ *See id.* at 84.

⁸⁴⁸ *Id.* at 74.

⁸⁴⁹ *See* AYRES & BRAITHWAITE, *supra* note 825, at 20, 36.

⁸⁵⁰ *See* Zetzsche et al., *supra* note 762, at 99-100.

regulatory goals might swing from promoting innovation toward ensuring financial stability.⁸⁵¹ Therefore, the above changing factors in the regulatory landscape which are associated with the technology itself do not seem to be included in the concepts of responsive regulation.

In addition, is responsive regulation suitable from the viewpoint of its ability in collecting information for both regulators and the regulated in the face of complexities? In fact, Baldwin and Black argued that responsive regulation is rarely concerned about the influence of regulatory strategies on collecting information.⁸⁵² One of the few relevant discussions is that Ayres and Braithwaite mentioned that it would be easier to get information for regulators in a persuasive rather than punitive manner.⁸⁵³ This might be the case when regulating FinTech and getting more information is important for regulators to understand its complexities.⁸⁵⁴ However, in the context of regulating FinTech, it is also equally important that those regulated could gain useful information from their dialogues with regulators in terms of, for instance, compliance.⁸⁵⁵ For example, are their products or services legitimate? Should they adopt any measures such as consumer protection safeguards to truly launch their products or services in real markets? As there seems to be a dearth of coverage of responsive regulation on this issue, it might be unfit.

In sum, responsive regulation could establish the cooperation between regulators and those regulated, and this specialty renders responsive regulation potentially suitable for regulating FinTech. It is because responsive regulation is dynamic to the degree that regulatory adjustments happen in response of different factors such as the conduct of those regulated

⁸⁵¹ See William Magnuson, *Regulating FinTech*, 71 VAND. L. REV. 1167, 1204 (2018).

⁸⁵² Baldwin & Black, *supra* note 829, at 61.

⁸⁵³ AYRES & BRAITHWAITE, *supra* note 825, at 34.

⁸⁵⁴ See, e.g., Allen, *supra* note 823, at 614.

⁸⁵⁵ See, e.g., *id.* at 623.

or other new situations. Nevertheless, it is still imperfect because of the above points, which show the paucities of clear criteria for regulatory adjustments and of a bilateral information collecting scheme for both regulators and the regulated.

2.4 Application of Self-Regulation

2.4.1 Basic Concepts

Secondly, the application of self-regulation on FinTech will be analyzed in this Section. While self-regulation refers to the “law formulated by private agencies to govern professional and trading activities”,⁸⁵⁶ it is worth studying the question of whether self-regulation could be applied to adaptively regulate FinTech. It is because, among other reasons, self-regulation has been recommended to establish a bottom-up approach to complexities.⁸⁵⁷ It was recommended because scholars suspected that top-down and pure command-and-control approaches are not needed in the world of complexities.⁸⁵⁸ In their approach, they promoted the “laissez-faire activism”, featuring a bottom-up approach in which the government plays a role “nudging” instead of “controlling” those regulated.⁸⁵⁹ In addition, a study also suggested that self-regulation should be encouraged when regulating FinTech because those regulated possess more information.⁸⁶⁰ In spite of the above notions, Section 2.4.2 further analyzes the application of

⁸⁵⁶ Anthony Ogus, *Self-Regulation*, in ENCYCLOPEDIA OF LAW & ECONOMICS 587, 587 (Boudewijn Bouckaert & Gerrit De Geest eds., 1999).

⁸⁵⁷ COLANDER & KUPERS, *supra* note 792, at 9, 181.

⁸⁵⁸ *Id.* at 21-22, 61.

⁸⁵⁹ *Id.* at 61-62, 230. The idea of “nudging” is aligned with the concepts from behavioral economics. *See id.* at 166-67. Nudging is deemed to be an important strategy to lead people to the desired direction. E.g., RICHARD H. THALER & CASS R. SUNSTEIN, *NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS* 76 (2008); CASS R. SUNSTEIN, *WHY NUDGE?: THE POLITICS OF LIBERTARIAN PATERNALISM* 95 (2014). Nudging is on the basis of freedom to choose. *See* Cass R. Sunstein & Richard H. Thaler, *Libertarian Paternalism Is Not an Oxymoron*, 70 U. CHI. L. REV. 1159, 1161-62 (2003).

⁸⁶⁰ Magnuson, *supra* note 851, at 1219-20.

it to see if it could regulate FinTech adaptively.

2.4.2 Application

Even though self-regulation may fit FinTech and the world of complexities as described above, could it solve the accompanying pacing issue? Few studies discussed this issue. For instance, one study mentioned that the utilization of self-regulation to regulate FinTech could avoid the situation that regulation would be outdated.⁸⁶¹ Regardless of the lack of detailed explanations in that study, it seems that the reason provided by the author was that those regulated have superior information.⁸⁶² Similarly, it was also argued in another study that if the regulatory intervention in general financial markets is in a form of self-regulation, information could be timely accessed and analyzed.⁸⁶³

However, the above descriptions are established on the premise that the regulated really have superior information. What if obtaining more information is also their aim due to the complexities shown in Chapter 3? Moreover, it was argued that dealing with complexities through self-regulation might incur rent-seeking as dealing with complexity would be merely an excuse, and self-regulation might overestimate individuals' ability to solve their problems.⁸⁶⁴ Therefore, this Section does not argue that self-regulation is completely unsuitable. Rather, it argues that it should not be the only approach to regulate FinTech. By observing the regulatory approaches to FinTech in different jurisdictions, self-regulation is sometimes seen especially at the early stage of FinTech when regulators do not quite understand the technology.⁸⁶⁵ Or, self-regulation is used in jurisdictions to

⁸⁶¹ *Id.* at 1222.

⁸⁶² *See id.*

⁸⁶³ Saule T. Omarova, *Rethinking the Future of Self-Regulation in the Financial Industry*, 35 *BROOK. J. INT'L L.* 665, 670, 685 (2010).

⁸⁶⁴ *See* George Leef, *Complexity and Command-and-Control*, 38 *REG.* 54, 55 (2015).

⁸⁶⁵ For instance, the PBOC (People's Bank of China, the "PBOC"), which is the Chinese

regulate FinTech where the influence of a certain interest group is strong.⁸⁶⁶

2.5 Application of Smart Regulation

2.5.1 Basic Concepts

Third, this Section studies the application of smart regulation on FinTech. In the following, its basic content which was proposed and developed by Gunningham, Grabosky and Sinclair will be briefly introduced. After this, an illustration of how the term “smart regulation”, whether or not it corresponds to the original ideas developed by the above scholars, has been

central bank, issued a regulatory sandbox regime for FinTech in December 2019 and launched it in January 2020 in Beijing. Timmy Shen, *China to Trial 11 New Fintech Projects in 'Regulatory Sandbox'*, CAIXIN (June 3, 2020), <https://www.caixinglobal.com/2020-06-03/china-to-trial-11-new-fintech-projects-in-regulatory-sandbox-101562708.html>. China's regulatory sandbox for FinTech, however, parallels its long-standing adoption of self-regulation, which is called “industry supervision + institutional self-governance”, to regulate FinTech. Shihua Tang, *Unlike UK's Regulatory Sandbox, China's Is Only for Licensed Firms*, PBOC Says, YICAI (Dec. 23, 2019), <https://www.yicai.com/news/china-regulatory-sandbox-only-accepts-licensed-firms-pboc-says>. Such regulatory approach seems to be aligned with China's regulatory approach to other applications of FinTech such as P2P (peer-to-peer, “P2P”) lending platforms as the latter also emphasizes that self-regulation should complement the interim regulation. Wang Luo Jie Dai Xin Xi Zhong Jie Ji Gou Ye Wu Huo Dong Guan Li Zhan Xing Ban Fa (网络借贷信息中介机构业务活动管理暂行办法) [Interim Measures for the Administration of the Business Activities of Online Lending Information Intermediary Institutions], art. 34.

⁸⁶⁶ Taiwan's open banking (hereinafter “OB”) regulation epitomizes the use of self-regulation which actually benefits a certain interest group. Regarding the self-regulation of OB in Taiwan, see Zhong Hua Min Guo Yin Hang Gong Hui Hui Yuan Yin Hang Yu Di San Fang Fu Wu Ti Gong Zhe He Zuo Zhi Zi Lü Gui Fan (中華民國銀行公會會員銀行與第三方服務提供者合作之自律規範) [The Self-Regulation Governing the Cooperation Between Member Banks of the Bankers Association of the Republic of China and Third-Party Services Providers]. In Taiwan, the FSC (Financial Supervisory Commission, the “FSC”) required in 2019 the BAROC (Bankers Association of the Republic of China, the “BAROC”), to formulate the self-regulation of OB. According to this self-regulation, banks could opt to open its data pools to FinTech companies, whilst the OB regulation in, for instance, the EU is compulsory. Regarding EU's OB regulation, see *supra* Chapter 4, Section 3.2. Thus, banks could choose not to open its data pools in Taiwan to FinTech companies which are sometimes banks' competitors. This voluntary approach in Taiwan benefits banks rather than FinTech, and this approach seems to mirror the heavy influence of the banking industry in Taiwan. Taiwan's OB regulation will be analyzed in more detail in a book I co-author with Prof. Robert Chang-Hsien Tsai and is forthcoming in 2022.

mentioned in FinTech-related literature will follow.

With respect to its definition, smart regulation originally “refers to a form of regulatory pluralism that embraces flexible, imaginative and innovative forms of social control” and “harnesses governments as well as business and third parties”.⁸⁶⁷ As smart regulation responds to and improves responsive regulation, it resorts to the ex-ante measures featuring non-governmental forces, thereby encompassing the ideas of self-regulation and co-regulation.⁸⁶⁸ It thus goes beyond the relationship between regulators and the regulated by including various participants such as NGOs (non-governmental organizations, “NGOs”).⁸⁶⁹ The partnership between the public and the private brings several benefits such as lower administrative and information costs.⁸⁷⁰ In addition to the above features in terms of the participants, another important part of smart regulation involves the complementarities of different instruments.⁸⁷¹

In the context of regulating FinTech or new technology, I observed that the term “smart regulation” has been usually mentioned. However, this usage illustrates a regulatory approach that re-balances different regulatory objectives when regulating FinTech.⁸⁷² The meaning of this type of smart regulation is two-fold. Firstly, it seems that the commentators proposing smart regulation in the context of FinTech implied that an introduction of technology to regulation renders regulation smart. They regarded PSD2,

⁸⁶⁷ Neil Gunningham & Darren Sinclair, *Smart Regulation*, in REGULATORY THEORY: FOUNDATIONS AND APPLICATIONS 133, 133 (Peter Drahos ed., 2017).

⁸⁶⁸ See, e.g., *id.*; Baldwin & Black, *supra* note 829, at 65.

⁸⁶⁹ Gunningham & Sinclair, *supra* note 867, at 133-34.

⁸⁷⁰ Michael G. Faure, *The complementary roles of liability, regulation and insurance in safety management: theory and practice*, 17 J. RISK RESEARCH 689, 695 (2014).

⁸⁷¹ Gunningham & Sinclair, *supra* note 867, at 133-34, 139. For instance, the mix of regulatory instruments has been emphasized when developing effective environmental laws. Judith van Erp, Michael Faure, André Nolkaemper & Niels Philipsen, *Conclusion*, in SMART MIXES IN RELATION TO TRANSBOUNDARY ENVIRONMENTAL HARM 329, 329-30 (Judith van Erp, Michael Faure, André Nolkaemper & Niels Philipsen eds., 2019).

⁸⁷² Zetzsche et al., *supra* note 762, at 36.

which was discussed in Chapter 4, and RegTech (regulatory technology, “RegTech”) as instances of smart regulation in the context of FinTech as technology such as open API and software helps these regulations achieve the goals.⁸⁷³ Secondly, some concepts of the smart regulation proposed and cultivated by Gunningham, Grabosky and Sinclair were also seen in the smart regulation for FinTech. Specifically, scholars argued that sequencing and combining different regulatory tools are a strategy that is often used to regulate FinTech.⁸⁷⁴ It was also suggested that the tools which are used to regulate FinTech should be proportionate to, for instance, the size of the firms.⁸⁷⁵ In addition to the aforementioned studies which focused on the application of smart regulation on FinTech, the term “smart regulation” has also been used when discussing regulating new technology by simply referring to literally being “smart”. For instance, it was argued that to optimize the regulation of new technology, regulation is “just enough and in the right ways when regulators are themselves smart.”⁸⁷⁶ As such, it was suggested that regulators would be smarter if they, for instance, enhance their organizational system and apply advanced informational technology.⁸⁷⁷

2.5.2 Application

A scholar argued that the contemporary studies on smart regulation in the context of FinTech emphasized proportionating to the regulated technology by, for instance, sequencing and mixing instruments or tailoring regulatory strategies.⁸⁷⁸ This scholar further pointed out that this emphasis

⁸⁷³ See *id.* at 56, 93. RegTech refers to the use of technology to advance regulatory compliance. EY, REGULATORY TECHNOLOGY (REGTECH): NAVIGATING THE RIGHT TECHNOLOGY TO MANAGE THE EVOLVING REGULATORY ENVIRONMENT 2 (2019), https://assets.ey.com/content/dam/ey-sites/ey-com/en_us/topics/financial-services/ey-regulatory-technology-regtech.pdf.

⁸⁷⁴ See Zetzsche et al., *supra* note 762, at 36.

⁸⁷⁵ See *id.* at 94.

⁸⁷⁶ Cary Coglianesi, *Optimizing Regulation for and Optimizing Economy*, 4 J.L. & PUB. AFF. 1, 13 (2018).

⁸⁷⁷ *Id.* at 10-12.

⁸⁷⁸ See Omarova, *supra* note 824, at 35-36.

would in a sense achieve “regulatory continuity”, thereby helping “keeping up with FinTech”.⁸⁷⁹ Despite this, there seems to be lack of detailed and further explanations for this notion in that study. I will thus re-examine it in the following section.

Therefore, the question concerned here would be – *could smart regulation keep pace with FinTech by being technology-oriented?* In fact, scholars argued that one of the criticisms that smart regulation has received is that the changes in the regulatory landscape are not fully considered.⁸⁸⁰ The situation that such changes may not be fully considered is also seen in the context of responsive regulation as studied before.⁸⁸¹ Regulation in fact needs to be able to “learn”.⁸⁸² In other words, even though the mix of regulatory instruments could vary depending on the development of technology, other factors such as regulatory goals that change with the technological development are not be considered. In addition, it is also doubtful that smart regulation could manage to collect information for both regulators and the regulated in the face of complexities because this aspect does not seem to be emphasized by smart regulation.

2.6 An Alternative Approach is Needed – the Rise of AFR

In the above sections, it could be observed that even though it is theoretically possible to apply those regulatory approaches to FinTech, they are not perfect in terms of the complexities and the pacing issue. In addition to the approaches examined above, scholars have studied several measures to regulate new technology. For instance, governance in the early stage of the development of technology was recommended.⁸⁸³ Emphasizing

⁸⁷⁹ *See id.*

⁸⁸⁰ Peter Van Gossum, Bas Arts & Kris Verheyen, *From “Smart Regulation” to “Regulatory Arrangements”*, 43 POL’Y SCI. 245, 249 (2010).

⁸⁸¹ *See supra* Section 2.3.2.

⁸⁸² *See* Gossum et al., *supra* note 880, at 251-52.

⁸⁸³ *E.g.*, Mandel, *supra* note 814, at 89.

principles rather than rules is also one of the strategies.⁸⁸⁴ The idea of “AFR” has been discussed as one of the solutions for the problems existing in complex and dynamic systems.⁸⁸⁵

The emergence of AFR has the following features. Firstly, AFR mirrors a regulatory approach beyond the dichotomy between to regulate and not to regulate.⁸⁸⁶ Secondly, the introduction of AFR seems to be influenced by the ideas in other fields. That is, the idea that regulation applied in complex systems should be adaptive appears in the discussions regarding not only financial regulation but also other fields. For instance, in the field of administrative law, it has been argued that experimentation should be emphasized by governmental administrative agencies by using the tool of adaptive management.⁸⁸⁷ The tool of adaptive management, according to scholars, enables administrative agencies to “base management decisions on programs of structured experimentation and learning.”⁸⁸⁸ Similar ideas have also appeared in, for instance, the field of environmental laws.⁸⁸⁹

While the idea of AFR is tailored to the needs of regulating new technology, I have observed that there is a paucity of studies which contain its concrete and complete contents and implementation. Thus, Section 3 will study its definition, implementation, and examples in the context of

⁸⁸⁴ E.g., Marchant, *supra* note 785, at 30; Dan Awrey, *Regulating Financial Innovation: A More Principles-Based Proposal?*, 5 BROOK. J. CORP. FIN. & COM. L. 273, 281 (2011); Julia Black & Robert Baldwin, *Really Responsive Risk-Based Regulation*, 32 LAW & POL’Y 181, 202 (2010).

⁸⁸⁵ E.g., Baxter, *supra* note 776, at 594; Baxter, *supra* note 778, at 254, 264; Lo, *supra* note 777, at 7; LO, *supra* note 772, at 368-70; Simon A. Levin & Andrew W. Lo, *Opinion: A New Approach to Financial Regulation*, 112 PNAS 12543, 12544 (2015).

⁸⁸⁶ See Zetzsche et al., *supra* note 762, at 98-100; Baxter, *supra* note 776, at 593-94.

⁸⁸⁷ Donald T. Hornstein, *Complexity Theory, Adaption, and Administrative Law*, 54 DUKE L.J. 913, 916, 934-35 (2005).

⁸⁸⁸ *Id.* at 936.

⁸⁸⁹ E.g., J.B. Ruhl, *Regulation by Adaptive Management—Is It Possible?*, 7 MINN. J.L. SCI. & TECH. 21, 34 (2005); Bradley C. Karkkainen, *Collaborative Ecosystem Governance: Scale, Complexity, and Dynamism*, 21 VA. ENV’T L. L.J. 189, 200-204 (2002).

regulating FinTech.

2.7 Summary

This Section studied the challenges when regulating FinTech due to the complexities and the pacing issue, and the applications of different regulatory approaches were also examined. From the perspective of law and technology, the technological change and complexity in modern markets would negatively influence the effectiveness of regulation as it might be outdated.⁸⁹⁰ While intervening earlier would mean a lack of information, intervening later may be costly as technology is more mature.⁸⁹¹ How to balance these opposing situations? I identified some critical factors by resorting to law and economics literature if intervening earlier is chosen as the studies of law and technology suggested.⁸⁹² The factors found in this Section are (1) the obsolescence costs, (2) the costs of enacting and implementing regulation, and (3) the possibility to collect information in the face of complexities.

Based on the above notions, the applications of several regulatory approaches were examined. Firstly, while responsive regulation could be utilized flexibly, it might not be perfect. It was found that the changes in the regulatory landscape such as the technology advancement are not fully considered in its escalation and de-escalation. It was also found that there are paucities of clear criteria for its regulatory adjustments and of a bilateral information collecting scheme for both regulators and those regulated. Responsive regulation seems to be imperfect in terms of its ignorance about collecting information for those regulated. Secondly, even though self-regulation has been recommended to deal with complexities and the potential

⁸⁹⁰ See, e.g., Marchant, *supra* note 785, at 23; Kaal, *supra* note 799, at 800; Moses, *supra* note 763, at 8.

⁸⁹¹ See, e.g., *id.*; Koops, *supra* note 788, at 317.

⁸⁹² *Id.*

regulatory obsolescence, these notions were established on the prerequisite that those regulated really have superior information. What if obtaining information is also their aim due to the complexities? Moreover, it was argued that dealing with complexities through self-regulation might incur rent-seeking, thereby leading to a failure to fulfil public interest regulatory goals. Thirdly, similar to the application of responsive regulation, smart regulation has received criticism that the changes in the regulatory landscape are not fully considered. Regulation needs to be able to learn. Lastly, this Section described that “AFR” was studied by being tailored to the needs of regulating new technology. It was argued in literature that this approach goes beyond the dichotomy between to regulate and not to regulate. How could it achieve this? The content of it will be examined in Section 3 in detail.

3. Definition and Implementation of AFR of FinTech

After describing the complexity and pacing issue when regulating FinTech and introducing AFR as a solution, this Section examines the content of it. Section 3.1 describes its definition and the models that could be found in the literature. The relevant literature, however, does not seem to be rich. Thus, based on these descriptions, this section also describes how AFR could be extended to FinTech. Section 3.2 studies the implementation of AFR in terms of the approach. This section shows the arrangements by illustrating a progressive approach that adapts to different stages of FinTech’s development. Actual cases are also given in this section. Section 3.3 further studies the implementation in terms of the regulatory instruments that could be utilized at different stages to adaptively regulate FinTech. The question of how these arrangements and instruments deal with complexity is also answered therein. Section 3.4 summarizes.

3.1 Basic Concepts

3.1.1 Definition

In general, the idea of AFR could be defined as a regulatory approach which emphasizes regulatory adjustments and enables regulation to learn over time through these adjustments and collecting information.⁸⁹³ This approach thus allows regulation and regulators to adapt to the changes in the regulatory landscape such as the technological developments.⁸⁹⁴ Therefore, from a higher perspective, dynamism features AFR, as opposed to directive regulation.⁸⁹⁵

3.1.2 Models

Based on the above definition, scholars argued that AFR could be realized through either (1) a greater discretion that regulators have,⁸⁹⁶ or (2) an automated regulatory process that includes some predetermined conditions with which rules will accordingly change.⁸⁹⁷ According to scholars, the discretionary adaptive regulation involves a structured approach by which regulatory bodies could assess regulatory performance and adjust the regulation accordingly.⁸⁹⁸ The dynamic nature of it was thus emphasized.⁸⁹⁹ Thus, it was regarded as the opposite of the pure command-and-control regulatory regime.⁹⁰⁰ The importance of the regulator's discretion could be seen in, for instance, the experimentation of FinTech, which is the essence of AFR that I will study in Section 3.2. I will thus mainly

⁸⁹³ Benneer & Wiener, *supra* note 821, at 7-8.

⁸⁹⁴ See, e.g., *id.*; Baxter, *supra* note 778, at 265; Chris Brummer, *Disruptive Technology and Securities Regulation*, 84 *FORD. L. REV.* 977, 1048 (2015). Scholars provided a more specific proposal of AFR in the context of preventing systemic financial crisis, which is “allowing regulatory leverage restrictions to adapt to time-varying risk levels of an institution’s assets as well as the level of aggregate risk in the macroeconomy.” Levin & Lo, *supra* note 885, at 12544.

⁸⁹⁵ Baxter, *supra* note 776, at 589, 595; Baxter, *supra* note 778, at 254.

⁸⁹⁶ Baxter, *supra* note 776, at 595; Benneer & Wiener, *supra* note 821, at 19-20.

⁸⁹⁷ *Id.* at 24.

⁸⁹⁸ *Id.* at 19.

⁸⁹⁹ See Baxter, *supra* note 776, at 595-97.

⁹⁰⁰ *Id.* at 594-95.

focus on this discretionary model.

In comparison, the automated adaptive regulation is characterized by its automation in terms of regulatory adjustments.⁹⁰¹ Technology such as algorithms, machine learning or artificial intelligence, together with a large amount of data for analysis based on the above technologies, could realize the automated adaptive regulation.⁹⁰² For instance, the emerging “RegTech” or “SupTech” (supervisory technology, “SupTech”) refers to the application of technology to help regulations work in terms of monitoring, reporting and compliance.⁹⁰³ They seem to mirror the idea of automated adaptive regulation.⁹⁰⁴

As argued by Hu, when facing increasing complexities in financial markets, it is critical that regulators could have a system to collect information on an on-going rather than one-time basis.⁹⁰⁵ The emergence of AFR, which could be either the discretionary or automated model, seems to be realizing that system. I will explain how AFR operates to collect information on an on-going basis in Section 3.2.

3.1.3 AFR of FinTech – Building on Responsive Regulation?

⁹⁰¹ Bennear & Wiener, *supra* note 821, at 24-25.

⁹⁰² *Id.* at 27-30.

⁹⁰³ Dirk A. Zetsche, Ross P. Buckley, Douglas W. Arner & János N. Barberis, *From FinTech to TechFin: The Regulatory Challenges of Data-Driven Finance*, 14 N.Y.U. J.L. & BUS. 400 (2018). To be clear, both RegTech and SupTech are characterized by the application of technology. However, RegTech emphasizes the regulatees’ management of regulatory process such as compliance based on technology. Jake Frankenfield, *What Should You Know About RegTech*, INVESTOPEDIA (Apr. 27, 2019), <https://www.investopedia.com/terms/r/regtech.asp>. In comparison, SupTech is more related to regulators’ use of technology to support their jobs. SIMONE DI CASTRI, STEFAN HOHL, AREND KULENKAMPFF & JERMY PRENIO, BANK OF INTERNATIONAL SETTLEMENTS, THE SUPTECH GENERATIONS 4 (Oct. 2019), <https://www.bis.org/fsi/publ/insights19.pdf>.

⁹⁰⁴ See Baxter, *supra* note 776, at 598.

⁹⁰⁵ Henry T.C. Hu, *Misunderstood Derivatives: The Causes of Informational Failure and the Promise of Regulatory Incrementalism*, 102 YALE L.J. 1457, 1503 (1993).

While some studies illustrated the definition and models of AFR as described above, the next Section will study the more complete contents of AFR by studying how it operates in the context of FinTech.⁹⁰⁶ Before that, I will describe that I have observed that AFR seems in a sense to echo responsive regulation. As I will explain in the following, AFR still differs in terms of (1) its emphasis on a more bilateral relationship between regulators and the regulated and (2) its arrangements tailored to the development stages of technology.

In fact, both featuring being dynamic rather than being static, the ideas of adaptive regulation and responsive regulation have been deemed similar to each other.⁹⁰⁷ Thus, the dynamism, which could be realized by either responsiveness or adaptiveness, is the essence of both approaches.⁹⁰⁸ The essence of responsive regulation depends, among other things, on the fact that it considers the voices from not only regulators but also the regulated.⁹⁰⁹ It is thus a dialogue-based approach.⁹¹⁰ Similarly, AFR could be realized by this essence. In particular, the aforementioned characteristics of AFR mirror the viewpoint that regulation would be “really responsive” when it responds to the regulatory environment, including the changes therein.⁹¹¹ However, AFR seems to improve responsive regulation by some different arrangements. For instance, the dialogues between regulators and the regulated in AFR are in a more *bilateral* manner than responsive regulation as described below.⁹¹² Moreover, the arrangements of AFR are especially established based on technological development and the goals of resisting

⁹⁰⁶ See *infra* Section 3.2.

⁹⁰⁷ Bennear & Wiener, *supra* note 821, at 6, 8.

⁹⁰⁸ See John Braithwaite, *Types of Responsiveness*, in REGULATORY THEORY: FOUNDATIONS AND APPLICATIONS 117, 118 (Peter Drahos ed., 2017); Baxter, *supra* note 776, at 589, 595.

⁹⁰⁹ See Braithwaite, *supra* note 831, at 130.

⁹¹⁰ See John Braithwaite, *The Essence of Responsive Regulation*, 44 U.B.C. L. REV. 475, 480-81 (2011).

⁹¹¹ See Baldwin & Black, *supra* note 829, at 74.

⁹¹² See *infra* Section 3.2.1.1.

being outdated and of collecting information for both regulators and the regulated. In the following, I will describe the implementation of AFR of FinTech by illustrating a progressive approach. The descriptions in the following will also show how AFR echoes responsive regulation but still differs.

3.2 Implementation – A Progressive Approach

3.2.1 Collecting and Exploring Information

Before looking into the details of the implementation of AFR of FinTech, it would be helpful to first answer a fundamental question – in general, how to design more adaptive regulation? In other words, how to make regulation shift from stasis closer to adaptability?

Scholars argued that, from stasis to adaptability on the spectrum of adaptability, there are (1) one-time regulation without follow-ups and changes, (2) regulation with a single review a few years after the enactment, and collecting information is not planned beforehand to conduct the review, (3) regulation with follow-ups, and collecting information is planned beforehand, and (4) regulation contains a series of on-going collecting information, evaluation and updating.⁹¹³ Thus, it could be observed that, if *collecting and exploring information* are planned or even embedded as a function of regulation, the more adaptive the regulation is. The aim of such an idea is to have regulation which is better updated in the light of new information.⁹¹⁴ This strategy could also deal with the complexities because, as studied in Chapter 3, FinTech may result in information deficits that contribute to complexity. By building on these notions, I illustrate the actual

⁹¹³ Bennear & Wiener, *supra* note 821, at 13-14.

⁹¹⁴ See Lawrence E. McCray, Kenneth A. Oye & Arthur C. Petersen, *Planned Adaptation in Risk Regulation: An Initial Survey of US Environmental, Health, and Safety Regulation*, 77 *TECH. FORECASTING & SOC. CHANGE* 951, 951 (2010).

implementation of AFR of FinTech in the following. Specifically, I will briefly describe a newly emerging strategy regulating FinTech, namely a “regulatory sandbox”⁹¹⁵, as an example realizing AFR of FinTech. Detailed analyses of this regulatory strategy will be in Chapters 6 and 7.

3.2.2 A Progressive Approach

3.2.2.1 Stage One – Deliberation & Experimentation

(1) Description

When AFR is implemented to regulate FinTech, a progressive approach that adapts to the FinTech’s development could be utilized. Further to Section 3.2.1, when AFR is implemented, collecting information should be emphasized to address the arising complexities.

In the first stage, this regulatory approach starts with “*deliberation*”, which I describe as a process which is more bilateral than persuasion because of the ongoing mutual dialogues between regulators and the regulated therein. Whilst persuasion could help compliance as the regulators communicate *to* the regulated,⁹¹⁶ the discussion here features its function of simultaneously benefiting both regulators and the regulated by exchanging and discovering information in the face of complexities. A collaborative relationship thus could to be established via such a process.⁹¹⁷

In practice, this discussion could be in the form of *experimentation*. As such, regulators get the information about the new technology and its

⁹¹⁵ Regarding its definition, *see infra* Section 3.2.1.1.

⁹¹⁶ *See* AYRES & BRAITHWAITE, *supra* note 825, at 35, 38.

⁹¹⁷ *See* GOVERNMENT OFFICE FOR SCIENCE, FINTECH FUTURES: THE UK AS A WORLD LEADER IN FINANCIAL TECHNOLOGIES 37 (2015), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/413095/gs-15-3-fintech-futures.pdf.

regulatory issues, and the regulated get the information about the impact of regulation on their products or services. Each experiment is temporary and will terminate according to its sunset rules. While sunset rules have been recommended to deal with obsolescence,⁹¹⁸ the temporary nature of the experimentation here may have a similar effect. *Experimentation*, furthermore, could be realized through, for instance, a “regulatory sandbox”, which is broadly defined as a regime establishing an area “where to trial innovation and regulation.”⁹¹⁹ It was also defined in more detail as the following:

“Regulatory sandboxes are defined as concrete frameworks which, by providing a structured context for experimentation, enable where appropriate in a real-world environment the testing of innovative technologies, products, services or approaches – at the moment especially in the context of digitalization – for a limited time and in a limited part of a sector or area under regulatory supervision ensuring that appropriate safeguards are in place.”⁹²⁰

Based on the definition above, FinTech products and services could be tested based on the exemptions from certain regulatory requirements such as full licensing requirements.⁹²¹ In theory, the testing firms or individuals could be free from liability,⁹²² but it still depends on the design of the

⁹¹⁸ E.g., Jonathan R. Macey, *Administrative Agency Obsolescence and Interest Group Formation: A Case Study of the SEC at Sixty*, 15 CARDOZO L. REV. 909, 909 (1993).

⁹¹⁹ FEDERAL MINISTRY FOR ECONOMIC AFFAIRS AND ENERGY, MAKING SPACE FOR INNOVATION: THE HANDBOOK FOR REGULATORY SANDBOXES 15 (July 2019).

⁹²⁰ *Press Release, Regulatory Sandboxes and Experimentation Clauses as Tools for Better Regulation: Council Adopts Conclusions*, EUROPEAN COUNCIL (Nov. 16, 2020), <https://www.consilium.europa.eu/en/press/press-releases/2020/11/16/regulatory-sandboxes-and-experimentation-clauses-as-tools-for-better-regulation-council-adopts-conclusions/#>.

⁹²¹ See, e.g., Hilary J. Allen, *Experimental Strategies for Regulating Fintech*, 3 J.L. INNOVATION 1, 20 (2020).

⁹²² See Matthew J. Razzano, *An Unsafe Sandbox: FinTech Innovation at the Expense of Consumer Protection?*, 2019 U. ILL. L. REV. ONLINE 132, 133 (2019).

regulatory sandbox in practice.⁹²³ The previously mentioned information collecting operates as indicated in the short description below.

Through truly running the business during the experiment, regulator's understanding of the FinTech business model and risks will be increased.⁹²⁴ Testers provide information about, for example, their business models and the experimental status to the regulator, improving the regulator's understanding of FinTech.⁹²⁵ Testers could also thus clarify the compliance issues about their FinTech products or services.⁹²⁶ However, the above descriptions about a regulatory sandbox are brief. A study of Taiwan's regulatory sandbox will be given in Chapter 6 to look into the details of an actual regulatory sandbox. Before that, a real example will be given later to render the above descriptions more vivid.⁹²⁷

The deliberative process in a regulatory sandbox informationally benefits both regulators and the regulated. In other words, the idea of a regulatory sandbox seems to echo the notion that waiting is not preferable in the case that information could be generated only from doing it in practice.⁹²⁸ Besides, the experiment is temporary according to its sunset rules and a certain termination specified therein. Before the termination, regulators and

⁹²³ For instance, in Taiwan's regulatory sandbox, testing firms or individuals still bear the liability for damages, and such liability should not be limited or waived by prior agreement between the testing party and the participants. Jin Rong Ke Ji Fa Zhan Yu Chuang Xin Shi Yan Tiao Li (金融科技發展與創新實驗條例) [Financial Technology Development and Innovative Experimentation Act], art. 20, para. 1; art. 23, para. 2 (hereinafter "FinTech Sandbox Act").

⁹²⁴ RADOSTINA PARENTI, REGULATORY SANDBOXES AND INNOVATION HUBS FOR FINTECH: IMPACT ON INNOVATION, FINANCIAL STABILITY AND SUPERVISORY CONVERGENCE 14 (2020), [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652752/IPOL_STU\(20\)652752_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652752/IPOL_STU(20)652752_EN.pdf).

⁹²⁵ See *id.* at 17-18.

⁹²⁶ See *The Role of Regulatory Sandbox In Fintech Innovation*, FINEXTRA (Sep. 10, 2018), <https://www.finextra.com/blogposting/15759/the-role-of-regulatory-sandboxes-in-fintech-innovation>.

⁹²⁷ See *infra* Section 3.2.1.1(2).

⁹²⁸ See Parisi & Ghei, *supra* note 805, at 29.

the regulated exchange and discover information through *deliberation* in a mutual manner. It is thus suitable to be the first stage of the AFR in the face of complexity that results in informational vagueness.

(2) Example

An actual case will be studied in this Section. In Taiwan, the first experiment in the regulatory sandbox is the test of using “Mobile ID”, which is an online identification means through mobile phones to apply for credit loans or credit cards, and the tester was the KGI bank.⁹²⁹ The idea behind it is that, while some people have difficulty gaining financial products such as credit loans or credit cards because they officially have no credit scores, financial products could still be offered through identifying their credit based on their histories of paying the mobile phone bills.⁹³⁰ Whilst this project aims to enhance financial inclusion, some legal issues arose because this project went beyond the traditional scope of banks’ businesses. For instance, it may be against the rules in the regulation of security control applied when financial institutions conduct electronic banking businesses.⁹³¹ Before experimenting with the project, the company had limited information about whether it will be against the regulations. Similarly, the regulator was not familiar with the “Mobile ID” business model and the associated risks as it is comparatively novel. Conceptually speaking, the relationship between the technology and the relevant regulation seemed to be unclear.

⁹²⁹ *Tui Dong Xing Dong Shen Fen Shi Bie Hai Xu Sao Chu De Ji Ge Zhang Ai* (推動行動身分識別還須掃除的幾個障礙) [*The Barriers That Should Be Removed When Promoting Mobile ID*], GONG SHANG SHI BAO (工商時報) [COMMERCIAL TIMES] (June 13, 2019), <https://view.ctee.com.tw/monetary/10308.html>.

⁹³⁰ *Id.*

⁹³¹ Qi-Yuan Zhou (周岐原), *Mei Xin Yong Ji Lu, Yong Shou Ji Men Hao Yi Yang Neng Dai Kuan! Suo You Yin Hang Dou Ke Ban, Zui Kuai Ba Yue Di Shang Lu* (沒信用紀錄，用手機門號一樣能貸款！所有銀行都可辦，最快八月底上路) [*Loans Could Be Offered Without Credit History! It Will Be Available in All the Banks Soon Before the End of August.*], FENG CHUAN MEI (風傳媒) [THE STORM MEDIA] (Aug. 7, 2020), <https://www.storm.mg/article/2921667>.

Against the background described above, this experiment was launched on 5 December 2018 and ended on 8 August 2019 to understand and examine the unknown risks and regulatory concerns.⁹³² Exploring and collecting the necessary information operated as follows. Over 5,000 people voluntarily participated in the experiment by truly applying for credit loans or credit cards, and the testing company regularly submitted reports to the regulator regarding the testing progress.⁹³³ The regulator could thus gain more information about the business model and the risks. The tester, namely the KGI bank, also gained the information about the regulation that it needed to comply with to truly launch its service out of the sandbox.⁹³⁴

3.2.2.2 Stage Two – Waiting & Risk-based Supervision

(1) Description

While experimentation could be undertaken at the first stage, what is the mechanism after that? Since, for instance, a regulatory sandbox is temporary, the mechanisms after that are also important.⁹³⁵ Nonetheless, I found that the studies of adaptive regulation barely include this part. As an experiment will terminate at the time that the FinTech firm exits it according

⁹³² *Id.*

⁹³³ Xiu-Zhen Liu (劉秀珍), *Zao Fan You Li – Zhi Ji Sha He Wu Ge An Zhi Chuang Xin Yu Tiao Zhan* (造反有理 – 直擊沙盒五個案之創新與挑戰) [*The Innovation and Challenges in Five Regulatory Sandbox Cases.*], JING JI RI BAO (經濟日報) [ECONOMIC DAILY NEWS] (Mar. 5, 2020), <https://money.udn.com/money/topic/2020030501>.

⁹³⁴ See Zhen-Ling Peng (彭禎伶) & Qiao-Yi Wei (魏喬怡), *Sha He Shi Yan Cheng Gong Fa Gui Gen Bu Shang Kai Ji Yin Jin Rong Xiao Bai Xian Ting* (沙盒實驗成功法規跟不上 凱基銀金融小白先停) [*Regulation Could Not Keep Pace After the Success of the Sandbox Experimentation. The KGI Bank's Project Stopped.*], GONG SHANG SHI BAO (工商時報) [COMMERCIAL TIMES] (Aug. 6, 2020), <https://m.ctee.com.tw/livenews/aj/a91617002020080620245843>.

⁹³⁵ See Jin-Lung Peng & Cheng-Yun Tsang, *FinTech Regulation and A Review of Taiwan's Financial Regulatory Sandbox Framework*, 38 MGMT. REV. 89, 94, 96 (2019).

to the sunset rules of the experimentation regime, the regulatory pacing issue may emerge again. Should the regulator act immediately again after each experiment? Or should the regulator wait?

The second stage could thus be waiting for collecting information through considering the following factors. As this stage is without a “formal” regulatory regime which will be introduced at the next stage,⁹³⁶ regulators’ supervision may play an important role. As such, the supervision could be more risk-based. That is, the aim of this risk-based supervision is to continuously identify the risks which regulators seek to address at the next stage.⁹³⁷ To be clear, the supervision is based on the information collected from the experiments at the previous stage, enabling regulators to familiarize themselves with the technology. Based on the information collected and the identification of risks in these two stages, a regulatory regime could be established through, for instance, amending laws at the next stage. However, in this stage, a conditional and interim permission could be given to the FinTech firm to let it run the business without being blocked after the experiment.⁹³⁸

The above strategies could be explained theoretically. As suggested by scholars, if the enactment costs decreased, to enact regulation later would be more preferable.⁹³⁹ In the context of FinTech regulation, it could be envisaged that it would be costly if amending or enacting laws is undertaken individually after each testing FinTech firm leaves the experimentation.⁹⁴⁰

⁹³⁶ See *infra* Section 3.2.2.3.

⁹³⁷ See Black & Baldwin, *supra* note 884, at 184.

⁹³⁸ See Jin-Lung Peng (彭金隆) & Cheng-Yun Tsang (臧正運), *Wo Guo Jin Rong Ke Ji Chuang Xin Shi Yan Ji Zhi Zhi Jian Shi Yu Gou Jian* (我國金融科技創新實驗機制之檢視與構建) [*Examination and Establishment of Taiwan’s FinTech Innovation Experimentation Mechanisms*], FTRC (國立政治大學商學院金融科技研究中心), <http://www.fttc.nccu.edu.tw/wordpresseng/?p=3536> (last visited Aug. 16, 2021).

⁹³⁹ E.g., Luppi & Parisi, *supra* note 802, at 24, 29; Gersen & Posner, *supra* note 807, at 559.

⁹⁴⁰ Peng & Tsang, *supra* note 938.

Therefore, it was suggested that regulators should act a bit later in order to collect more information from the experiments and to lower the costs of amending or enacting laws.⁹⁴¹ In the face of complexity, waiting a bit and emphasizing the risk-based supervision at this stage might be beneficial as more information could be collected to mitigate opacity. This stage, however, is temporary before introducing or revising regulation in the next stage.

(2) Example

Whilst the first stage was exemplified by, for instance, the regulatory sandbox regime as shown above, the second stage does not seem to be in fact realized yet. Scholars pointed out that the post-experimentation mechanisms in jurisdictions are not complete.⁹⁴² This Section thus describes what happened after the experiment case “Mobile ID” to argue that the measures proposed in Section 3.2.2.2(1) are necessary.

After that experiment ended on 8 August 2019, it was expected to amend the relevant regulation by the end of August 2020 in order to truly launch the tested financial service in the open market.⁹⁴³ Therefore, there was a period in which no post-experimentation mechanisms could be applied and the company was eager to truly provide their financial services. In the end, the financial regulator, which is the FSC (Financial Supervisory Commission, the “FSC”), announced that the financial service could be temporarily offered on a trial basis until March 2020.⁹⁴⁴

⁹⁴¹ *See id.*

⁹⁴² *Id.*

⁹⁴³ Zhou, *supra* note 931.

⁹⁴⁴ Jia-Yun Ji (紀佳媛), *Xin Yong Xiao Bai Yong Shou Ji Hao Ma Ban Dai Kuan! 8 Yue Di Suo You Yin Hang Ke Wang Kai Ban* (信用小白用手機號碼辦貸款! 8月底所有銀行可望開辦) [*People Without Credit Scores Could Apply For Loans Through Mobile Phone Numbers! It Is Expected to Come in All the Banks Before the End of August.*], ETODAY (Aug. 6, 2020), <https://finance.ettoday.net/news/1778932>.

The meaning of the aforementioned situation is two-fold. Firstly, it mirrors the necessity for waiting because more information is needed in this stage to form regulatory responses which could be applied in the next stage. That seems to explain why the FSC would not act immediately after the experiment but waited until a certain time. Secondly, the paucity of post-experimentation mechanisms in an organized manner was also revealed by the situation. Both the FSC and the testing company had undergone the situations that it was difficult to form any regulatory responses, that the financial service could not be launched at this stage, and that regulation was still falling behind technology.⁹⁴⁵

It might be because even though collecting information was planned and seems to be the main task at this stage, the means to collect information was not effective. Thus, in order to regulate adaptively, some elements of collecting information should not be ignored. For instance, scholars suggested that the periodicity, which is the frequency of examining the relevant regulation based on the information collected, and the scope, which refers to the variables that should be examined by collecting information, should be carefully considered when implementing adaptive regulation.⁹⁴⁶ Besides, as I will study in Section 4, there might be other criteria which are connected with the role of regulators for the success of AFR of FinTech.

3.2.2.3 Stage Three – A Multi-Tiered and Gradual Regulatory Regime

(1) Description

⁹⁴⁵ See Zhen-Ling Peng (彭禎伶) & Qiao-Yi Wei (魏喬怡), *Sha He Shi Yan Cheng Gong Fa Gui Gen Bu Shang Kai Ji Yin Jin Rong Xiao Bai Xian Ting* (沙盒實驗成功法規跟不上 凱基銀金融小白先停) [Regulation Could Not Keep Pace After the Success of the Sandbox Experimentation. The KGI Bank's Project Stopped.], GONG SHANG SHI BAO (工商時報) [COMMERCIAL TIMES] (Aug. 6, 2020), <https://m.ctee.com.tw/livenews/aj/a91617002020080620245843>.

⁹⁴⁶ See Bennear & Wiener, *supra* note 821, at 18.

In addition to the experimentation, waiting and risk-based supervision, forming the “formal” responses afterwards is still challenging. Scholars argued that a tailored regulatory mechanism for FinTech is more preferable because the FinTech firms exiting experiments are possibly still not capable of bearing the costs of regulation applied to financial institutions.⁹⁴⁷ Therefore, the question of how to design a flexible mechanism for FinTech is critical. In fact, when it comes to regulating FinTech, several scholars suggested a multi-tiered and gradual regulatory regime. For example, it could be a multi-tiered licensing regime, in which FinTech firms are first exempted from the licensing regime for traditional financial institutions and start with a special license.⁹⁴⁸ When FinTech firms grow and the corresponding risk level increases in the future, a full licensing regime could be adopted later.⁹⁴⁹ From a higher perspective, this tiered regime is in response to the maturity of FinTech by gradually and proportionately increasing the strictness of regulation, thereby adapting to the development of FinTech.

(2) Example

As described in the “Mobile ID” case in Sections 3.2.2.1(2) and 3.2.2.2(2), the tested financial service was not smoothly available in the market after the experiment because of the delay in amending regulation. Commentators pointed out that this situation showed that regulation still had difficulty in being capable of keeping pace with technology even though we have the experimentation mechanism.⁹⁵⁰ As studied in Section 3.2.2.2(2), the lack of post-experimentations in an organized way at the second stage

⁹⁴⁷ See Peng & Tsang, *supra* note 938.

⁹⁴⁸ See, e.g., *id.*; Saule T. Omarova, *Technology v. Technocracy: Fintech as a Regulatory Challenge*, 6 J. FIN. REG. 75, 112-14 (2020); Zetzsche et al., *supra* note 762, at 98-99.

⁹⁴⁹ See *id.* at 99.

⁹⁵⁰ E.g., Peng & Wei, *supra* note 945; Ya-Mian Xu (許雅緝), *Gu Li Chuang Xin De Jian Li Sha He Fan Zu Duan Xin Chuang Huo Lu* (鼓勵創新的監理沙盒 反阻斷新創活路?) [Does the Regulatory Sandbox Aiming to Encourage Innovation Hinder Innovation Instead?], YUAN JIAN (遠見) (Aug. 27, 2020), <https://www.gvm.com.tw/article/74340>.

might be the reason. Similarly, the imperfections could also be found at the third stage as the FSC seems to seek a solution by amending the relevant regulation in a one-time manner. From the adaptive regulation perspective, however, there is no need for a once-and-for-all decision to be made; rather, the financial service or product could be approved first for limited customers.⁹⁵¹ Thus, in the Mobile ID case, it might be feasible for this financial service to be approved, for example, for customers without credit histories but with longer histories of paying mobile phone bills. The approval for all the people without credit histories could be in place later. This measure thus exemplifies the multi-tiered and gradual approach described in Section 3.2.2.3(1).

3.3 Implementation – Regulatory Instruments

3.3.1 Information Regulation

First, information regulation, which is a regulatory instrument with lower intervention,⁹⁵² exists in not only traditional financial regulation but also AFR. The use of this instrument can be often found at, among other stages, stage one and two in relation to experiments.

Theoretically, as an ex-ante strategy,⁹⁵³ the information regulation used to regulate financial markets centers on disclosure.⁹⁵⁴ This instrument thus to a certain degree relies on those regulated for provision of information. By contrast, in the context of AFR, the provision of information does not solely rely on those regulated. This notion is two-fold.

⁹⁵¹ See Benneer & Wiener, *supra* note 821, at 20-21.

⁹⁵² ANTHONY I. OGUS, REGULATION: LEGAL FORM AND ECONOMIC THEORY 5 (Hart Publ'g 2004) (1994).

⁹⁵³ JOHN ARMOUR, DAN AWREY, PAUL DAVIES, LUCA ENRIQUES, JEFFERY N. GORDON, COLIN MAYER & JENNIFER PAYNE, PRINCIPLES OF FINANCIAL REGULATION 73 (2016).

⁹⁵⁴ E.g., OGUS, *supra* note 952, at 138; ARMOUR ET AL., *supra* note 953, at 76.

Firstly, in the automated model of AFR described in Section 3.1.2, information could automatically be provided at later stages of services or products through a certain process.⁹⁵⁵ This process consists of, for instance, digitalizing regulatory provisions, performing digital regulatory reporting and creating models for semantic interoperability, being exemplified by the case that the UK financial regulators including the Bank of England and the FCA have been developing RegTech applications.⁹⁵⁶ Therefore, the provision of information does not rely only on those regulated but also on technology.

Secondly, in the progressive approach illustrated in Section 3.2.2, information could be explored and discovered in a mutual manner in the face of complexity. Specifically, when technology is still at its early stage and thus unclear in terms of its influence on stage one, regulators and the regulated could share and explore the information regarding the technology during the experiment. Moreover, as more information is discovered and collected in this bilateral way and thus helps design the regulatory regime at a later stage, this regime might be closer to the reality and thus more adaptive.⁹⁵⁷ According to scholars, a process starting from “deregulation” when entering the sandbox to “re-regulation” when leaving is envisaged.⁹⁵⁸ Therefore, the information regulation used in AFR could improve the decision-making process undertaken by regulators by easing the

⁹⁵⁵ See, e.g., Douglas W. Arner, János Barberis & Ross P. Buckley, *FinTech, RegTech, and the Reconceptualization of Financial Regulation*, 37 NW. J. INT’L L. & BUS. 371, 385 (2017).

⁹⁵⁶ Tom Butler & Leona O’Brien, *Understanding RegTech for Digital Regulatory Compliance*, in *DISRUPTING FINANCE: FINTECH AND STRATEGY IN THE 21ST CENTURY* 85, 90-96 (Theo Lynn, John G. Mooney, Pierangelo Rosati & Mark Cummins eds., 2018).

⁹⁵⁷ See BAKER MCKENZIE, *A GUIDE TO REGULATORY FINTECH SANDBOXES INTERNATIONALLY* 20 (2020), https://www.bakermckenzie.com/-/media/files/insight/publications/2020/05/a_guide_to_regulatory_fintech_sandboxes_internationally_8734.pdf?la=en.

⁹⁵⁸ Chang-Hsien Tsai, Ching-Fu Lin & Han-Wei Liu, *The Diffusion of the Sandbox Approach to Disruptive Innovation and Its Limitations*, 53 CORNELL INT’L L.J. 261, 267 (2020).

informational shortfall arising from complexities brought by technology.⁹⁵⁹

3.3.2 Entry Regulation

Second, entry regulation or prior approval, which is a more interventionist strategy,⁹⁶⁰ exists in both traditional financial regulation and AFR.⁹⁶¹ They affect the possibility of entering the market or undertaking certain activities.⁹⁶² For instance, the licensing requirements are imposed on financial markets participants.⁹⁶³ In the progressive approach to AFR studied in Section 3.2.2, this entry regulation could be seen at stage two and especially stage three.

The conditional and interim permission at the second stage that allows the tested service or product to be launched after the experiment but before the formal regulatory response, is an example of the entry regulation in AFR.⁹⁶⁴ Another example is the multi-tiered licensing regime that is crafted especially for FinTech firms at stage three.⁹⁶⁵ For instance, Singapore's financial regulator proposed a multi-tiered licensing regime for blockchain-based platforms after they leave the regulatory sandbox.⁹⁶⁶ In addition, the "FinTech license" or "banking license light" regime, was introduced in

⁹⁵⁹ See Brummer, *supra* note 894, at 1043. I already studied in detail how FinTech brings changes in complexity, resulting in information deficit. See *supra* Chapter 3.

⁹⁶⁰ OGUS, *supra* note 952, at 5.

⁹⁶¹ Regarding the discussions about the entry regulation in the context of traditional financial regulation, see ARMOUR ET AL., *supra* note 953, at 74-75. Scholars have proposed that the idea that drugs approval such as establishing a governmental agency to approve new drugs could be utilized to test and approve financial innovations. Eric A. Posner & E. Glen Weyl, *An FDA for Financial Innovation: Applying the Insurable Interest Doctrine to Twenty-First-Century Financial Markets*, 107 NW. U. L. REV. 1307, 1322, 1348-51 (2013). The similar idea, namely establishing a regulator specialized in FinTech, will not be studied in my thesis but in my future research mentioned in footnote 866.

⁹⁶² OGUS, *supra* note 952, at 214; ARMOUR ET AL., *supra* note 953, at 74.

⁹⁶³ *Id.*

⁹⁶⁴ See *supra* Section 3.2.2.2.

⁹⁶⁵ See *supra* Section 3.2.2.3.

⁹⁶⁶ MONETARY AUTHORITY OF SINGAPORE, CONSULTATION PAPER: REVIEW OF THE RECOGNIZED MARKET OPERATORS REGIME 7 (May 22, 2018).

Switzerland and in effect since January 2019 as an exemption from requiring FinTech firms to obtain the traditional banking license.⁹⁶⁷ These two cases above exemplify the way in which entry regulation could be utilized to adapt to the influence of FinTech.

Thus, the introduction of different licensing regimes described above establishes a framework under which FinTech firms could fit themselves into regulation. After all, the success of FinTech regulation lies, among other things, in the flexibility of the regulatory approach.⁹⁶⁸ As argued in Chapter 3, one of the sources of complexity brought by technology is the regulatory uncertainty due to the situation that technology could not fit in the existing regulation. The introduction of regulatory flexibility by establishing a multi-tiered regulatory regime might deal with the situation.⁹⁶⁹ Nevertheless, this multi-tiered regulatory regime should not expand without limits in order to avoid the opposite outcome, which is increasing regulatory complexity, as it may render regulation too fragmented. Thus, as I will argue in Section 3.3.6, this regime should be embedded with principles rather than detailed rules.

3.3.3 Economic Instruments

Thirdly, the use of economic instruments is also mentioned in the literature regarding FinTech. The use of economic instruments is thus feasible in AFR. Specifically, these instruments may be used widely rather than being limited to a particular stage. For example, newly established

⁹⁶⁷ Daniel Flühmann & Peter Hsu, *Switzerland: The New Swiss Fintech License – A License For The Future?*, MONDAQ (Apr. 4, 2019), <https://www.mondaq.com/fintech/794708/the-new-swiss-fintech-licence-a-licence-for-the-future>; *New Fintech regulation – Banking license “light”*, LOYENS & LOEFF (Mar. 20, 2018), <https://www.loyensloeff.com/ch/en/news/new-fintech-regulation-banking-license-light-n10505/#>.

⁹⁶⁸ See, e.g., Chiu, *supra* note 768, at 63; Brummer, *supra* note 894, at 1052.

⁹⁶⁹ See DOUGLAS W. ARNER, JÁNOS BARBERIS & ROSS P. BUCKLEY, CFA INSTITUTE RESEARCH FOUNDATION, FINTECH AND REGTECH IN A NUTSHELL, AND THE FUTURE IN A SANDBOX 7 (2017), <https://www.cfainstitute.org/-/media/documents/article/rief/rief-v3-n4-1.ashx>.

FinTech companies might enjoy lower tax rates, and the capital requirements for them might be different.⁹⁷⁰ However, these examples of economic instruments do not seem to mitigate only undesirable activities. Rather, they also aim to promote innovation by aiding these newly emerging FinTech companies. However, reducing undesirable harms to investors or consumers by utilizing economic instruments, is still possible. For example, when implementing AFR of FinTech, such a use of economic instruments could be in the form like when for instance, when the FinTech firms take further measures to ensure and enhance consumer and investor protection, tax reduction could be given.⁹⁷¹

3.3.4 Product Regulation

Fourthly, while the regulatory instruments requiring information disclosure are used as a tool representing a lower degree of intervention, the instruments regulating the provisions of products are also utilized in a more interventionist means.⁹⁷² In the context of regulating financial products, product regulation was considered to be the regulation of the relevant contractual terms between financial products or services providers and customers. For instance, product regulation influences the providers' ability to offer such products or services as financial products are in fact a contract or package of contracts.⁹⁷³ Capping the interest rates, fees on default and total costs of borrowing and requiring the addition of certain mandatory terms in credit card contracts exemplify the financial product regulation.⁹⁷⁴

⁹⁷⁰ Simone di Castri & Ariadne Plaitakis, *Going Beyond Regulatory Sandboxes to Enable FinTech Innovation in Emerging Markets* 10 (Jan. 23, 2018), <https://ssrn.com/abstract=3059309>.

⁹⁷¹ See Brummer, *supra* note 894, at 1047.

⁹⁷² For instance, the use of standards is the case of regulating products. OGUS, *supra* note 952, at 150-51.

⁹⁷³ ARMOUR ET AL., *supra* note 953, at 74, 245.

⁹⁷⁴ *Id.* 261-62, 264.

In the context of AFR, such measures seem to remain, but they are coupled with, for instance, the aforementioned experimentation model such as a sandbox to flexibly regulate. For instance, product regulation could be observed in the Regulations Governing Financial Technology Innovative Experimentation of Taiwan. That is, the aggregate amount of funds, transactions or risk exposures in the contracts between the testing firms in a sandbox and its customers are capped at NTD 100 million.⁹⁷⁵ Thus, in AFR, this product regulation could be embedded in the experimental regime.

3.3.5 Conduct Regulation

Fifthly, besides product regulation, conduct regulation is also adopted to prevent financial products providers from exploiting consumers and seeking rents by implementing standards.⁹⁷⁶ As both information regulation and product regulation may have their limits,⁹⁷⁷ conduct regulation for financial products has been deemed helpful by complementing them.⁹⁷⁸ As described above, product regulation could be used to make FinTech regulation more adaptive by incorporating it into the experiments of AFR.⁹⁷⁹ Similarly, conduct regulation of FinTech could be utilized in the experiments. For example, according to the Sandbox Act of Taiwan, the advertisements and promotional activities shall be “free of falsehood, deception, concealment or other situations sufficient to mislead others.”⁹⁸⁰ This reflects

⁹⁷⁵ Jin Rong Ke Ji Chuang Xin Shi Yan Guan Li Ban Fa (金融科技創新實驗管理辦法) [Regulations Governing Financial Technology Innovative Experimentation], art. 5.

⁹⁷⁶ ARMOUR ET AL., *supra* note 953, at 255, 265-66.

⁹⁷⁷ The limits of information regulation are, for instance, the bounded rationality of individuals and their limited ability to understand the disclosed information. *E.g., id.* at 255-56; OGUS, *supra* note 952, at 152; Omri Ben-Shahar & Carl E. Schneider, *The Failure of Mandated Disclosure*, 159 U. PENN. L. REV. 647, 709-20 (2011). The limits of product regulation are, for instance, the difficulties in finding out the actual consumers' preferences and the possibility that consumers' access to products might be limited due to the intervention in the contracts. ARMOUR ET AL., *supra* note 953, at 255, 261.

⁹⁷⁸ *See id.* at 264-65.

⁹⁷⁹ *See supra* Section 3.3.4.

⁹⁸⁰ FinTech Sandbox Act, *supra* note 923, art. 22.

the use of conduct regulation. Besides, as scholars pointed out, the success of conduct regulation of financial products depends on implementing high-level and open-ended standards in order to ensure its dynamics because it leaves room for interpretation.⁹⁸¹ This also seems to be crucial when adaptively utilizing conduct regulation for FinTech products as dynamism is a feature of the era of FinTech. The utilization of principles is explained in the following section.⁹⁸²

3.3.6 Principles

Sixthly, it was also argued that principles instead of rules should be embedded in the regulation for FinTech.⁹⁸³ To be clear, relying on principles creates more space for regulators to realize greater regulatory discretion in the face of complexity.⁹⁸⁴ Principles are said to bring flexibility for both regulators and the regulated.⁹⁸⁵ In contrast, detailed rules could be out of date soon.⁹⁸⁶ It is worth mentioning that the term “principles” here is in relation to a lower degree of regulatory specificity, thereby being similar to the term “standards”.⁹⁸⁷ Therefore, since the aim of AFR is to retain the

⁹⁸¹ ARMOUR ET AL., *supra* note 953, at 265.

⁹⁸² *See infra* Section 3.3.6.

⁹⁸³ *E.g.*, Baxter, *supra* note 776, at 595-96. *See generally* Dan Awrey, *Regulating Financial Innovation: A More-Principles-Based Proposal?*, 5 BROOK. J. CORP. FIN. & COM. L. 273 (2011).

⁹⁸⁴ *See id.* at 273-74, 295.

⁹⁸⁵ *E.g.*, Julia Black, Martyn Hopper & Christa Band, *Making Success of Principles-based Regulation*, 1 L. & FIN. MKT. 191, 195 (2007).

⁹⁸⁶ Julia Black, *Paradoxes and Failures: New Governance Techniques and the Financial Crisis*, 75 MOD. L. REV. 1037, 1044 (2012).

⁹⁸⁷ In the law and economics studies, rules-based regulation is with a higher level of specificity, whilst standards-based regulation is with a lower level of specificity. FRANCESCO PARISI, *THE LANGUAGE OF LAW AND ECONOMICS* 262 (2013). Similarly, according to Kaplow, the term “standards” refers to an idea that “entails leaving both specification of what conduct is permissible and factual issues for the adjudicator”; conversely, “rules” would “entail an advance determination of what conduct is permissible and leave only factual issues for the adjudicator.” Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557, 559-60 (1992). Nonetheless the fact that the term “standards” has been often used in law and economics studies, a similar term “principles” could be found in the studies especially on financial innovation and regulation. For instance, Awrey promoted a “more

dynamics of regulation to adapt to FinTech's development, the use of principles is capable of helping that because there is more room for explanation.

In addition, principles might be used at every stage. For example, the regulation of the experimentation undertaken at an early stage establishes a framework, regulating how FinTech firms experiment. It was suggested that this framework should be embedded with principles in order to allow the firms to experiment flexibly.⁹⁸⁸ The above conduct regulation is an example.⁹⁸⁹ At the later stage after exiting the experiment, scholars argued that financial regulators could also conditionally authorize the FinTech firms.⁹⁹⁰ However, this conditional authorization mechanism is based on the regulator's discretion to flexibly correspond to each case,⁹⁹¹ which could be retained by the principles in the authorization regulation.

3.3.7 Command-and-control Regulation

Seventhly, even though a scholar argued that AFR is opposed to command-and-control regulation,⁹⁹² is it possible that command-and-control regulation will be completely removed? The command-and-control approach has been said to face challenges in the complex and dynamic

principles-based financial regulation" that features a lower degree of regulatory precision therein. Awrey, *supra* note 983, 274-75, 278. A similar use of the term "principles" could also be seen in Black et al.'s study. Black et al., *supra* note 985. In particular, Awrey mentioned the use of "principles" instead of "standards" could avoid the confusion that the term "standards" is developed and used by non-governmental organizations when governing, for instance, conduct. *Id.* at 275. I thus chose to mainly use the term "principles" that are often found in the literature about financial innovation and regulation.

⁹⁸⁸ See Chang-Hsien Tsai, *To Regulate or Not to Regulate? A Comparison of Government Responses to Peer-to-Peer Lending among the United States, China, and Taiwan*, 87 U. CIN. L. REV. 1077, 1113-14 (2019).

⁹⁸⁹ See *supra* Section 3.3.5.

⁹⁹⁰ Peng & Tsang, *supra* note 940.

⁹⁹¹ *Id.*

⁹⁹² Baxter, *supra* note 776, at 575.

markets, and other approaches such as the regulatory sandbox were therefore proposed.⁹⁹³ However, according to the above descriptions, the instruments that are used in a regulatory sandbox such as the standards for products and conduct of the testing FinTech firms seem inevitably and implicitly to reflect the command-and-control regime. When a regulation such as multi-tiered licensing regime is established, the command-and-control regime would likewise exist. Therefore, it might be more proper that AFR relies less on a pure command-and-control regime.

3.3.8 Actual Cases

From Sections 3.3.1 to 3.3.7, the question of how various regulatory instruments could be utilized and mixed at different stages was answered. The implementation of AFR was also studied. In this Section, examples are given by further description of the Mobile ID case. As shown in the following, the use of regulatory instruments such as information regulation, product regulation, conduct regulation and command-and-control regulation was in fact exemplified by that case.

When the experiment was undertaken, first, the testing company was obliged to periodically submit reports to explain, for instance, the amount of credit loans approved and whether there was any fraudulence.⁹⁹⁴ This provision of information enabled the regulator to better understand the technology and the potential risks. Besides, both the FSC and the testing company were engaged in mutual dialogues, for example, to examine the progress of the experiment and to jointly decide whether to exit the

⁹⁹³ See *id.*; Allen, *supra* note 823, at 600.

⁹⁹⁴ Peng-Min Tsai (蔡茺敏), *Zhong Hua Dian Xi Shou Kai Ji Yin Jin Rong Jian Li Sha He An Qian Yue Yu Bai Jian* (中華電攜手凱基銀金融監理沙盒案 簽約逾百件) [*Chunghwa Telecom Cooperated with KGI Bank In the Regulatory Sandbox Experiment. More Than 100 Cases Were Done Therein.*], CNA (中央通訊社) (June 6, 2019), <https://www.cna.com.tw/news/afe/201906060311.aspx>.

experiment.⁹⁹⁵ The above descriptions reflect that information regulation is utilized in AFR not only through unilateral provision of information but also the exchange of information between the regulator and the regulated.

Second, as described before, to restrict the amount of money involved in the transactions in the experiment could be the means to curb the potential risks in it, thereby exemplifying product regulation.⁹⁹⁶ For example, in the Mobile ID case, the financial service or product involved was regulated by capping the amount of credit that each person could obtain and the total amount of credit involved in this experiment.⁹⁹⁷

Thirdly, with respect to conduct regulation, the testing company advertised their financial services on some e-commerce platforms to attract people to join the experiment.⁹⁹⁸ However, the testing company was subject to the conduct regulation in the Sandbox Act of Taiwan, which rules the advertisements and promotional activities during the experiment.⁹⁹⁹

Lastly, as discussed before, command-and-control regulation seems to inevitably exist in AFR of FinTech rather than being completely removed.¹⁰⁰⁰ Specifically, it might be utilized at the experimentation stage to control potential risks. In the Mobile ID case, it manifested itself as, for instance, the standards for information security when transmitting data among the

⁹⁹⁵ See Zhen-Ling Peng (彭禎伶), Xin-Wen Chen (陳欣文) & Qiao-Yi Wei (魏喬怡), *Kai Ji Yin Sha He Shi Yan Jin Guan Hui An Zan* (凱基銀沙盒實驗 金管會按讚) [The FSC Appraised KGI Bank's Experiment in the Regulatory Sandbox.], GONG SHANG SHI BAO (工商時報) [COMMERCIAL TIMES] (May 8, 2019), <https://ctee.com.tw/news/finance/85674.html>.

⁹⁹⁶ See *supra* Section 3.3.4.

⁹⁹⁷ Tsai, *supra* note 994.

⁹⁹⁸ Zhen-Ling Peng (彭禎伶) & Qiao-Yi Wei (魏喬怡), *Jin Rong Jian Li Sha He Kai Ji Yin Qiang Tou Xiang* (金融監理沙盒 凱基銀搶頭香) [*KGI Bank Was the First One Entering the Financial Regulatory Sandbox.*], GONG SHANG SHI BAO (工商時報) [COMMERCIAL TIMES] (Sep. 19, 2018), <https://readers.ctee.com.tw/cm/20180919/a05aa5/924741/share>.

⁹⁹⁹ See *supra* Section 3.3.5.

¹⁰⁰⁰ See *supra* Section 3.3.7.

participating customers, the testing company and the telecom company.¹⁰⁰¹

3.4 Summary

This Section described the definition and models of AFR that could be found in the limited literature. This Section then studied the implementation of AFR of FinTech by illustrating a progressive approach and the use of various regulatory instruments. AFR has been defined as a regulatory approach which emphasizes regulatory adjustments, flexibility and dynamism, enabling regulation to learn and adapt to the development.¹⁰⁰² Based on this definition, I found that AFR in a sense echoes responsive regulation, but AFR still differs due to (1) its emphasis on a more bilateral and mutual relationship between regulators and the regulated and (2) the fact that its arrangements were tailored to the stages of technology's development. I emphasized that the progressive approach studied in this Section is based on these differences.

Firstly, *deliberation* features in the first stage where the ongoing mutual dialogues between regulators and the regulated are involved. The dialogues here feature the function of simultaneously benefiting both regulators and those regulated by discovering and exchanging information in the face of complexities. A collaborative relationship is thus established. This stage could be realized in the form of *experimentation*. As such, regulators get the information to understand the new technology and its regulatory issues, and those regulated get the information to understand the impact of

¹⁰⁰¹ See Hwei-Ling Chen (陳蕙綾), *Kai Ji Tiao Kuan Ke Wang Wei Shou Li Jian Li Sha He Ye Wu Ruo Wei She Fa Ling Jin Jih Ci Ta Yin Hang Ye Ke Shih Ban* (凱基條款可望為首例 監理沙盒業務若未涉法令禁止 其他銀行也可試辦) [*The KGI Bank Rules May Be the First Case. Other Banks Could Conduct the Regulatory Sandbox Businesses Which Are Not Forbidden by Laws on a Trail Basis.*], Ju Heng (鉅亨) [anue] (June 18, 2019), <https://news.cnyes.com/news/id/4341136>.

¹⁰⁰² See, e.g., Benneer & Wiener, *supra* note 821, at 7-8; Baxter, *supra* note 776, at 589, 595; Baxter, *supra* note 778, at 254, 265.

regulation on their products or services. Information regulation thus plays an important role at this stage as information could be explored and discovered in a mutual manner in the face of complexity rather than merely through the provision from those regulated. The discovered information further helps design the regulatory regime at a later stage to make it closer to the reality and thus more adaptive. In practice, *experimentation* could be in the form of a regulatory sandbox. While sunset rules have been recommended to deal with obsolescence,¹⁰⁰³ the transitory nature of the experimentation here may have the similar effect. The introduction of the deliberation and experimentation at an early stage of FinTech means that waiting is not preferable in the case that information could be generated only from experimentation in practice. The “Mobile ID” experiment under the Taiwan’s regulatory sandbox regime was described as an example of this stage. It could be observed that the use of regulatory instruments such as information regulation, product regulation, conduct regulation, and command-and-control regulation is widespread in the experimentation regime. However, by studying this case, I also found that it is facing a conundrum that the tested FinTech application could not be truly launched in the market due to the paucity of the post-experimentation mechanisms in an organized manner. It was thus difficult to form any regulatory responses to the results of that experiment, and regulation is still falling behind technology. As such, the regulatory sandbox seems to be to a certain degree in vain. Chapter 6 will study the actual regulatory sandbox regime in more detail as it epitomizes AFR of FinTech.

Secondly, despite the fact that studies on post-experimentation mechanisms are scarce, I argued that *waiting* and regulators’ *risk-based supervision* could form the second stage. In the context of FinTech regulation, it would be costly if enacting or amending regulation is undertaken

¹⁰⁰³ See, e.g., Macey, *supra* note 918, at 909.

individually after each experiment.¹⁰⁰⁴ Therefore, it was suggested that regulators should act a bit later in order to collect more information from the experiments and to lower the costs of enacting or amending regulation.¹⁰⁰⁵ Moreover, the aim of this risk-based supervision at this stage is to continuously identify the risks which regulators seek to address at the next stage. In the face of complexity, waiting a bit and emphasizing the risk-based supervision at this stage might be beneficial as more information could be obtained to mitigate opacity.

Lastly, after the above two stages, a *multi-tiered regulatory regime* was recommended by scholars as FinTech firms are possibly still not capable of bearing the costs of the pre-existing regulation.¹⁰⁰⁶ At this stage, the question of how to design a flexible mechanism for FinTech is critical. For example, this mechanism could be a multi-tiered licensing regime, in which FinTech firms are first exempted from the licensing regime for traditional financial institutions and start with a special license.¹⁰⁰⁷ When FinTech firms grow and the corresponding risk level increases in the future, a full licensing regime could be adopted later.¹⁰⁰⁸ From a higher perspective, this tiered regime is in response to the maturity of FinTech by gradually and proportionately increasing the strictness of regulation. Thus, this tiered regime would potentially adapt to FinTech's development. The entry regulation would be utilized especially at this stage as it is more interventionist.

Among all the regulatory instruments that could be utilized at different stages, I especially emphasized that applying principles is of vital importance at every stage. It is because principles could retain the dynamics of regulation,

¹⁰⁰⁴ Peng & Tsang, *supra* note 938.

¹⁰⁰⁵ *See id.*

¹⁰⁰⁶ *See id.*

¹⁰⁰⁷ *See, e.g.,* Peng & Tsang, *supra* note 938; Omarova, *supra* note 948, at 112-14; Zetzsche et al., *supra* note 762, at 98-99.

¹⁰⁰⁸ *See id.* at 99.

thereby adapting to FinTech's development with more room for explanation. Principles also create more space for regulators to realize greater regulatory discretion to deal with complexities.¹⁰⁰⁹

4. Downside and Limitations

The definition and implementation of AFR of FinTech and its ability in addressing complexity and the pacing issue were studied in Section 3. This Section embarks on the appraisal of its downside and limitations. Specifically, this Section focuses on the downside of AFR of FinTech. Then, it also studies the limitation of AFR of FinTech. In particular, the factors that might negatively influence the effectiveness of AFR of FinTech will be studied. By exploring these issues, this Section aims to explore some conceptual implications and lay the foundations for the case study of Taiwan's sandbox in Chapter 6.

Section 4.1 studies the downside of AFR of FinTech. Section 4.2 focuses on the limitations, namely the potential challenges that would be encountered when implementing it and thus influence the effectiveness. Section 4.3 summarizes.

4.1 Downside

4.1.1 Higher Costs

Although in this Chapter it has been argued that AFR could be a solution for regulating FinTech in the face of complexity and the pacing issue, it has several disadvantages. Despite the lack of studies comprehensively examining them, I will list some of the problems which may be foreseeable.

¹⁰⁰⁹ See Awrey, *supra* note 983, at 273-74, 295.

Firstly, since that AFR largely relies on regulators' discretion in the case of the discretionary model, the costs of applying it might be high. It is quite possible that, in order to keep up with technology, regulators need to, for example, interpret the principles embedded in AFR,¹⁰¹⁰ undertake case-by-case assessments and formulate the regulation if needed.¹⁰¹¹ Since experimentation is one of the core elements in AFR,¹⁰¹² some costs specifically relevant to the experimentation such as the establishment costs of experimentation parameters or safeguard measures and the assessment costs of the experiment results would be raised.¹⁰¹³ Higher costs might thus be incurred.

4.1.2 Lack of Legal Certainty

Secondly, since AFR encompasses, for instance, experimentation and principles to ensure its dynamism and flexibility, a lack of legal certainty might be envisaged.¹⁰¹⁴ Experiments should thus be a temporary means.¹⁰¹⁵ As I will further study in Chapter 6, the experiments in a sandbox aim to bring some impacts such as regulatory changes after the experiments. In addition, since principles still often play a role at different stages of AFR, the lack of legal certainty might remain. The certainty that could be provided by AFR is thus limited to the short-term predictability that the activities of these FinTech firms would not be immediately regarded as illegal because relevant regulations are temporarily relaxed. More discussions about the costs of principles, namely standards,¹⁰¹⁶ will follow in Chapter 6.

¹⁰¹⁰ Regarding the use of principles in AFR, *see supra* Section 3.3.6.

¹⁰¹¹ In order to regulate flexibly, regulators could adopt a regulatory approach that is based on case-by-case assessments in the experimentation regime. Zetzsche et al., *supra* note 762, at 58, 61.

¹⁰¹² *See supra* Section 3.2.2.1.

¹⁰¹³ Brummer, *supra* note 894, at 1050.

¹⁰¹⁴ *See* Black et al., *supra* note 985, at 197.

¹⁰¹⁵ Zetzsche et al., *supra* note 762, at 63-64, 80.

¹⁰¹⁶ As I explained before, the terms principles and standards refer to similar concepts. *See supra* note 987. I use them interchangeable.

4.2 Limitations

4.2.1 Preliminary Remarks

In order to realize AFR of FinTech, some factors would be critical. In spite of the fact that relevant studies which explicitly discuss this issue are scarce, in the following I categorize these factors into two groups which respectively represent the different aspects of realizing AFR of FinTech. These groups are (1) the factors in respect of regulators, and (2) the factors regarding the relationship between regulators and the regulated. The analysis of the former would mainly focus on the issue that regulators may be influenced by other industries especially when regulating something new such as FinTech. The analysis of the latter would be in relation to the collaboration between regulators and the regulated as it is the basis of the early stage of AFR.¹⁰¹⁷

4.2.2 Factors in Respect of Regulators

4.2.2.1 Regulatory Inertia

Chapters 3 and 4 have argued that the rapid advancement of technology causes the old regulatory approach to be unsuitable at times. Therefore, the introduction of AFR illustrated above mirrors an alternative means of regulating modern financial markets. To shift from an old regulatory approach to an adaptive one, however, a different mind-set of regulators is required.¹⁰¹⁸ This would mean that one of the barriers to AFR of FinTech may be that the regulators are conservative and have a tendency to follow old regulatory approaches or regulations, forming regulatory inertia.

¹⁰¹⁷ See *supra* Section 3.2.2.1.

¹⁰¹⁸ See Brummer, *supra* note 894, at 1043.

Regulatory inertia, in fact, has been witnessed when it comes to regulating FinTech.¹⁰¹⁹ Commentators argued that, when regulating FinTech, regulatory inertia would especially result in regulatory obsolescence as regulations could not adapt to the development of FinTech.¹⁰²⁰ Therefore, regulatory inertia may be a contributing factor in the limitation of AFR of FinTech because the regulator might even be unwilling to truly adopt this regulatory approach. In fact, it has been argued that regulatory inertia results from, among other factors, the fact that the regulator is captured by interest groups and that its independence is thus affected.¹⁰²¹ In the following Section, the factor in relation to the potential capture will be briefly explained.

4.2.2.2 Influence of Incumbents

The influence of incumbents on regulation is often found in the context of FinTech. It is because, among other reasons, the incumbent financial institutions such as banks which have already captured regulators regard newly arising FinTech firms as competitors, and thus urge regulators to impose burdensome regulations on FinTech firms. As a result, competition might thus be inhibited by those rent-seekers.¹⁰²² When implementing AFR, it is also possible to imagine that a captured regulator might still favor incumbents in substance while it claims that encouraging FinTech is its goal. In other words, the regulation is in fact generated and supplied for these incumbents' benefits.¹⁰²³ According to a study, when regulation is always

¹⁰¹⁹ See Paul Newson, *Gambling Regulators & Industry Ought to Get in the Regulatory Sandbox*, LEXOLOGY (Oct. 22, 2020), <https://www.lexology.com/library/detail.aspx?g=d6659b63-ed35-4383-b774-7caff91261c5>.

¹⁰²⁰ Lev Bromberg, Andrew Godwin & Ian Ramsay, *Fintech Sandboxes: Achieving a Balance between Regulation and Innovation* 13 (2017), <https://ssrn.com/abstract=3090844>.

¹⁰²¹ See Antonie Faure-Grimaud & David Martimort, *Regulatory Inertia*, 34 RAND J. ECON. 413, 414 (2003).

¹⁰²² See Magnuson, *supra* note 851, at 1220. Rent-seekers' activities are a waste from the perspective of the whole society. Gordon Tullock, *The Welfare Costs of Tariffs, Monopolies, and Theft*, 5 ECON. INQUIRY 224, 228 (1967).

¹⁰²³ E.g., George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. &

outpaced by technology and innovation, the regulator would thus be unable to intervene, rendering the incumbents' rent-seeking efforts wasted, making them less willing to act, and eventually mitigating rent-seeking.¹⁰²⁴ Mirroring this notion, it seems to be possible that as long as the regulator's ability to intervene is enhanced by implementing adaptive regulation, rent-seeking might be envisaged again.

As I will examine through the case study of Taiwan's sandbox in Chapter 6, the influence of incumbents is an important factor in implementing AFR effectively. As I will show, when adaptively regulating FinTech was claimed by the regulator, the influence of incumbents could still be observed. Will the effectiveness of regulation, namely Taiwan's sandbox, be affected? I will analyze this issue in Chapter 6.

4.2.3 Factors in Respect of the Relationship Between Regulators and Those Regulated

4.2.3.1 FinTech Firms' Incentives to Provide Information

In addition to the above factors in respect of regulators, the effectiveness of AFR may be influenced by some factors that are relevant to the relationship between regulators and those regulated. These factors are related to, for instance, the information channeling in experiments between regulators and the regulated as their collaboration is critical to AFR. In this sense, (1) to incentivize the regulated to provide information and (2) to ensure the efficacy of the information channeling between regulators and the regulated are critical.

MANAGE. SCI. 3, 3-4 (1971); DENNIS C. MUELLER, PUBLIC CHOICE III 344-45 (2003); Fred S. McChesney, *Rent Extraction and Rent Creation in the Economic Theory of Regulation*, 16 J. L. STUD. 101, 104 (1987).

¹⁰²⁴ Jeremy Kidd, *FinTech: Antidote to Rent-Seeking?*, 93 CHI.-KENT L. REV. 165, 177 (2018).

With respect to the former, the experimentation in AFR such as sandboxes was thought to be designed to encourage those regulated to provide information,¹⁰²⁵ thereby enabling regulators to understand FinTech better, coping with complexities and reconsidering regulatory responses. However, to truly incentivize the testers to join a sandbox and provide information in experiments may depend on the expectation of the benefits that the testers could gain from joining the sandbox. For instance, the testers could expect some regulatory changes after experiments that could provide more leniency and help them enter the market. If the testers could not expect these benefits, their incentives to provide information might not be sufficient. In Chapter 6, I will describe through a real case how such beneficial regulatory changes might not be formed easily.¹⁰²⁶

4.2.3.2 Information Channeling Between Regulators and Those Regulated

With respect to the information channeling between regulators and the regulated, it should be deemed important at every stage of AFR of FinTech. The efficacy of it is critical at an early stage particularly as both regulators and the regulated need to gain and collect the necessary information about FinTech.¹⁰²⁷ It thus to a large extent relies on the communication channeling information between them.¹⁰²⁸ Barriers to such communication should thus be removed. In fact, as I will study in Chapter 6, these barriers might be the factors regarding the role of regulators described above. For instance, FinTech firms' voices could not be truly heard because the design of the regulation in fact favors a certain group. The public interest goals of this regulation are accordingly ostensible. Chapter 6 will study these issues in

¹⁰²⁵ See Magnuson, *supra* note 851, at 1215-16.

¹⁰²⁶ See *infra* Chapter 6, Section 5.1.2.2.

¹⁰²⁷ See, e.g., Brummer, *supra* note 894, at 1048-49.

¹⁰²⁸ See Zetzsche et al., *supra* note 762, at 61-62, 79.

more detail.¹⁰²⁹

4.3 Summary

This Section studied the downside and limitations of AFR of FinTech. That is, the implementation of it would mean that some disadvantages would be encountered and that there are some contributing factors in its limitation. While AFR is capable of addressing complexities and the pacing issue through the progressive approach proposed before, it has some downsides. For instance, first, higher costs might be incurred as it largely relies on the regulator's discretion. Second, since it emphasizes using principles and being dynamic, it lacks legal certainty.

In addition, AFR of FinTech has limitations. In order to realize AFR of FinTech, some factors are critical. I categorized these factors into (1) the ones in respect of regulators, and (2) the ones regarding the relationship between regulators and those regulated. With respect to the factors in respect of regulators, first, regulators are conservative and have a tendency to follow old regulatory approaches, forming regulatory inertia; this would be a barrier to the realization of AFR of FinTech. These phenomena have been witnessed when it comes to regulating FinTech, and regulatory inertia would especially result in regulatory obsolescence as regulation could not adapt to the development of FinTech.¹⁰³⁰ Secondly, the regulatory inertia is the result of, among other factors, that the regulator is captured by interest groups and that its independence is thus affected. Such an influence is often found in the context of FinTech because, among other reasons, the incumbent financial institutions which have already captured regulators and regard newly arising FinTech firms as competitors; as a result, competition might thus be inhibited

¹⁰²⁹ See *infra* Chapter 6, Sections 5.1.2.1, 5.2.2 and 5.2.3.

¹⁰³⁰ Bromberg et al., *supra* note 1020, at 13.

by those rent-seekers.¹⁰³¹ In other words, regulation functions in fact for the benefit of these incumbents.¹⁰³² Or, regulation may be supplied in response to the incumbent rent-seekers' demands.¹⁰³³ As I will show in Chapter 6, these phenomena exist in Taiwan.

With respect to the factors regarding the relationship between regulators and those regulated, (1) to incentivize the regulated to provide information and (2) to ensure the efficacy of the information channeled between regulators and the regulated are critical. With respect to the former, the experimentation in AFR such as sandboxes has been deemed to be designed to encourage those regulated to provide information to enable regulators to understand FinTech better, cope with complexities and reconsider regulatory responses to FinTech.¹⁰³⁴ However, if the testing FinTech firms could not expect something beneficial afterwards such as a regulatory regime which provides more leniency, it is doubtful that their incentives to join sandboxes and provide information would be sufficient. In addition, the information channeling should be deemed important at every stage of AFR of FinTech. Barriers to the communication between regulators and the regulated when, for instance, experimenting FinTech should thus be removed.

5. Conclusion

This Chapter studied the design of FinTech regulation by adding the dimension of time and considering complexities. AFR of FinTech was thus proposed. To create it, this Chapter resorted to the literature of both law and technology and law and economics. This Chapter also argued that, when AFR of FinTech is implemented, a progressive approach might be preferable.

¹⁰³¹ See Magnuson, *supra* note 851, at 1220.

¹⁰³² E.g., Stigler, *supra* note 1023, at 3; MUELLER, *supra* note 1023, at 344-45.

¹⁰³³ See McChesney, *supra* note 1023, at 104; MUELLER, *supra* note 1023, at 347-48.

¹⁰³⁴ See Magnuson, *supra* note 851, at 1215-16.

Experimentation, waiting, risk-based supervision and a multi-tiered regulatory regime sequentially form the stages of this approach, which correspond to the FinTech development. Various regulatory instruments could be utilized and complement each other at each stage. Sandboxes, which will be studied in more detail in Chapter 6, largely exemplify AFR of FinTech. However, AFR of FinTech has its downside and limitations. For instance, higher regulatory costs might be incurred because regulators' discretion plays an important role. Greater regulatory uncertainty may also arise because of the emphasis on using principles. Moreover, several contributing factors in the limitations of AFR of FinTech were also discovered in this Chapter. Regulatory inertia, the influence of incumbent financial institutions, regulators' incentives to focus on FinTech issues, incentives for those regulated to provide information, and the efficacy of the information channeling between regulators and regulated are critical. By drawing on the above arguments and findings, Chapter 6 will particularly analyze sandboxes as they largely exemplify AFR of FinTech and study Taiwan's FinTech regulatory sandbox as a case.

Chapter 6

Ensuring Regulatory Adaptability: A Study on FinTech Regulatory Sandboxes and Taiwan's Experience as An Example

1. Introduction

In Chapter 5, a solution to the difficulties in regulating FinTech due to the pacing issue identified in Chapters 3 and 4 was studied. This solution, which is AFR of FinTech, aims to enhance the dynamism, flexibility and adaptability of the regulation of FinTech. Adding dynamic, flexible and adaptive elements into FinTech regulation has been one of the tasks faced by financial regulators nowadays.¹⁰³⁵ As discussed in Chapter 5, the introduction of AFR seems to mirror a regulatory approach beyond the dichotomy between to regulate and not to regulate.¹⁰³⁶

Specifically, Chapter 5 argued that the core of AFR is experimentation. Experimentation could be exemplified by FinTech regulatory sandboxes. A regulatory sandbox was defined as a mechanism providing a virtual environment where FinTech services or products could be tested through actually being provided to real consumers.¹⁰³⁷ The testing environment in a

¹⁰³⁵ See, e.g., JOYCE TAIT & GEOFFREY BANDA, PROPORTIONATE AND ADAPTIVE GOVERNANCE OF INNOVATIVE TECHNOLOGIES: THE ROLE OF REGULATIONS, GUIDELINES AND STANDARDS 7-8, <https://www.bsigroup.com/LocalFiles/en-GB/BIS/Innovate%20UK%20and%20emerging%20technologies/Summary%20Report%20-%20Adaptive%20governance%20-%20WEB.pdf>.

¹⁰³⁶ See, e.g., Lawrence G. Baxter, *Adaptive Financial Regulation and RegTech: A Concept Article on Realistic Protection for Victims of Bank Failures*, 66 DUKE L.J. 567, 593-94 (2016).

¹⁰³⁷ See, e.g., Hilary J. Allen, *Regulatory Sandboxes*, 87 GEO. WASH. L. REV. 579, 580 (2019); Giulio Cornelli et al., *Inside the Regulatory Sandbox: Effects on Fintech Funding 2* (BIS Working Papers No. 901, November 2020), <https://www.bis.org/publ/work901.pdf>; WORLD BANK GROUP, GLOBAL EXPERIENCES FROM REGULATORY SANDBOXES 2 (2020), <https://documents1.worldbank.org/curated/en/912001605241080935/pdf/Global->

sandbox is controlled as safeguards are embedded through, for instance, regulators' on-going guidance and supervision during the experiments, the limitation of the number of the consumers joining experiments, the limitation of the period of time within which experiments could be conducted, no waiver of liability for the damages to consumers, and no waiver of AML/CFT regulations.¹⁰³⁸ Detailed arrangements of the safeguards may vary across jurisdictions. Sandboxes could provide different benefits. For example, testers could thus gain legal advice from regulators for their products or services when, for instance, seeking authorization for their products or services or clarifying relevant compliance issues.¹⁰³⁹ Meanwhile, regulators could thus understand the tested products or services better.¹⁰⁴⁰ Other goals and benefits will be discussed in Section 2.2.

As argued by scholars, having various types of regulations, especially a sandbox, forms the current regulatory landscape in the era of FinTech.¹⁰⁴¹ This Chapter looks into the practice of a FinTech regulatory sandbox in terms of its operation, impacts, benefits and drawbacks, and the lessons learnt from it. Finding normative recommendations for regulating FinTech adaptively is the goal of this Chapter. Therefore, this Chapter asks whether having a FinTech regulatory sandbox could ensure regulatory adaptability? If not, why? Since these questions focus on why, using case study as my research

[Experiences-from-Regulatory-Sandboxes.pdf](#).

¹⁰³⁸ See, e.g., *id.* at 2, 24-25; *Press Release, Regulatory Sandboxes and Experimentation Clauses as Tools for Better Regulation: Council Adopts Conclusions*, EUROPEAN COUNCIL (Nov. 16, 2020), <https://www.consilium.europa.eu/en/press/press-releases/2020/11/16/regulatory-sandboxes-and-experimentation-clauses-as-tools-for-better-regulation-council-adopts-conclusions/#>. Regarding the no waiver of liability for damages and of AML/CFT regulation in Taiwan, see *infra* Sections 3.2.2 and 4.1.2.2.

¹⁰³⁹ See, e.g., Cornelli et al., *supra* note 1038, at 2. Regarding this goal of sandboxes, see *infra* Section 2.2.2.

¹⁰⁴⁰ See, e.g., *id.* Regarding this goal of sandboxes, see *infra* Section 2.2.1.

¹⁰⁴¹ See Oscar Borgogno & Giuseppe Colangelo, *Regulating FinTech: From Legal Marketing to the Pro-Competitive Paradigm* 3-4 (2020), <https://ssrn.com/abstract=3563447>.

method in this Chapter is favorable.¹⁰⁴² By studying the above topic, this Chapter will answer the research question – *what are the barriers to adaptive and effective FinTech regulation?*

Taiwan’s regulatory sandbox for FinTech will be an example studied in this Chapter for the following reasons. Firstly, according to the World Bank, only 30 percent of all the 73 sandboxes in the world exist in advanced economies, and only 6 sandboxes out of this 30 percent were created in the countries of the East Asia and Pacific region.¹⁰⁴³ These countries are Australia, Japan, South Korea, Singapore, and Taiwan.¹⁰⁴⁴ As the sandboxes in this group are comparatively rare, every single case should be worth studying. It is because, as pointed out by the World Bank and the IMF (International Monetary Fund, the “IMF”), the advanced economies’ experiences in regulating FinTech are documented better and more complete,¹⁰⁴⁵ thereby providing reliable and complete information. Besides, as pointed out by the World Bank and the IMF again, Asia is ahead of other regions in terms of developing FinTech,¹⁰⁴⁶ thereby providing some preparatory insights for other regions. Thus, considering both the completeness of information and the maturity of FinTech markets, Asian advanced economies’ experiences in regulating FinTech are worth analyzing.

Secondly, among these 5 countries, I chose Taiwan. It is not only because I could more easily obtain some interesting information about the operation of Taiwan’s sandbox as Taiwan is my mother country. It is also because I observed that the number of the firms that entered Taiwan’s sandbox is comparatively low even though Taiwan’s sandbox was created

¹⁰⁴² ROBERT K. YIN, CASE STUDY RESEARCH: DESIGN AND METHODS 2-3 (3rd ed., 2003).

¹⁰⁴³ WORLD BANK GROUP, *supra* note 1037, at 6, 56-62.

¹⁰⁴⁴ *Id.* at 56-62.

¹⁰⁴⁵ INTERNATIONAL MONETARY FUND & WORLD BANK GROUP, FINTECH: THE EXPERIENCE SO FAR 16 (June 2019), <https://www.imf.org/-/media/Files/Publications/PP/2019/PPEA2019024.ashx>.

¹⁰⁴⁶ *Id.* at 15, 46.

earlier than, for instance, South Korea, where the number of firms in its sandbox is apparently higher than Taiwan. This fact appealed to me. What are the reasons behind it? Is Taiwan’s sandbox effective? What are the lessons that could be learned from this case? I tabulated below the relevant data extracted from the World Banks’ webpage.

Table 2: Key data about the sandboxes in the advanced economies in the East Asia & Pacific region

Country	Sandbox Creation Year	Number of Firms in the Sandbox
Australia	2016	7
Japan	2017	12
South Korea	2019	36
Singapore	2016	3
	2019	unknown
Taiwan	2018	6

Source: extracted from the World Banks’ webpage - <https://www.worldbank.org/en/topic/fintech/brief/key-data-from-regulatory-sandboxes-across-the-globe>; the data was listed by the World Bank on November 1, 2020 (last visited 24 Sep. 2021).

I chose Taiwan’s sandbox to study due to the above reasons. Several real cases will also be studied, including both successful and unsuccessful cases of the experiments in Taiwan’s sandbox. Analyses of these several cases, however, will not result in very strong conclusions regarding the effectiveness of sandboxes. Despite this, I aim to find some implications from these cases to form some regulatory design principles in Chapter 7 that help ensure regulatory adaptability when regulating FinTech.

The remainder of this Chapter proceeds as follows. Section 2 is a short opening section studying FinTech regulatory sandboxes in general. This section will study the current status, goals, and benefits of sandboxes around the globe. Section 3 studies Taiwan’s sandbox as an example. This section will explain its background, operation, and impacts. Section 4 then presents several real cases of experimenting with FinTech in Taiwan’s sandbox. This section will especially study both successful and unsuccessful cases. Section 5 analyzes what the advantages and disadvantages of Taiwan’s sandbox are. This section also analyzes if and why Taiwan’s sandbox is truly and sufficiently adaptive. Section 6 concludes.

2. General Overview of FinTech Regulatory Sandboxes

This Section contains a general overview of FinTech regulatory sandboxes. Section 2.1 describes the status of FinTech regulatory sandboxes in the world. Specifically, this section illustrates where the sandboxes are and the pattern of establishing the sandboxes. Section 2.2 studies the general goals and benefits of sandboxes. Section 2.3 summarizes.

2.1 Status Around the Globe

2.1.1 Where Are the Sandboxes?

The idea of FinTech regulatory sandboxes has existed for several years. An overview of the sandboxes globally is given in the following. According to a World Bank’s report, there are 73 FinTech sandboxes in 57 countries.¹⁰⁴⁷ UK’s sandbox, which was launched in 2016 by the financial regulator, the FCA (Financial Conduct Authority, the “FCA”), has been regarded as the pioneer in the world.¹⁰⁴⁸ According to the FCA, “the regulatory sandbox

¹⁰⁴⁷ WORLD BANK GROUP, *supra* note 1037, at 1.

¹⁰⁴⁸ *E.g.*, Allen, *supra* note 1037, at 596; LATHAM & WATKINS, WORLD-FIRST

allows businesses to test innovative propositions in the market, with real consumers”.¹⁰⁴⁹ One of the reasons why a sandbox is needed is, according to the FCA, “the innovation does not easily fit the existing regulatory framework, making it difficult or costly to get the innovation to market”.¹⁰⁵⁰ Thus, a sandbox is expected to clarify regulatory issues about FinTech, helping FinTech access to the market.¹⁰⁵¹

Outside the UK, sandboxes for FinTech also appear in other countries. For instance, several EU Member States such as Denmark,¹⁰⁵² Hungary,¹⁰⁵³ Lithuania,¹⁰⁵⁴ Latvia,¹⁰⁵⁵ the Netherlands,¹⁰⁵⁶ Malta,¹⁰⁵⁷ Greece¹⁰⁵⁸ and Austria¹⁰⁵⁹ already launched regulatory sandboxes.¹⁰⁶⁰ Sandboxes in other

REGULATORY SANDBOX OPEN FOR PLAY IN THE UK 1 (May 9, 2016), <https://www.lw.com/thoughtLeadership/LW-world-first-regulatory-sandbox-open-for-play-in-UK>.

¹⁰⁴⁹ *Regulatory sandbox*, *supra* note 1109.

¹⁰⁵⁰ *Applying to the regulatory sandbox*, FCA, <https://www.fca.org.uk/firms/innovation/regulatory-sandbox-prepare-application> (last visited Sep. 22, 2021).

¹⁰⁵¹ *See The Role of Regulatory Sandbox In Fintech Innovation*, FINEXTRA (Sep. 10, 2018), <https://www.finextra.com/blogposting/15759/the-role-of-regulatory-sandboxes-in-fintech-innovation>.

¹⁰⁵² *FT Lab*, DFSA, <https://www.dfsa.dk/Supervision/Fintech/FT-lab> (last visited June 2, 2021).

¹⁰⁵³ *Regulatory Sandbox*, MNB, <https://www.mnb.hu/en/innovation-hub/regulatory-sandbox> (last visited June 2, 2021).

¹⁰⁵⁴ *Regulatory Sandbox*, LIETUVOS BANKAS, <https://www.lb.lt/en/regulatory-sandbox> (last visited June 2, 2021).

¹⁰⁵⁵ *Innovation Sandbox*, FINANŠU UN KAPITĀLA TIRGUS KOMISIJA, <https://www.fktk.lv/en/licensing/innovation-and-fintech/innovation-sandbox/> (last visited June 2, 2021).

¹⁰⁵⁶ *Regulatory Sandbox*, AFM, <https://www.afm.nl/en/professionals/onderwerpen/innovationhub-maatwerk> (last visited June 2, 2021).

¹⁰⁵⁷ *FinTech Regulatory Sandbox*, MFSA, <https://www.mfsa.mt/fintech/regulatory-sandbox/> (last visited June 2, 2021).

¹⁰⁵⁸ *Bank of Greece Regulatory Sandbox launch event*, EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT (June 2, 2021), <https://www.ebrd.com/news/events/bank-of-greece-regulatory-sandbox-launch-event.html>.

¹⁰⁵⁹ *FMA Sandbox*, FMA, <https://www.fma.gv.at/en/fintech-point-of-contact-sandbox/fma-sandbox/> (last visited June 2, 2021).

¹⁰⁶⁰ RADOSTINA PARENTI, REGULATORY SANDBOXES AND INNOVATION HUBS FOR FINTECH: IMPACT ON INNOVATION, FINANCIAL STABILITY AND SUPERVISORY CONVERGENCE 21 (2020), [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652752/IPOL_STU\(20](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652752/IPOL_STU(20)

Member States such as Estonia, Spain, Italy and Poland are also around the corner as of the time of writing.¹⁰⁶¹ Bulgaria and Slovakia were reported to be planning to establish their sandboxes for FinTech also.¹⁰⁶² However, a FinTech regulatory sandbox at the EU level does not exist at this time.¹⁰⁶³

On the other side of the Atlantic Ocean, in the US, the first statewide sandbox could be found in Arizona since 2018.¹⁰⁶⁴ Wyoming and Utah also established their statewide sandboxes in 2019.¹⁰⁶⁵ At the federal level, a bill was proposed in 2016 to build a federal-level sandbox. Nevertheless, the progress was said to be at a standstill since then.¹⁰⁶⁶ In September 2019, one of the federal-level financial regulators, the CFPB (Consumer Financial Protection Bureau, the “CFPB”), created its sandbox to help clarify compliance issues.¹⁰⁶⁷ However, this sandbox seems to function only within the area of consumer financial law.¹⁰⁶⁸ Issues about other regulations beyond the CFPB’s missions may not be dealt with.¹⁰⁶⁹

In Asia, FinTech sandboxes were introduced in, for instance, Hong

20)652752_EN.pdf.

¹⁰⁶¹ *Id.* at 21.

¹⁰⁶² *Id.*

¹⁰⁶³ See Wolf-Georg Ringe & Christopher Ruof, *Regulating Fintech in the EU: The Case for a Guided Sandbox*, 11 EUR. J. RISK REGUL. 604, 620-21 (2020).

¹⁰⁶⁴ *Things to know about Arizona’s FinTech Sandbox*, GREATER PHOENIX ECONOMIC COUNCIL (Apr. 8, 2021), <https://www.gpec.org/blog/things-to-know-about-arizonas-fintech-sandbox/>.

¹⁰⁶⁵ Allen S. Li, *Utah Passes the Third State-Run “Sandbox” for Innovative Financial Products and Services*, NATIONAL LAW REVIEW (Aug. 1, 2019), <https://www.natlawreview.com/article/utah-passes-third-state-run-sandbox-innovative-financial-products-and-services>.

¹⁰⁶⁶ Luke G. Thomas, *The Case for a Federal Regulatory Sandbox for Fintech Companies*, 22 N.C. BANKING INST. 257, 268 (2018).

¹⁰⁶⁷ Eamonn K. Moran, *CFPB Revises Trial Disclosure Policy and Issues Compliance Assistance Sandbox Policy*, MORGAN LEWIS (Oct. 2, 2019), <https://www.morganlewis.com/blogs/finreg/2019/10/cfpb-revises-trial-disclosure-policy-and-issues-compliance-assistance-sandbox-policy>.

¹⁰⁶⁸ BUREAU OF CONSUMER FINANCIAL PROTECTION, POLICY ON THE COMPLIANCE ASSISTANCE SANDBOX 3-4 (Sep. 10, 2019), https://files.consumerfinance.gov/f/documents/cfpb_final-policy-on-cas.pdf.

¹⁰⁶⁹ See Matthew J. Razzano, *An Unsafe Sandbox: Fintech Innovation at the Expense of Consumer Protection?*, 2019 U. ILL. L. REV. ONLINE 132, 139 (2019).

Kong,¹⁰⁷⁰ Singapore,¹⁰⁷¹ Taiwan,¹⁰⁷² Japan¹⁰⁷³, Thailand,¹⁰⁷⁴ Malaysia¹⁰⁷⁵ and South Korea.¹⁰⁷⁶ In China, sandbox trials could be found in 9 cities.¹⁰⁷⁷

2.1.2 Pattern of Establishing Sandboxes

As mentioned before, the UK pioneered this trend by launching a sandbox in 2016. The question of where the other sandboxes are was also answered. This Section studies the pattern of establishing sandboxes in the world. According to the World Bank, sandboxes have been established in jurisdictions by following the UK (particularly around 2018).¹⁰⁷⁸ The

¹⁰⁷⁰ *Fintech Supervisory Sandbox (FSS)*, HONG KONG MONETARY AUTHORITY, <https://www.hkma.gov.hk/eng/key-functions/international-financial-centre/fintech/fintech-supervisory-sandbox-fss/> (last visited June 2, 2021).

¹⁰⁷¹ *Sandbox*, MONETARY AUTHORITY OF SINGAPORE, <https://www.mas.gov.sg/development/fintech/sandbox> (last visited June 2, 2021).

¹⁰⁷² Jin Rong Ke Ji Fa Zhan Yu Chuang Xin Shi Yan Tiao Li (金融科技發展與創新實驗條例) [Financial Technology Development and Innovative Experimentation Act], art. 1 (hereinafter “FinTech Sandbox Act”).

¹⁰⁷³ Naoki Kanehisa, *New Initiatives of the Japanese Financial Services Agency in 2020*, IFLR1000 (Dec. 10, 2019), <https://www.iflr1000.com/NewsAndAnalysis/New-Initiatives-of-the-Japanese-Financial-Services-Agency-in-2020/Index/10064>.

¹⁰⁷⁴ BAKER MCKENZIE, INTERNATIONAL GUIDE TO REGULATORY FINTECH SANDBOXES 28 (2018), https://www.bakermckenzie.com/en/-/media/files/insight/publications/2018/12/guide_intlguideregulatorysandboxes_dec2018.pdf.

¹⁰⁷⁵ *Financial Technology Regulatory Sandbox Framework*, BANK NEGARA MALAYSIA (Oct. 18, 2016), <https://www.bnm.gov.my/-/financial-technology-regulatory-sandbox-framework>.

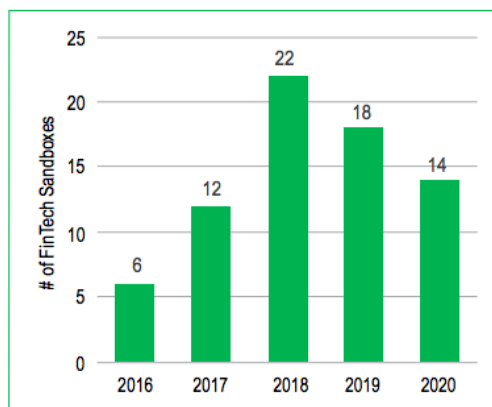
¹⁰⁷⁶ *Overview*, SANDBOX KOREA, <https://sandbox.fintech.or.kr/financial/overview.do?lang=en> (last visited Aug. 19, 2021).

¹⁰⁷⁷ Steve Kaaru, *China Adds 9th City to FinTech Regulatory Sandbox*, COINGEEK (July 25, 2020), <https://coingeek.com/china-adds-9th-city-to-fintech-regulatory-sandbox/>.

¹⁰⁷⁸ WORLD BANK GROUP, *supra* note 1037, at 6-7.

following figure shows this pattern.

Figure 6: The Establishment of Sandboxes in the World Since 2016



Source: WORLD BANK GROUP, *supra* note 1037, at 7.

It could be observed from the above that, after the launch of the UK’s sandbox, the sandbox regime has spread and been adopted in other jurisdictions. Conceptually speaking, scholars argue that this diffusion reflects (1) the market demand of a regulatory approach helping FinTech access the market and (2) the regulatory competition between jurisdictions.¹⁰⁷⁹ It is because, as I will explain further in Sections 2.2 and 5, a sandbox could encourage FinTech innovation and competition, facilitating market entry, and stakeholders often require a sandbox. Besides, governments often deem a sandbox to be a “legal marketing” tool in the era of FinTech.¹⁰⁸⁰ That is, having a sandbox could show that this jurisdiction is embracing FinTech, thereby attracting FinTech companies to operate there

¹⁰⁷⁹ Chang-Hsien Tsai, Ching-Fu Lin & Han-Wei Liu, *The Diffusion of the Sandbox Approach to Disruptive Innovation and Its Limitations*, 53 CORNELL INT’L L.J. 261, 267-68 (2020).

¹⁰⁸⁰ See Borgogno & Colangelo, *supra* note 1041, at 13-14, 16-17.

and competing with other jurisdictions.¹⁰⁸¹

2.2 Goals and Benefits

2.2.1 Enabling Regulators to Better Understand FinTech and Reconsider Regulatory Responses

This Section explains the goals and benefits of sandboxes. Firstly, a sandbox enables regulators to better understand FinTech by closely collaborating with the industry and actually testing the FinTech products or services.¹⁰⁸² For instance, by truly running the business during the experiment, regulator's understanding of FinTech's business models and risks will be facilitated.¹⁰⁸³ Testers provide information about, for example, their business models and the experiment status to the regulator, improving the regulator's understanding of FinTech.¹⁰⁸⁴ Commentators pointed out that a sandbox accordingly gives the regulator a chance to reconsider the relevant regulations to see if any regulatory changes are necessary in the future.¹⁰⁸⁵

2.2.2 Helping Testers Clarify Compliance Issues

Secondly, a sandbox helps testers to clarify the compliance issues about their FinTech products or services.¹⁰⁸⁶ For instance, during the experiment, the regulator provides tailored guidance to the testers about how the current regulations might be interpreted.¹⁰⁸⁷ While the costs of seeking legal advice

¹⁰⁸¹ *Id.* at 14; Tsai et al., *supra* note 1079, at 267-68, 278.

¹⁰⁸² Douglas W. Arner, János Barberis & Ross P. Buckley, *FinTech, RegTech, and the Reconceptualization of Financial Regulation*, 37 *NW. J. INT'L L. & BUS.* 371, 381 (2017).

¹⁰⁸³ PARENTI, *supra* note 1060, at 14.

¹⁰⁸⁴ *See id.* at 17-18.

¹⁰⁸⁵ BAKER MCKENZIE, *supra* note 1074, at 26.

¹⁰⁸⁶ *See The Role of Regulatory Sandbox In Fintech Innovation, supra* note 1051.

¹⁰⁸⁷ Hilary J. Allen, *Experimental Strategies for Regulating Fintech*, 3 *J.L. INNOVATION* 1, 20 (2020).

are high,¹⁰⁸⁸ a sandbox would possibly reduce such costs as the testers could gain the legal guidance systematically.

2.2.3 Exempting Testers from Certain Regulations

Thirdly, a sandbox also brings benefits that the testers are temporarily exempted from certain regulations during the experiment. For instance, in Taiwan, regulatory obligations such as the licensing requirements and the accompanied criminal liabilities that would be applied otherwise are accordingly relaxed.¹⁰⁸⁹ It means that the testers could test their products or services in the real market without the need to obtain a license. In the UK, such rules are in the form of “restricted authorization”, which allows firms to test without bearing the full costs of applying for full authorization.¹⁰⁹⁰

2.2.4 Encouraging Financial Innovation and Competition; Facilitating Market Entry

Fourthly, a sandbox aims to encourage financial innovation and competition by facilitating market entry. For example, as stated by the UK’s financial regulator FCA, its sandbox seeks to help firms that will deliver the innovation that promotes competition to the UK market.¹⁰⁹¹ Specifically, UK’s sandbox helps firms by providing, among others, “reduced time-to-market at potentially lower cost” and “better access to finance”.¹⁰⁹² According to commentators from the World Bank, a sandbox aims to facilitate market entry for firms, fostering competition.¹⁰⁹³ It is because, as

¹⁰⁸⁸ Nuno Garoupa & Andrew P. Morriss, *The Fable of the Codes: The Efficiency of the Common Law, Legal Origins, and Codification Movements*, 2012 U. ILL. L. REV. 1443, 1476 (2012).

¹⁰⁸⁹ FinTech Sandbox Act, *supra* note 1072, art. 8, para. 4, subpara. 4; art. 11; art. 26.

¹⁰⁹⁰ *E.g.*, *Regulatory sandbox*, *supra* note 1109; Allen, *supra* note 1037, at 596.

¹⁰⁹¹ *Applying to the regulatory sandbox*, *supra* note 1050.

¹⁰⁹² *Regulatory sandbox*, *supra* note 1109.

¹⁰⁹³ Sharmista Appaya & Mahjabeen Haji, *Four years and counting: What we’ve learned from regulatory sandboxes*, WORLD BANK BLOGS (Nov. 18, 2020),

mentioned above, a sandbox helps the testers to clarify compliance issues to enter the market, reducing the costs of looking for legal advice. It is also because a limited licensing regime with lighter regulatory requirements might be established after the sandbox through amending regulations. As I will show in Section 4 through real cases, those amendments might alleviate the regulatory barriers to market entry that the testers have faced.

Taiwan's sandbox also seeks to realize the above goals and benefits while ensuring financial consumer protection.¹⁰⁹⁴ In Section 3, the content of Taiwan's sandbox will be studied as an example by describing its components to see how these goals and benefits may be achieved and realized through the operation of this sandbox.

2.3 Summary

This Section first studied the status and the pattern of establishing sandboxes for FinTech around the globe. This Section found that sandboxes already exist in different jurisdictions, while sandboxes are around the corner in some other jurisdictions. The establishment of these sandboxes, however, followed a diffusion pattern. That is, sandboxes have been established in jurisdictions by following the UK, which pioneered the establishment of sandboxes as the UK launched its sandbox in 2016.¹⁰⁹⁵ Besides, the establishment of sandboxes by following the UK mirrors a diffusion. This diffusion reflects (1) the market demand from stakeholders of a regulatory approach helping FinTech to access the market and (2) the regulatory competition between jurisdictions.¹⁰⁹⁶

<https://blogs.worldbank.org/psd/four-years-and-counting-what-weve-learned-regulatory-sandboxes>.

¹⁰⁹⁴ FinTech Sandbox Act, *supra* note 1072, art. 1.

¹⁰⁹⁵ See WORLD BANK GROUP, *supra* note 1037, at 6-7; Allen, *supra* note 1037, at 596; LATHAM & WATKINS, *supra* note 1048, at 1.

¹⁰⁹⁶ See Tsai et al., *supra* note 1079, at 267-68.

This Section then studied the general goals and benefits of sandboxes. First, a sandbox enables regulators to better understand FinTech and to reconsider regulatory responses as testers would systematically provide information about FinTech. Second, a sandbox helps testers clarify compliance issues, lowering the costs of seeking legal advice. Third, a sandbox exempts the testers during the experiment from certain regulatory requirements especially licensing requirements. Fourth, a sandbox encourages financial innovation and competition by facilitating market entry. For instance, regulatory amendments may follow after the experiment, introducing lighter regulations.

3. Taiwan's FinTech Regulatory Sandbox as An Example

This Section studies Taiwan's FinTech regulatory sandbox as an example. This Section will show how the goals and benefits described above are achieved through actually running a sandbox. Section 3.1 describes the background of Taiwan's sandbox. Section 3.2 studies the operation and impacts of Taiwan's sandbox. Section 3.3 summarizes.

3.1 Background – An Evolutionary Perspective

In this Section, the background of Taiwan's sandbox will be explained from a more evolutionary perspective. As studied in previous chapters, the pacing and complexity issues characterize the difficulties regulating FinTech. In this situation, a regulatory approach with an experimental nature has been deemed by scholars to be an appropriate solution.¹⁰⁹⁷ FinTech regulatory sandboxes epitomize this approach. Accordingly, sandboxes have been introduced in various jurisdictions as described in Section 2.1.

Against the above background, the Taiwanese financial regulator, the

¹⁰⁹⁷ See, e.g., Allen, *supra* note 1087, at 19.

FSC (Financial Supervisory Commission, the “FSC”), has also been emphasizing that encouraging FinTech is one of its focuses.¹⁰⁹⁸ Therefore, the “Financial Technology Development and Innovative Experimentation Act” (hereinafter “Taiwan’s FinTech Sandbox Act”) was in effect since April 30, 2018.¹⁰⁹⁹ It is noteworthy that Taiwan’s sandbox was established through new legislation (i.e., Taiwan’s FinTech Sandbox Act). By contrast, the sandbox in the UK was introduced based on existing laws and regulator’s supervisory powers without legislating new laws.¹¹⁰⁰ The sandbox was also established in several European countries such as the Netherlands without requiring legal changes,¹¹⁰¹ while they are also civil law system countries like Taiwan.

In addition, Taiwan’s sandbox seems to be unique in the sense that the testing period is comparatively longer. According to the World Bank, the most common length of sandboxes globally is 1-year as shown in the following figure.¹¹⁰² This period is with the possibility of extension, but this extension is said to be usually short according to a report authored by a research officer at the European Parliament.¹¹⁰³ Taiwan’s sandbox, however, is also basically for 1-year but can be for 3 years at the most.¹¹⁰⁴ As

¹⁰⁹⁸ See, e.g., *The FSC released FinTech Development Strategy White Paper*, FINANCIAL SUPERVISORY COMMISSION (June 23, 2016), https://www.fsc.gov.tw/en/home.jsp?id=74&parentpath=0,2&mcustomize=multimes_sage_view.jsp&dataserno=201608240002&aplistdn=ou=bulletin,ou=multisite,ou=english,ou=ap_root,o=fsc,c=tw&dtable=Bulletin.

¹⁰⁹⁹ Ken-Ying Tseng, *Major Changes Taiwan Financial Services – Sandbox Experiments, Token Offerings and Internet Banks*, THE IN-HOUSE LAWYER (Oct. 15, 2019), <http://www.inhouselawyer.co.uk/legal-briefing/major-changes-to-taiwan-financial-services-sandbox-experiments-token-offerings-and-internet-banks/>.

¹¹⁰⁰ E.g., Allen, *supra* note 1037, at 593.

¹¹⁰¹ EUROPEAN SECURITIES AND MARKETS AUTHORITY, EUROPEAN BANKING AUTHORITY & EUROPEAN INSURANCE AND OCCUPATIONAL PENSIONS AUTHORITY, REPORT – FINTECH: REGULATORY SANDBOXES AND INNOVATION HUBS 20 (2018), https://www.esma.europa.eu/sites/default/files/library/jc_2018_74_joint_report_on_regulatory_sandboxes_and_innovation_hubs.pdf.

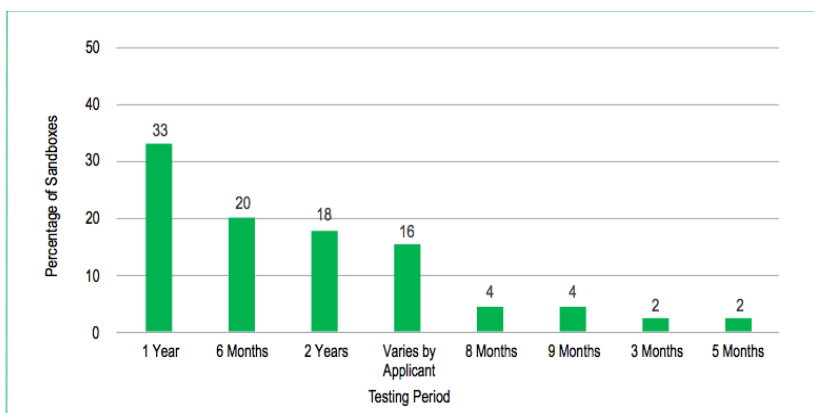
¹¹⁰² WORLD BANK GROUP, *supra* note 1037, at 22.

¹¹⁰³ PARENTI, *supra* note 1060, at 36.

¹¹⁰⁴ FinTech Sandbox Act, *supra* note 1072, art. 9, para. 1.

described in more detail later,¹¹⁰⁵ such a longer length was expected to effectively bring regulatory changes adapting to the evolving FinTech after the sandbox as it is one of the goals of a sandbox.¹¹⁰⁶ However, does Taiwan’s sandbox effectively achieve the goals? If not, what are the lessons learnt? I will analyze these issues in Section 5.

Figure 7: Length of Sandboxes Investigated by the World Bank



Source: WORLD BANK GROUP, *supra* note 1037, at 22.

3.2 Operation

3.2.1 Before the Experiment – Application and Evaluation

Before the experiment, both companies or individuals in Taiwan are eligible to apply to enter the sandbox, and the applications would be evaluated. This Section describes the application and evaluation.

In Taiwan, individuals or companies conducting the financial

¹¹⁰⁵ See *infra* Sections 3.2.2 and 5.1.1.4.

¹¹⁰⁶ See *infra* Section 3.2.3.

businesses that require the regulator’s permission or approval and are based on technological innovation or innovative business models could apply.¹¹⁰⁷ Thus, Taiwan’s sandbox is open to only the FinTech services or products that need authorization but are currently unauthorized. By contrast, as pointed out by the World Bank, other sandboxes in the world seem to be more widely open as they are open to both regulated and unregulated FinTech.¹¹⁰⁸ For instance, UK’s sandbox “is for authorized firms, unauthorized firms that require authorization, and technology businesses that are looking to deliver innovation in the UK financial services market.”¹¹⁰⁹

The applicants in Taiwan are required to submit documents providing and explaining (1) the applicant’s basic information, (2) the extent of the innovation, (3) the scope of the experiment’s influence, and (4) the plan about risk control.¹¹¹⁰ However, an application involving a business similar to one that was already tested will not be approved.¹¹¹¹ The reason given by the FSC is that if there is already a similar or identical one which was tested before, the one coming later could not be deemed “innovative” to enter the sandbox.¹¹¹² By contrast, a negative indicator regarding the “innovation” in

¹¹⁰⁷ FinTech Sandbox Act, *supra* note 1072, art. 3 and art. 4.

¹¹⁰⁸ See WORLD BANK GROUP, *supra* note 1037, at 2.

¹¹⁰⁹ *Regulatory sandbox*, FCA, <https://www.fca.org.uk/firms/innovation/regulatory-sandbox> (last visited Sep. 22, 2021).

¹¹¹⁰ *Id.* art. 4; Xiao-Han Wu (吳筱涵) & Chen-Hao Ko (柯晨皓), *Qu Kuai Lian Yu Xu Ni Huo Bi Fa Lü Zhuan Ti (Wu)* (區塊鏈與虛擬貨幣法律專題 (五)) [*Special Topic 5: Blockchain and Virtual Currency and the Laws*], ZHONG YIN LÜ SHI SHI WU SUO (中銀律師事務所) [ZHONG YIN LAW FIRM], (Apr. 10, 2018), <https://zhongyinlawyer.com.tw/%E5%8D%80%E5%A1%8A%E9%8F%88%E8%88%87%E8%99%9B%E6%93%AC%E8%B2%A8%E5%B9%A3%E6%B3%95%E5%BE%8B%E5%B0%88%E9%A1%8C%E4%BA%94/>.

¹¹¹¹ 「JIN RONG KE JI CHUANG XIN SHI YAN FA GUI」 WEN DA JI (「金融科技創新實驗法規」問答集) [THE FINTECH SANDBOX ACT Q&A] 3, <https://www.fsc.gov.tw/uploaddownloadoc?file=news/201804261659470.pdf&filedisplay=%E6%96%B0%E8%81%9E%E7%A8%BF%E9%99%84%E4%BB%B6-%E9%87%91%E8%9E%8D%E7%A7%91%E6%8A%80%E5%89%B5%E6%96%B0%E5%AF%A6%E9%A9%97%E6%B3%95%E8%A6%8F%E5%95%8F%E7%AD%94%E9%9B%86.pdf&flag=d> (last visited June 8, 2021) [hereinafter THE FINTECH SANDBOX ACT Q&A].

¹¹¹² *Id.*

UK's sandbox is that there are already “numerous” examples of similar FinTech in markets.¹¹¹³ If there are only a “few” comparable FinTech products or services in markets, the one applying later could still apply to enter UK's sandbox.¹¹¹⁴

After the application, an evaluation will begin. The evaluation may take up to 60 days.¹¹¹⁵ Not only the FSC but also experts, scholars, and representatives of the relevant government agencies would participate in the evaluation.¹¹¹⁶ If the experimentation plan is approved, the FSC may make changes with respect to the experimentation plan or the applicant's obligations.¹¹¹⁷

3.2.2 During the Experiment – Length, Benefits and Obligations

A sandbox experiment is principally 1-year in Taiwan.¹¹¹⁸ If amendments to legislation are involved, the whole experiment could be extended to 3 years at most.¹¹¹⁹ The FSC closely collaborates with the testers during the experiments by, for instance, giving individual guidance.¹¹²⁰ The testers are also obliged to provide information about the experiment status to the FSC.¹¹²¹ This provision of information helps the FSC understand better the tested FinTech and enables the FSC to reconsider the necessity of regulatory amendments after the experiment.¹¹²²

¹¹¹³ *Applying to the regulatory sandbox*, FCA, *supra* note 1050.

¹¹¹⁴ *Id.*

¹¹¹⁵ FinTech Sandbox Act, *supra* note 1072, art. 8, para. 1.

¹¹¹⁶ *Id.* art. 6.

¹¹¹⁷ According to the FinTech Sandbox Act, the competent authority, namely the FSC, can (1) adjust or revise the experimentation plan, (2) limit participants, (3) add other requirements or obligations, and (4) exempt the experimentation from specific regulations or laws. FinTech Sandbox Act, *supra* note 1072, art. 8, para. 4.

¹¹¹⁸ *Id.* art. 9, para. 1.

¹¹¹⁹ *Id.*

¹¹²⁰ *See supra* Section 2.2.2.

¹¹²¹ FinTech Sandbox Act, *supra* note 1072, art. 14, para. 1.

¹¹²² *See supra* Section 2.2.1.

As explained before, testing parties are exempted during the experiment from certain regulations such as certain licensing requirements.¹¹²³ In Taiwan, for instance, these licensing exemptions apply if the testers conduct a certain type of business including, but not limited to,¹¹²⁴ accepting deposits,¹¹²⁵ electronic payment services,¹¹²⁶ issuing electronic stored value cards,¹¹²⁷ trust businesses,¹¹²⁸ or securities businesses.¹¹²⁹ If the experiment involves other regulations, orders or administrative rules set forth by other government agencies, exemptions from them need to be based on these government agencies' agreement.¹¹³⁰ In other words, with respect to the sandbox arrangements during the experiment made by the regulator such as the exemptions, the regulator has most room in terms of its own regulations.¹¹³¹ There will be less room if the

¹¹²³ See *supra* Section 2.2.3.

¹¹²⁴ FinTech Sandbox Act, *supra* note 1072, art. 26. However, the liability associated with fraudulence is not waived. Wu & Ko, *supra* note 1110.

¹¹²⁵ According to Taiwan's Banking Act, only banks are allowed to "accept deposits, manage trust funds or public property under mandate or handle domestic or foreign remittances." Ying Hang Fa (銀行法) [The Banking Act of The Republic of China], art. 29, para. 1.

¹¹²⁶ The examples of the electronic payment services are accepting deposits of funds as stored value funds or transferring funds between e-payment accounts. According to Taiwan's "Act Governing Electronic Payment Institutions", firms conducting such businesses should be approved as "electronic payment institutions". Dian Zi Zhi Fu Ji Gou Guan Li Tiao Li (電子支付機構管理條例) [Act Governing Electronic Payment Institutions], art. 3, para. 1.

¹¹²⁷ According to Taiwan's "Act Governing Issuance of Electronic Stored Value Cards", electronic stored value card issuers are the approved companies issuing the instruments such as IC chips, cards, certificates applying electronic, magnetic or optical means to store monetary value for payment purposes. Dian Zi Piao Zheng Fa Xing Guan Li Tiao Li (電子票證發行管理條例) [Act Governing Issuance of Electronic Stored Value Cards], art. 3, para. 1, subpara. 1 & subpara. 2.

¹¹²⁸ According to Taiwan's "Trust Enterprise Act", non-trust enterprises are not allowed to conduct trust businesses based on non-specified investors. Xin Tuo Ye Fa (信託業法) [Trust Enterprise Act], art. 33, para. 1.

¹¹²⁹ According to Taiwan's "Securities and Exchange Act", firms conducting securities businesses in the regulatory sandbox do not have to be approved to be securities firms or securities finance enterprises. Zheng Quan Jiao Yi Fa (證券交易法) [Securities and Exchange Act], art. 44-1.

¹¹³⁰ FinTech Sandbox Act, *supra* note 1072, art. 25, para. 1.

¹¹³¹ DNB & AFM, MORE ROOM FOR INNOVATION IN THE FINANCIAL SECTOR – MARKET ACCESS, AUTHORISATIONS AND SUPERVISION: NEXT STEPS AFM-DNB 6 (Dec. 2016), https://www.afm.nl/~/_profimedia/files/onderwerpen/innovation-hub/publicaties/2016/room-for-innovation-in-financial-sector.pdf?la=en.

regulations set forth by other government agencies are involved.

Regardless of the benefits above, in Taiwan, the testers still bear the liability for damages to consumers, and such liability cannot be limited or waived by prior agreement between the testing party and the participants.¹¹³² Such rules apply in Taiwan regardless of the possibility that the testing party's liability may be waived in theory.¹¹³³

3.2.3 After the Experiment – Outcome and Impacts

If the experiment is deemed materially adverse to the market or the interests of participants or violates the aforementioned additional requirements or obligations, the experiment may be revoked.¹¹³⁴ However, if the experiment successfully terminates, three actions might be taken by the FSC afterwards. First, amendments to the relevant financial regulations may follow.¹¹³⁵ As I will show in Section 4.1 through real cases, those amendments may remove the regulatory barriers to market entry that the testers have faced before the experiments. Specifically, Sections 4.1.1 and 4.1.2 will respectively show that the regulatory changes or amendments were made by either the regulator or the legislative branch. Second, the FSC may aid or collaborate with the testers to start their businesses.¹¹³⁶ Third, the FSC may refer the testers to other government agencies, organizations or funds which can provide business startup assistance.¹¹³⁷

The first possible action that would be taken has been mainly

¹¹³² FinTech Sandbox Act, *supra* note 1072, art. 20, para. 1; art. 23, para. 2.

¹¹³³ See Matthew J. Razzano, *An Unsafe Sandbox: FinTech Innovation at the Expense of Consumer Protection?*, 2019 U. ILL. L. REV. ONLINE 132, 133 (2019).

¹¹³⁴ FinTech Sandbox Act, *supra* note 1072, art. 15, para. 1.

¹¹³⁵ *Id.* art. 17, para. 2.

¹¹³⁶ *Id.* art. 17, para. 1.

¹¹³⁷ *Id.*

emphasized and studied in literature.¹¹³⁸ In the following section, more details about this action will be given. In particular, what are the scope and limitation of the possible regulatory amendments after exiting the sandbox? In other words, are these amendments limited to only the regulations that regulators could influence? In Taiwan, such amendments are not limited to the regulations that the regulator, namely the FSC, according to the laws could impact. These amendments may also be related to legislation based on the legislative body's approval.¹¹³⁹ That is, if the FSC decides after the experiment that some relevant financial regulations should be amended, it could submit an amendment draft to the Executive Yuan (the executive branch of Taiwan) for review.¹¹⁴⁰ If the draft is agreed by the Executive Yuan, the draft would, if it is necessary, be sent to the Legislative Yuan (the legislative branch of Taiwan) for deliberation and approval.¹¹⁴¹ In addition, in Taiwan, such amendments may apply not only to the testers but also to the entire industry or business.¹¹⁴² A successful case that will be studied in Section 4.1.2 shows that the amendments may be related to legislation.

3.3 Summary

This Section studied the background, operation and impacts of

¹¹³⁸ See, e.g., Allen, *supra* note 1037, at 643; BAKER MCKENZIE, *supra* note 1074, at 26.

¹¹³⁹ See Jin-Lung Peng (彭金隆) & Cheng-Yun Tsang (臧正運), *Wo Guo Jin Rong Ke Ji Chuang Xin Shi Yan Ji Zhi Zhi Jian Shi Yu Gou Jian* (我國金融科技創新實驗機制之檢視與構建) [*Examination and Establishment of Taiwan's FinTech Innovation Experimentation Mechanisms*], FTFC (國立政治大學商學院金融科技研究中心), <http://www.ftfc.nccu.edu.tw/wordpresseng/?p=3536> (last visited Aug. 20, 2021).

¹¹⁴⁰ FinTech Sandbox Act, *supra* note 1072, art. 17, para. 2.

¹¹⁴¹ Regarding the details of the legislative procedure in Taiwan, see *Legislative Procedure, Legislative Yuan, REPUBLIC OF CHINA (TAIWAN)*, <https://www.ly.gov.tw/EngPages/Detail.aspx?nodeid=335&pid=43232> (last visited Aug. 20, 2021).

¹¹⁴² See Jia-Yun Ji (紀佳妘), *Xin Yong Xiao Bai Yong Shou Ji Hao Ma Ban Dai Kuan! 8 Yue Di Suo You Yin Hang Ke Wang Kai Ban* (信用小白用手機號碼辦貸款! 8月底所有銀行可望開辦) [*People Without Credit Scores Could Apply For Loans Through Mobile Phone Numbers! It Is Expected to Come in All the Banks Before the End of August.*], ETODAY (Aug. 6, 2020), <https://finance.ettoday.net/news/1778932>.

Taiwan's sandbox as an example, showing how the goals and benefits illustrated in Section 2.2 are achieved. This Section firstly described the background of Taiwan's sandbox. Taiwan's sandbox was established in 2018 following the diffusion of the sandbox regime in the world since 2016. This Section then studied the operation and impacts of Taiwan's sandbox. In Taiwan, experiments follow the application and evaluation stages. An experiment in Taiwan's sandbox is basically 1-year but may be 3-years at most. This Section found that this is comparatively long in comparison with the sandboxes in other countries. During an experiment, the FSC closely collaborates with the testers by, for instance, giving individual legal guidance. The testers are also obliged to provide information about the experiment status to the FSC. The FSC could thus be more familiar with the tested FinTech, thereby reconsidering the regulatory responses in the future. Testers are exempted from certain licensing requirements but still bear the liability for damages to consumers. After an experiment, amendments to the relevant financial regulations may follow. In Taiwan, these amendments are related not only to the regulations that the FSC is conferred by laws to influence but also to legislation. These amended regulations will apply to all the firms doing the same business. A successful case that will be studied in Section 4.1.2 particularly shows that the amendments may be related to legislation.

4. Some Cases of the FinTech Sandbox Experiments in Taiwan

This Section studies several cases of the sandbox experiments in Taiwan. Since Taiwan's sandbox has been in operation since 2018, there have been 9 applications that were approved as of June 2021.¹¹⁴³ Section 4.1

¹¹⁴³ Zi-Jie Lin (林資傑), 《*Jin Rong*》*Sha He Shi Yan 3 Nian 9 An Huo Zhun Jin Nian 2 An Jiang Luo Di* (《金融》沙盒實驗3年9案獲准 今年2案將落地) [*Finance*》9 Applications Were Approved in the Three Years that the Sandbox Has Been Implemented. 2 Cases Are Expected to Exiting the Sandbox this Year.], ZHONG SHI XIN WEN WANG (中時新聞網) [CHINA TIMES] (May 10, 2021), <https://www.chinatimes.com/realtimenews/20210510001537-260410?chdtv>.

shows successful cases. There are 2 cases in Taiwan that caused amendments to regulations. Section 4.2 presents an “unsuccessful” case. This section shows that entering the sandbox may sometimes be difficult, thereby not realizing the goals and benefits of the sandbox. Section 4.3 summarizes.

4.1 Successful Cases

4.1.1 Case 1: Funds Exchange

4.1.1.1 Applicant and Experimented Business

The first successful case is an experiment on funds exchange. The applicant, which is a FinTech startup “How-Investech”, established a platform “FundSwap”, on which funds owners could exchange their funds.¹¹⁴⁴ This business model changes the old way in which fund owners could transfer their funds into only the ones that are also issued by the same company.¹¹⁴⁵ On the FundSwap, however, two fund owners having the funds issued by different companies could directly swap.¹¹⁴⁶ This exchange thus does not need to be done through the original fund issuing company but only the platform.¹¹⁴⁷ The advantages of such exchanges are that the process is more timesaving and that lower transaction fees will be incurred, thereby lowering transaction costs.¹¹⁴⁸

¹¹⁴⁴ Zhi-Hao Yu (余至浩), *Guo Nei Jin Rong Jian Li Sha He Shou Chuang De Ji Jin Jiao Huan Ping Tai 12 Yue Ji Jiang Shang Xian, Wei Yun Tuan Dui Hao Hao Tou Zi Jie Lu Geng Duo Ji Shu Yun Zuo Xi Jie* (國內金融監理沙盒首創的基金交換平臺 12 月即將上線，維運團隊好好投資揭露更多技術運作細節) [*The First Funds Exchange Platform in Taiwan's Regulatory Sandbox Is Operating Soon in December. The Operation Team of How Investech Reveals More Operational Details.*], ITHOME (Oct. 9, 2019), <https://www.ithome.com.tw/news/133522>.

¹¹⁴⁵ *Id.*

¹¹⁴⁶ *Id.*

¹¹⁴⁷ *Id.*

¹¹⁴⁸ *Id.*

4.1.1.2 Regulatory Exemptions

How-Investech applied to enter the sandbox and started on December 29, 2019 to test the business model. During the experiment, How-Investech collaborated with a bank, and this collaboration was actually preferred by the FSC.¹¹⁴⁹ There were some regulatory exemptions during the experiment, allowing How-Investech to test its business with real customers to clarify compliance issues. For instance, during the experiment, the regulations that only licensed financial institutions could engage in funds-related business, were temporarily relaxed.¹¹⁵⁰ How-Investech, which is a technology company rather than a bank or a securities broker, could accordingly operate its funds exchange business without obtaining a license.¹¹⁵¹

4.1.1.3 Outcome

The experiment was expected to last for 12 months, i.e., until December 28, 2020.¹¹⁵² However, it was extended for 6 months more.¹¹⁵³ On May 6, 2021, the FSC announced that some regulatory amendments were

¹¹⁴⁹ See Xiu-Zhen Liu (劉秀珍), *Zao Fan You Li — Zhi Ji Sha He Wu Ge An Zhi Chuang Xin Yu Tiao Zhan Ji Jin Jiao Huan Pian* (造反有理—直擊沙盒五個案之創新與挑戰 基金交換篇) [*Revolution Is Reasonable. Looking into the Five Cases of Sandbox About the Innovation and Challenges. The Case of Funds Exchange.*], UDN (Apr. 1, 2020), <https://money.udn.com/money/story/9740/4461709>.

¹¹⁵⁰ *Id.*

¹¹⁵¹ *Id.*

¹¹⁵² Jin Rong Ke Ji Fa Zhan Yu Chuang Xin Shi Yan Jie Lu Ge Shi (金融科技發展與創新實驗揭露格式) [The Sandbox Experiment Information Disclosure Form] 1, <https://www.fsc.gov.tw/uploaddowndoc?file=20160223020901/202001141412540.pdf&filedisplay=%E5%BC%B1%E4%B8%AD%E5%BF%83%E5%8C%96%E5%85%B1%E5%90%8C%E5%9F%BA%E9%87%91%E4%BA%A4%E6%98%93%E5%B9%B3%E5%8F%B0%E6%8F%AD%E9%9C%B2%E8%A1%A8%28New%29.pdf&flag=doc> (last visited June 30, 2021).

¹¹⁵³ Jin Rong Ke Ji Fa Zhan Yu Chuang Xin Shi Yan Jie Lu Ge Shi (金融科技發展與創新實驗揭露格式) [The Sandbox Experiment Information Disclosure Form] 1, <https://www.fsc.gov.tw/uploaddowndoc?file=20160223020901/202012141019270.pdf&filedisplay=%E5%A5%BD%E5%A5%BD%E6%8A%95%E8%B3%87%E7%A7%91%E6%8A%80%E8%82%A1%E4%BB%BD%E6%9C%89%E9%99%90%E5%85%AC%E5%8F%B8.pdf&flag=doc> (last visited June 30, 2021).

already made and in effect.¹¹⁵⁴ Specifically, the “Standards Governing the Establishment of Securities Firms” were amended by the FSC to introduce a type of securities brokers with a lower capital requirement, allowing them to conduct only funds exchange business.¹¹⁵⁵ These lighter regulations will apply to all the firms doing the same business.

Thus, this sandbox experiment provided the FSC with a chance to reconsider regulatory issues, thereby leading to regulatory changes that introduce lighter regulations. The explanations on the amendments revealed the reasons why these lighter regulations were introduced. It is because only a funds exchange business is involved and these companies are operating merely as platforms rather than as normal securities brokers.¹¹⁵⁶ It seems to imply that the FSC deemed this FinTech business to be less risky, and so opened the door for it.

In this case, such amendments were only to the regulations that the FSC has direct influence on because the FSC is granted these powers by law. That is, the FSC is conferred by Article 4, Paragraph 4 of the Securities and Exchange Act to prescribe and amend the aforementioned Standards Governing the Establishment of Securities Firms.¹¹⁵⁷ In the next case as I will show, amendments may be made through a legislative body.

¹¹⁵⁴ *Zui Xin Fa Ling Han Shi* (最新法令函釋) [*Explanations on New Regulations*], JIN RONG JIAN DU GUAN LI WEI YUAN HUI (金融監督管理委員會) [FINANCIAL SUPERVISORY COMMISSION] (May 6, 2021), https://www.fsc.gov.tw/ch/home.jsp?id=3&parentpath=0&mcustomize=lawnew_vie_w.jsp&dataserno=202105060001&dtable=NewsLaw.

¹¹⁵⁵ *Zheng Quan Shang She Zhi Biao Zhun* (證券商設置標準) [Standards Governing the Establishment of Securities Firms], art. 3, para. 1, subpara. 3.

¹¹⁵⁶ *Zheng Quan Shang She Zhi Biao Zhun Bu Fen Tiao Wen Xiu Zheng Zong Shuo Ming* (證券商設置標準部分條文修正總說明) [Explanations on Amendments of Standards Governing the Establishment of Securities Firms] [hereinafter *Amendments to the Securities Firms Establishment Regulation*], at 1.

¹¹⁵⁷ *Standards Governing the Establishment of Securities Firms*, *supra* note 1155, art. 1.

4.1.2 Case 2: Cross-border Remittance for Migrant Workers

4.1.2.1 Applicant and Experimented Business

The second successful case was in relation to a cross-border remittance business especially for migrant workers in Taiwan. In Taiwan, migrant workers from countries such as Indonesia, Vietnam, Philippines, and Thailand have faced difficulties sending the money they earn in Taiwan back to their home countries through banks.¹¹⁵⁸ It is because of, for instance, high transaction fees required by banks, linguistic constraints and the inconvenience in terms of time and location.¹¹⁵⁹ Therefore, two companies – Welldone and EMQ – provide online cross-border remittance services especially for these migrant workers through mobile apps in multiple languages.¹¹⁶⁰

4.1.2.2 Regulatory Exemptions

These two companies entered the sandbox in April 30, 2019, and the experiment was planned to last until April 29, 2020.¹¹⁶¹ It is worth mentioning that banks were also involved in this case. In case 1, the

¹¹⁵⁸ Yao-Lian Tsai (蔡曜蓮), *Liang Jia “Lao” Xin Chuang Yao Bang Yi Gong An Xin Hui Qian Hui Jia* (兩家「老」新創 要幫移工安心匯錢回家) [*Two “Old” Startups Are Helping Migrant Works Send Money Back Home.*], JIN ZHOU KAN (今周刊) [BUSINESS TODAY] (June 12, 2019), <https://www.businesstoday.com.tw/article/category/80393/post/201906120021/%E5%85%A9%E5%AE%B6%E3%80%8C%E8%80%81%E3%80%8D%E6%96%B0%E5%89%B5%20%20%E8%A6%81%E5%B9%AB%E7%A7%BB%E5%B7%A5%E5%AE%89%E5%BF%83%E5%8C%AF%E9%8C%A2%E5%9B%9E%E5%AE%B6>.

¹¹⁵⁹ *Id.*

¹¹⁶⁰ *Id.*

¹¹⁶¹ Jin Rong Ke Ji Fa Zhan Yu Chuang Xin Shi Yan Jie Lu Ge Shi (金融科技發展與創新實驗揭露格式) [The Sandbox Experiment Information Disclosure Form] 1, <https://www.fsc.gov.tw/uploaddowndoc?file=20160223020901/201907011629140.pdf&filedisplay=%E8%B7%A8%E5%A2%83%E5%8C%AF%E6%AC%BE%E5%89%B5%E6%96%B0%E5%AF%A6%E9%A9%97%E6%8F%AD%E9%9C%B2.pdf&flag=doc> (last visited June 14, 2021).

phenomenon that the FSC preferred FinTech firms to collaborate with banks was mentioned.¹¹⁶² Similarly, banks were also involved in the business model of the cross-border remittance business for migrant workers in this case.¹¹⁶³ I will particularly analyze this phenomenon in Section 5.

During the experiment, there were some regulatory exemptions. Specifically, Article 29 of the Banking Act holding that only banks, “unless otherwise provided by law”, are allowed to conduct cross-border remittance services was relaxed.¹¹⁶⁴ Welldone and EMQ, which are not banks, could accordingly test their services within the sandbox. However, anti-money laundering regulations still basically applied in this experiment. For instance, these two companies still needed to verify the identity of their customers pursuant to the KYC (know your customer, “KYC”) regulations.¹¹⁶⁵ In fact, according to the “Regulations Governing Anti-Money Laundering and Countering Terrorism Financing of Financial Technology Innovative Experimentation”, anti-money laundering regulations still basically applied during experiments in the sandbox.¹¹⁶⁶

¹¹⁶² See *supra* Section 4.1.1.2.

¹¹⁶³ See *infra* note 1214 and accompanying text.

¹¹⁶⁴ Fang-Wei Lin (林芳維), *Cong Cherrypay An Li Kan Kua Jing Hui Dui Zai Wo Guo Ji Wai Guo Li Fa Li Xiang Guan Fa Ling Fa Zhan* (從 Cherrypay 案例看跨境匯兌在我國及外國立法例相關法令發展) [*Study on the Regulatory Development of International Remittance in Taiwan and Other Countries from the Cherrypay Case*], LI CI (理慈) [LEE, TSAI & PARTNERS] (July 29, 2019), <https://www.leetsai.com/%E9%87%91%E8%9E%8D%E7%A7%91%E6%8A%80-%E6%96%B0%E5%89%B5%E6%B3%95%E5%BE%8B/%E5%BE%9Echerrypay%E6%A1%88%E4%BE%8B%E7%9C%8B%E8%B7%A8%E5%A2%83%E5%8C%AF%E5%85%8C%E5%9C%A8%E6%88%91%E5%9C%8B%E5%8F%8A%E5%A4%96%E5%9C%8B%E7%AB%8B%E6%B3%95%E4%>.

¹¹⁶⁵ Rui-Yao Dai (戴瑞瑤), *Wai Ji Yi Gong Kua Jing Hui Kuan Sha He Shi Yan Ni Jie Gui Dian Zhi Tiao Li 7 Yue Luo Di* (外籍移工跨境匯款沙盒實驗 擬接軌電支條例 7 月落地) [*Sandbox Experiment of Cross-border Remittance for Migrant Workers May End by Following the Act Governing Electronic Payment Institutions.*], LIAN HE XIN WEN WANG (聯合新聞網) [UDN] (Mar. 6, 2021), <https://udn.com/news/story/7239/5298505>.

¹¹⁶⁶ Jin Rong Ke Ji Chuang Xin Shi Yan Fang Zhi Xi Qian Ji Da Ji Zi Kong Ban Fa (金融科技創新實驗防制洗錢及打擊資恐辦法) [*Regulations Governing Anti-Money Laundering and Countering Terrorism Financing of Financial Technology Innovative Experimentation*], art. 1 (hereinafter “Regulation of Sandbox AML/CFT”).

4.1.2.3 Outcome

This experiment was extended until October 29, 2021.¹¹⁶⁷ The total length would thus be 2.5 years. However, before the experiment ended, some regulatory changes were made. In May 2020, it was reported that some regulations would be amended to establish a limited licensing regime.¹¹⁶⁸ On January 27, 2021, it was officially announced that some amendments to the “Act Governing Electronic Payment Institutions” were approved by the legislative branch and that these amendments would be in effect from July 1, 2021.¹¹⁶⁹ One of the amendments allows electronic payment institutions to conduct foreign remittances of small amounts.¹¹⁷⁰ Non-electronic payment institutions may also be allowed to do so with the approval of the competent authority, namely the FSC.¹¹⁷¹ Conferring by this law, the FSC established and announced on May 20, 2021 the regulation governing non-electronic payment institutions conducting small-amount cross-border remittances for migrant workers.¹¹⁷² This regulation establishes a limited licensing regime

¹¹⁶⁷ Jing-Yi Li (李靜宜), *Jin Guan Hui Jie Lu Dian Zhi Tiao Li Zi Fa 7 Da Zhong Dian, Ji Ming Shi Chu Zhi Ka You Wang Kua Jing Xiao Fei. Bi Zhao Yin Hang Shu Cun Zhang Hu Fen Lei Qiang Hua Shen Fen Yan Zheng Ji Zhi* (金管會揭露電支條例子法 7 大重點，記名式儲值卡有望跨境消費、比照銀行數存帳戶分類強化身分驗證機制) [*The FSC Revealed 7 Points about Regulations Related to the Act Governing Electronic Payment Institutions. Registered Stored Cards May be Used for Cross-border Consumption. Fortified Authorization Measures Will Apply.*], ITHOME (May 21, 2021), <https://www.ithome.com.tw/news/144554>.

¹¹⁶⁸ Zhen-Ling Peng (彭禎伶) & Qiao-Yi Wei (魏喬怡), *Qiang Yin Hang Sheng Yi Wai Ji Yi Gong Kua Jing Hui Kuan Sha He Shi Yan Cheng Gong* (搶銀行生意 外籍移工跨境匯款沙盒實驗成功) [*Competing With Banks. The Experimentation of Migrant Workers' International Money Transfer Is Successful.*], ZHONG SHI XIN WEN WANG (中時新聞網) [CHINA TIMES] (May 7, 2020), <https://www.chinatimes.com/m/realtime/news/20200507005917-260410>.

¹¹⁶⁹ *Statute For Management of Electronic Payment Institutions*, GLOBAL LEGAL INFORMATION NETWORK LEGISLATIVE YUAN, R.O.C. (Jan. 27, 2021), <https://glin.ly.gov.tw/web/nationalLegal.do?isChinese=false&method=legalSummary&fromWhere=legalAnnounce&id=6830>.

¹¹⁷⁰ Act Governing Electronic Payment Institutions, *supra* note 1126, art. 4, para. 1, subpara. 3.

¹¹⁷¹ *Id.*, art. 4, para. 4.

¹¹⁷² *Fa Gui Cao An Yu Gao* (法規草案預告) [*Preview of Law Draft*], JIN RONG JIAN DU

with a lower capital requirement,¹¹⁷³ allowing all the companies which are neither banks nor electronic payment institutions to operate this business.¹¹⁷⁴ Welldone and EMQ could certainly benefit from the new regulation.

In this case, the amendments and new regulation are the outcome of this experiment. These regulatory changes apply to not only the testers, which are Welldone and EMQ, but also to all the companies engaging in the same business. In addition, regulatory changes in this case are not limited to the ones in the regulation that the FSC could directly influence. Regulatory changes also appear in legislation. The amendments to the “Act Governing Electronic Payment Institutions” were approved by the legislative branch.

4.2 An Unsuccessful Case

4.2.1 What Does This Unsuccessful Case Aim to Show?

In Taiwan, as of June 2021, the four experiments that had already terminated all resulted in either regulatory changes or the outcome that the FSC found that regulatory changes were not needed.¹¹⁷⁵ Therefore, there are no cases showing that regulatory changes or examination were

GUAN LI WEI YUAN HUI (金融監督管理委員會) [FINANCIAL SUPERVISORY COMMISSION], (May 25, 2021), https://www.fsc.gov.tw/ch/home.jsp?id=133&parentpath=0,3&mcustomize=lawnotice_view.jsp&dataserno=202105250001&dttable=NoticeLaw.

¹¹⁷³ Wai Ji Yi Gong Guo Wai Xiao E Hui Dui Ye Wu Guan Li Ban Fa Cao An Zong Shuo Ming (外籍移工國外小額匯兌業務管理辦法草案總說明) [Explanations on the Regulations Governing the Business of Small-amount Cross-border Remittance for Migrant Workers] [hereinafter Explanations on Regulations of Remittance for Migrant Workers], at 1, 5.

¹¹⁷⁴ Wai Ji Yi Gong Guo Wai Xiao E Hui Dui Ye Wu Guan Li Ban Fa Cao An (外籍移工國外小額匯兌業務管理辦法草案) [Draft of the Regulations Governing the Business of Small-amount Cross-border Remittance for Migrant Workers], art. 3, 7.

¹¹⁷⁵ See Zhen-Ling Peng (彭禎伶), *Sha He Zai Guo Yi An Shi Yan Ding Qi Ding E Tou Zi Hai Wai* (沙盒再過一案 實驗定期定額投資海外) [One More Experiment Application Was Approved. Dollar-cost Averaging Overseas Investment Will Be Tested.], ZHONG SHI XIN WEN WANG (中時新聞網) [CHINA TIMES] (Jan. 20, 2021), <https://www.chinatimes.com/realtimenews/20210120005081-260410?chdtv>.

unsuccessfully brought after entering the sandbox. However, is there a case showing that the entry itself to the sandbox is difficult? I study this type of cases here as unsuccessful cases. It is because the benefits and goals of the sandbox studied in Section 2 may not be realized due to the difficulty of entering the sandbox. In particular, an unsuccessful case studied in the following sections shows that there is a hidden reason behind being excluded from the sandbox. This reason is not only relevant to the strict entry criteria introduced in Section 3.2.1, thereby compounding the difficulty of entering Taiwan's sandbox. I regarded this reason to be hidden because it is not listed in Taiwan's Sandbox Act but could be observed from the FSC's regulatory trajectory. I study a case in the following section and show what the hidden reason might be. This reason will be discussed again in Section 5.1.2 as one of the negative aspects of Taiwan's sandbox. This reason will also be explained in Section 5.2.2 from the public choice viewpoint.

4.2.2 What Happened?

In December 2018, a FinTech startup operating a P2P (peer-to-peer, "P2P") money transfer platform, namely CherryPay, applied to enter the sandbox, aiming to clarify the regulatory issues about its business model.¹¹⁷⁶ Its business model had been deemed innovative as CherryPay matches members who have the opposite needs of money exchange and transfer.¹¹⁷⁷ CherryPay applied to enter the sandbox to clarify the relevant legal issues because its business was halted in August 2018, and CherryPay was under a prosecutorial investigation.¹¹⁷⁸ There were mainly two reasons behind the

¹¹⁷⁶ Yong-Ru Lin (林咏儒), *Tan Tao Jin Rong Xin Chuang P2P Zai Wo Guo Fa Zhan Suo Mian Lin De Xi Qian Fang Zhi Gui Fan Ji Jian Li Feng Xian—Yi Ying Tao Zhi Fu An Wei Li* (探討金融新創 P2P 在我國發展所面臨的洗錢防制規範及監理風險—以櫻桃支付案為例) [*Analysis of the AML Regulations and Regulatory Risks Faced When Developing Innovative Financial P2P—A Case Study on CharryPay*], 71 QI HUO REN (期貨人) [TAIWAN FUTURES] 70, 74 (2019).

¹¹⁷⁷ *Id.* at 73.

¹¹⁷⁸ Lin, *supra* note 1164.

suspension and investigation. Firstly, the FSC suspected that CherryPay's P2P money transfer service may constitute a cross-border remittance business, while, in Taiwan, only banks could operate this business according to the Banking Act.¹¹⁷⁹ Thus, CherryPay, which is not a bank, was suspected of violating the Banking Act. Secondly, some criminals exploited CherryPay's service to launder money.¹¹⁸⁰ CherryPay was thus suspected of not fully complying with the relevant AML regulations to prevent money-laundering.¹¹⁸¹

4.2.3 Outcome and Reason

The outcome of CherryPay's application to enter the sandbox is that, as of this writing, CherryPay revoked its application in November 2020.¹¹⁸² Since its application in December 2018, it has been nearly 2 years in which CherryPay was asked for multiple times to provide additional documents in order to be approved.¹¹⁸³

The hidden reason behind CherryPay's revocation seems to be that the FSC emphasizes applicants should collaborate with banks. A legislator pointed out that CherryPay was actually asked to revoke its own application because only the cross-border remittance business involving the collaboration of lawful intermediaries such as banks is allowed to enter the sandbox.¹¹⁸⁴ The regulator's emphasis on the collaboration with banks is

¹¹⁷⁹ *Id.* Regarding the relevant regulation, *see supra* note 1125 and accompanying text.

¹¹⁸⁰ Lin, *supra* note 1164.

¹¹⁸¹ *E.g., id.*; Lin, *supra* note 1176, at 74-75.

¹¹⁸² Qiao-Yi Wei (魏喬怡) & Zhen-Ling Peng (彭禎伶), *Ying Tao Zhi Fu Ke Qi Si Hui Sheng Jin Sha He? Huang Tian Mu San Zi Hui Ying* (櫻桃支付可起死回生進沙盒? 黃天牧三字回應) [*Will CherryPay Revive to Enter the Sandbox? Tian-Mu Huang Replied with Three Characters.*], ZHONG SHI XIN WEN WANG (中時新聞網) [CHINA TIMES] (Nov. 9, 2020), <https://www.chinatimes.com/realtimenews/20201109003074-260410?chdtv>.

¹¹⁸³ *See id.*

¹¹⁸⁴ Qiao-Yi Wei (魏喬怡) & Zhen-Ling Peng (彭禎伶), *Xiao Sheng Yi Da Re Men Wai Ji Yi Gong Hui Kuan Ye Zhe Qiang Jin Sha He* (小生意大熱門 外籍移工匯款 業

thus observed again. In both of the successful cases studied in Section 4.1, this emphasis on the collaboration with banks were shown. The applicants collaborating with banks were allowed to enter the sandbox, whilst CherryPay had difficulties entering it. As reported in November 2020, the FSC was still considering if CherryPay could enter the sandbox.¹¹⁸⁵ This case shows that it is doubtful that the sandbox could sufficiently realize the goals and benefits studied in Section 2 because entering the sandbox seems to be difficult sometimes. Does this case mirror any cons of Taiwan's sandbox? Will regulations still be falling behind FinTech accordingly? I will analyze further in Section 5.

4.3 Summary

This Section studied successful and unsuccessful cases of Taiwan's sandbox experiments. First, a successful case is an experiment on funds exchange. The testing FinTech company collaborated with a bank. During the experiment, the regulation that only licensed financial institutions could engage in funds-related business was temporarily relaxed. It was found that regulatory changes were caused due to this experiment, allowing the firms conducting the same business could do so by only gaining a license with lighter regulatory requirements. It was also found that these amendments were made by the FSC.

Secondly, another successful case is an experiment on cross-border remittance services for migrant workers. Banks also involved in this experiment. It was found that the collaboration with banks was actually preferred by the FSC when approving experiments. During the experiment,

者搶進沙盒) [*Small Businesses Are Popular: Migrant Workers Cross-border Remittance. Companies Are in a Rush to Enter the Sandbox.*], ZHONG SHI XIN WEN WANG (中時新聞網) [CHINA TIMES] (Nov. 10, 2020), <https://www.chinatimes.com/newspapers/20201110000157-260202?chdtv>.

¹¹⁸⁵ Wei & Peng, *supra* note 1182.

Article 29 of the Banking Act that only banks, unless otherwise provided by law, are allowed to conduct cross-border remittance services, was relaxed. Regulatory changes were also brought by this experiment, allowing non-banks to conduct cross-border remittance business. However, the regulatory amendments in this case were done by both the legislative branch and the FSC, introducing a lighter licensing regime for all the firms conducting the same business.

Thirdly, an unsuccessful case is a failed application to enter the sandbox. The reason for choosing this case is that in Taiwan, at this time of writing, the 4 experiments that already terminated all resulted in either regulatory changes or the outcome that the FSC found that regulatory changes are not needed. This application involved the cross-border P2P money transfer. The applicant applied to enter the sandbox because its business was suspected of violating the Banking Act and AML regulations. However, after being asked multiple times in 2 years to submit additional documents, the applicant revoked its application. Through studying all the relevant information, I found that a reason behind this revocation may be that the FSC was actually not willing to approve an application in which banks were not involved. The FSC's emphasis on the collaboration with banks when approving sandbox experiment applications was again reflected. This unsuccessful case shows that there is a hidden reason behind being excluded from the sandbox, which is the FSC's emphasis on the involvement of banks, resulting in FinTech firms' limited entry to the sandbox if they do not collaborate with banks. It is thus doubtful that the sandbox could sufficiently realize the goals and benefits because entering the sandbox is limited or difficult for FinTech firms sometimes. Does this case mirror any negative aspects of Taiwan's sandbox? What are the reasons behind? I will analyze in Section 5.

5. Analysis of Taiwan's FinTech Regulatory Sandbox

This Section appraises Taiwan's sandbox based on the actual cases studied in Section 4. Section 5.1 analyzes what the positive and negative aspects of Taiwan's FinTech sandbox are. Section 5.2 studies the extent to which this sandbox may reflect an adaptive system but fails to be sufficiently flexible and adaptive. Some reasons will be provided. Section 5.3 summarizes.

5.1 Advantages and Disadvantages of Taiwan's FinTech Regulatory Sandbox

5.1.1 Advantages

5.1.1.1 Enabling Regulators to Better Understand FinTech and Reconsider Regulations

As described in Section 2.2, FinTech sandboxes could enable regulators to better understand FinTech and accordingly reconsider regulatory responses. This Section will show how the outcome of the experimental cases of funds exchange and cross-border remittance for migrant workers, which were studied in Section 4.1, epitomizes the realization of these benefits.

Firstly, in the case of the funds exchange experiment, the FSC gained the information about a new business model, namely funds intermediation through a platform, by actually running this business in the sandbox. Through the experiment, the FSC learnt that this new business model is based on FinTech and refers to revealing the information of funds on a platform to enable funds owners to trade.¹¹⁸⁶ This experiment also provided

¹¹⁸⁶ See Amendments to Securities Firms Establishment Regulation, *supra* note 1156, at

a chance for the FSC to consider if regulatory changes are needed. That is, the experiment showed that this new business model is innovative and increases the efficiency of financial services.¹¹⁸⁷ The FSC also realized that this new business model incurs fewer risks because the platform merely reveals information rather than participating in selling or buying, being different from a normal securities broker.¹¹⁸⁸ According to these experimental findings, the FSC decided to establish a limited licensing regime with lighter regulatory requirements for all the companies conducting this business.¹¹⁸⁹

Secondly, in the case of the cross-border remittance for migrant workers experiment, the FSC also had the chance, because of the experiment, to understand the business model and decided the regulatory responses. Specifically, this experiment showed that this business involves smaller amounts of money and few customers, thereby being less risky.¹¹⁹⁰ The FSC thus accordingly introduced a limited licensing regime with lighter regulatory requirements for all the companies specializing in this business.¹¹⁹¹

5.1.1.2 Enhancing Regulatory Adaptability; Addressing Complexities and Information Deficits

1; Hui-Ling Chen (陳蕙綾), *Jin Rong Jian Li Sha He Shou Zong Shi Yan An Jiang Luo Di Hao Hao Tou Zi Ke Gai Zhi Wei Quan Shang* (金融監理沙盒首宗實驗案將落地 好好投資可改制為券商) [*The First Case that a Sandbox Experiment Will Terminate and Bring Changes. How-Investech Could Be a Securities Firm.*], ANUE (鉅亨) (Mar. 23, 2021), <https://news.cnyes.com/news/id/4617142>.

¹¹⁸⁷ *See id.*

¹¹⁸⁸ *See id.*; Zheng Quan Shang She Zhi Biao Zhun Bu Fen Tiao Wen Xiu Zheng Tiao Wen Dui Zhao Biao (證券商設置標準部分條文修正條文對照表) [Comparison Table of the Amendments to the Securities Firms Establishment Regulation], at 1.

¹¹⁸⁹ *See supra* Section 4.1.1.3.

¹¹⁹⁰ *See* Explanations on Regulations of Remittance for Migrant Workers, *supra* note 1173, at 1, 5-6.

¹¹⁹¹ *See supra* Section 4.1.2.3.

Conceptually speaking, the benefits of enabling the regulator to better understand FinTech and reconsider regulatory responses are twofold. Firstly, a sandbox could enhance regulatory adaptability. As discussed in Chapter 5, to make regulation shift from stasis closer to adaptability lies in, among other things, that collecting and exploring information is planned or even embedded as a function of regulation.¹¹⁹² Regulation could thus be better updated according to the new information gained.¹¹⁹³ Both the successful cases show that the FSC could learn and gain more information about what the FinTech and the business model actually are through the experiments better. Moreover, experiments might lead to lighter regulations as shown in both successful cases. This outcome shows that a sandbox might enhance regulatory suitability and adaptability in the era of FinTech because the regulator could learn that the tested FinTech is beneficial, less risky and deserves lighter regulations.

Taiwan's sandbox helped to address the regulatory complexities resulting in information deficits and higher information costs, which were studied in Chapter 3.¹¹⁹⁴ Through the experiments, the legal issues in relation to the legal status of the tested FinTech and the applicable regulations could be clarified. For instance, as shown in the case of the funds exchange experiment, the companies were found to be operating merely as platforms rather than as normal securities brokers, thus deserving lighter regulations.¹¹⁹⁵

5.1.1.3 Signaling and Marketing for FinTech Firms

Another advantage of Taiwan's FinTech sandbox is that the testing

¹¹⁹² See Chapter 5, Section 3.2.1.

¹¹⁹³ See Lawrence E. McCray, Kenneth A. Oye & Arthur C. Petersen, *Planned Adaptation in Risk Regulation: An Initial Survey of US Environmental, Health, and Safety Regulation*, 77 *TECHNOL. FORECAST. & SOC. CHANGE* 951, 951 (2010).

¹¹⁹⁴ See *supra* Chapter 3, Section 3.2.4.

¹¹⁹⁵ See *supra* Section 3.1.1.3.

FinTech firms could gain trust from consumers. In Taiwan, there have been demands for FinTech regulation coming from different stakeholders. These stakeholders include, for instance, consumers and FinTech firms. As reported, when facing new FinTech services or products, Taiwanese people commonly consider that these FinTech services or products lack suitable regulation and need that.¹¹⁹⁶ This demand for regulation could be mirrored by what I analyzed in Chapter 3 regarding FinTech's influence that it brings complexities. Regulation is thus deemed to be able to verify the quality of these new financial services or products.¹¹⁹⁷

In the light of this public demand of FinTech regulation, FinTech firms in Taiwan also expressed their willingness to be regulated in order to enter the markets because they could accordingly be trusted by consumers.¹¹⁹⁸ This phenomenon reflects that “being regulated” seems to improve the reputational value, namely “symbolic rewards”,¹¹⁹⁹ in Taiwan. Entering the sandbox in Taiwan seems to have the similar functions for FinTech firms. Specifically, according to Taiwan's FinTech Sandbox Act, the applicants need to reveal detailed information regarding, for instance, the organization of the applicant such as the responsible persons and the source of funds.¹²⁰⁰

¹¹⁹⁶ See Xiao-Wen Huang, **【Diao Cha】Uber Shi Fa Zheng Yi Min Diao: 68% Min Zhong Ren Wei Ye Zhe Mei You Shi He De Fa Lu Neng Zun Shou** (**【調查】Uber 適法爭議民調：68%民眾認為業者沒有適合的法律能遵守**) [**【Investigation】A Poll of Legal Issues Regarding Uber: 68% of People Think That There Is No Suitable Law.**], KE JI BAO JU (科技報橘) [TECHORANGE] (Nov. 28, 2016), <https://buzzorange.com/techorange/2016/11/28/press-release-about-new-service/>.

¹¹⁹⁷ See Randall G. Holcombe & Lora P. Holcombe, *The Market for Regulation*, 142 J. INST. THEOR. ECON. 684, 685, 689 (1986).

¹¹⁹⁸ See, e.g., Pei-Hua Lu (盧沛樺), *Xu Ni Huo Bi Yu Lai Yu Nan Wan? Wei Lai Fan Xi Qian Xin Gui Shang Lu · Xian Guo Jin Guan Hui Zhe Guan!* (虛擬貨幣愈來愈難玩？未來反洗錢新規上路，先過金管會這關！) [*Harder to Perform the Virtual Currency Transactions? New Anti-Money Laundering Regulation Will be in Effect in the Future, and the First Task Is Associated With the FSC!*], TIAN XIA ZA ZHI (天下雜誌) [COMMONWEALTH MAGAZINE] (July 4, 2019), <https://www.cw.com.tw/article/5095892?template=transformers>.

¹¹⁹⁹ See P.N. Grabosky, *Regulation by Reward: On the Use of Incentives as Regulatory Instruments*, 17 LAW & POL'Y 257, 261 (1995).

¹²⁰⁰ FinTech Sandbox Act, *supra* note 1072, art. 4, para. 1.

Commentators argued that this information disclosure would enhance people's trust.¹²⁰¹ Taiwan's sandbox thus helps address the opacity brought by FinTech, which has been faced by consumers and resulting in information asymmetry studied in Chapter 3.¹²⁰²

5.1.1.4 Bringing Impacts on Legislation

As studied in the case of cross-border remittance for migrant workers in Section 4.1.2, a sandbox experiment may have impacts on legislation as a result. That is, after the experiment was successfully terminated, the regulatory changes appeared to have caused the legislative branch in Taiwan to approve some amendments to laws according to the experiment results. In Taiwan, these laws and amendments are the type that must be passed by the legislative branch.¹²⁰³ In contrast, in the case of funds exchange in Section 4.1.1, the regulatory changes appeared to be influenced by the FSC which introduced some lighter regulations to the extent that the FSC is conferred by laws. In Taiwan, these lighter regulations are the type of "executive orders", which only need to be submitted by the executive agency to the legislative branch after the orders are publicized.¹²⁰⁴ Therefore, the regulatory changes brought by Taiwan's sandbox are in relation not only to the regulations that the regulator has direct impacts on such as executive orders, but also the laws that have to be approved by the legislative branch.

According to the former chairman of the FSC, the longer length of Taiwan's sandbox experiment, which is 3-years at the most,¹²⁰⁵ was established to bring impacts to not only the regulation that the regulator could

¹²⁰¹ Wu & Ko, *supra* note 1110.

¹²⁰² *See supra* Chapter 3, Section 3.2.2.

¹²⁰³ Zhong Yang Fa Gui Biao Zhun Fa (中央法規標準法) [Central Regulation Standard Act], art. 2, 4 and 6.

¹²⁰⁴ *Id.* art. 7.

¹²⁰⁵ *See supra* Section 3.1.

influence but also legislation.¹²⁰⁶ By contrast, the duration of the sandbox in other jurisdictions may be shorter on a case-by-case basis and often limited to 1 year.¹²⁰⁷ For instance, the length of UK's sandbox experiments is 3 to 6 months.¹²⁰⁸ In Japan and Malaysia, the testing period is basically 12 months.¹²⁰⁹ The longer duration in Taiwan gives the FSC and the legislative branch more time, while the testing company could stay in the sandbox to operate its business by being exempted from the licensing requirements within the sandbox. For instance, the experiment of cross-border remittance for migrant workers was extended twice. One of the reasons for the extensions is that the applicants could enjoy the limited licensing regime pursuant to the amendments right after they leave the sandbox.¹²¹⁰ If they left the sandbox when the amendments were not ready, they would have difficulties operating because the exemption from licensing requirements provided by the sandbox does not apply anymore.

5.1.2 Cons

5.1.2.1 Entering the Sandbox Might be Difficult and Limited

In spite of the above advantages, entering the sandbox in Taiwan may be difficult. Firstly, entering the sandbox is costly. As described in the case of CherryPay's application, an applicant needs to make lots of efforts by

¹²⁰⁶ Tsung-Han Yu (余宗翰), 《Zhuan Fang》 *Gu-Li Xiong: Jian Li Sha He Zui Chang San Nian De Shi Yan Shi Jian Shi Wei Le Zuo Fa Gui Tiao Shi* (《專訪》顧立雄：監理沙盒最長三年的實驗時間是為了做法規調適) [《Interview》 *Gu-Li Xiong: The 3-year Length of the Sandbox Is For Adapting Laws.*], ANUE (鉅亨) (Dec. 20, 2017), <https://news.cnyes.com/news/id/3994534>.

¹²⁰⁷ See PARENTI, *supra* note 1060, at 36.

¹²⁰⁸ DEFAULT STANDARDS FOR SANDBOX TESTING PARAMETERS, FCA, <https://www.fca.org.uk/publication/policy/default-standards-for-sandbox-testing-parameters.pdf> (last visited June 22, 2021).

¹²⁰⁹ BAKER MCKENZIE, *supra* note 1074, at 18; Jayoung James Goo & Joo-Yeun Heo, *The Impact of the Regulatory Sandbox on the Fintech Industry, with a Discussions on the Relation between Regulatory Sandboxes and Open Innovation*, 6 J. OPEN INNOV. TECH. MKT. COMPLEX. 1, 1, 6 (2020).

¹²¹⁰ See Dai, *supra* note 1165.

providing more documents required by the FSC after its application in order to be approved. These efforts, most importantly, may be in vain as shown by the case of CherryPay. Commentators thus doubted if smaller-sized FinTech firms are able to bear these costs.¹²¹¹ Accordingly, larger financial institutions are more able to bear them, being more likely to be approved.

Secondly, even though Taiwan has the sandbox for FinTech firms, the FSC seems to prefer the applicants which are financial institutions or the FinTech firms collaborating with banks to enter the sandbox. For instance, the unsuccessful case of CherryPay's application studied in Section 4.2 showed that the FSC doubted if CherryPay could fully comply with AML regulations while CherryPay was not collaborating with any banks. CherryPay's application was thus obstructed.¹²¹²

Even the successful case of the funds exchange experiment studied in Section 4.1.2 to an extent mirrors FinTech firms' difficulties entering the sandbox. As reported, the FSC "felt relieved to see that the applicant, How-Investech, was collaborating with a bank when evaluating its application".¹²¹³ It shows that the FSC trust banks more than FinTech firms when evaluating applications to the sandbox. In fact, the applicants of all the 9 approved sandbox applications in Taiwan are either financial institutions themselves such as banks or FinTech firms collaborating with banks.¹²¹⁴

¹²¹¹ Guo-Rui Chen (陳國瑞), "Jin Rong Jian Li Sha He" Shang Lu Liang Nian Zhi He Zhun Qi An, Wen Ti Chu Zai Na Li? (「金融監理沙盒」上路兩年只核准七案，問題出在哪裡?) [Only 7 Experiments Were Approved Since the FinTech Sandbox Has Been in Effect for 2 Years. What Are the Problems?], GUAN JIAN PING LUN (關鍵評論) [THE NEWS LENS] (Apr. 24, 2020), <https://www.thenewslens.com/article/134230>.

¹²¹² See *supra* Section 4.2.3.

¹²¹³ Liu, *supra* note 1150.

¹²¹⁴ The applicants of all the 9 approved applications are – (1) the KGI bank, (2) a FinTech firm, EMQ, collaborating with foreign banks, (3) a FinTech firm, Welldone, collaborating with foreign banks, (4) the Fubon Bank, together with a technology company, AMIS, (5) the Cathay Life Insurance, (6) a FinTech firm, How-Investech, collaborating with the Far Eastern International Bank, (7) the Capital Securities Corporation, (8) a FinTech firm, JOiNVEST, collaborating with the First Bank, and (9) a FinTech firm, Alpha Robo-advisor, collaborating with the SinoPac Securities.

Therefore, it seems that the FSC in a sense relies on financial institutions when facing FinTech. This phenomenon has been observed and criticized by scholars by arguing that the FSC tends to favor financial institutions.¹²¹⁵ This phenomenon could also be perceived when it is the FSC's intention to develop FinTech through encouraging financial institutions rather than FinTech firms.¹²¹⁶ However, as studied in Section 2, one of the goals of a sandbox is promoting financial innovation and competition by facilitating market entry. It may thus be doubtful that this goal could be achieved because the entry barriers to the sandbox in Taiwan seem to remain for FinTech firms.

Thirdly, the processes are repetitive. For example, before the formal application, the applicants in Taiwan might go through a process in which the regulator counsels and provides opinions to them regarding their applications.¹²¹⁷ After the application, as shown before, applicants might be required again to, for instance, submit more detailed documents.¹²¹⁸ A commentator pointed out that the above processes are in fact repetitive and incur excessive costs, thereby being one of the reasons why only few

The detailed information about these applications is disclosed on the FSC's website. *Jin Rong Ke Ji Chuang Xin Shi Yan Xiang Guan Zi Xun Jie Lu - He Zhun* (金融科技創新實驗相關資訊揭露-核准) [*Sandbox Experiments Information Disclosure – Approval*], JIN RONG JIAN DU GUAN LI WEI YUAN HUI (金融監督管理委員會) [FINANCIAL SUPERVISORY COMMISSION], <https://www.fsc.gov.tw/ch/home.jsp?id=667&parentpath=0,7,478> (last visited June 23, 2021).

¹²¹⁵ *E.g.*, Tsai et al., *supra* note 1079, at 285-86.

¹²¹⁶ *Id.*

¹²¹⁷ JIN RONG JIAN DU GUAN LI WEI YUAN HUI (金融監督管理委員會) [FINANCIAL SUPERVISORY COMMISSION], JIAN LI SHA HE FU DAO JI SHEN QING ZHI YIN (監理沙盒輔導及申請指引) [GUIDANCE ON REGULATORY SANDBOX COUNSELLING AND APPLICATION] 7 (June 2021), <https://www.fsc.gov.tw/websitedowndoc?file=chfsc/202107061712120.pdf&filedisplay=%E7%9B%A3%E7%90%86%E6%B2%99%E7%9B%92%E8%BC%94%E5%B0%8E%E5%8F%8A%E7%94%B3%E8%AB%8B%E6%8C%87%E5%BC%95.pdf>.

¹²¹⁸ *See supra* Sections 4.2.2, 4.2.3 and 5.1.2.1.

companies have entered Taiwan's sandbox.¹²¹⁹

Lastly, entering Taiwan's sandbox is limited also due to the strict criteria introduced in Section 3.1.2. For instance, a company's application will not be approved when there is already one company in the sandbox conducting similar or the same business. The ostensible reason is that the one coming later is not "innovative" enough. This "one-company" rule seems to be different from the rule in other sandboxes. For instance, as described in Section 3.2.1, UK's sandbox seems to open to more companies as the FCA explicitly emphasized that a negative indicator of innovation is that there are already "numerous" companies conducting similar or the same business.¹²²⁰ It is doubtful if Taiwan's measure is fair because while a sandbox could provide benefits to the testing company, only one company could enjoy those benefits in Taiwan. Specifically, since the regulatory changes after one experiment will also apply to other companies conducting the same business,¹²²¹ it is doubtful if having only one experiment is enough to justify the regulatory changes. Moreover, will that "one-company" rule in Taiwan, together with the FSC's emphasis on banks' involvement described above, result in oligopoly or even monopoly? It is worth observing, and I leave the detailed analysis for future research. However, I emphasize here that some goals of sandboxes, which are facilitating market entry and encouraging financial innovation and competition,¹²²² would not be achieved because of the limited entry to the sandbox.

¹²¹⁹ Guo-Rui Chen (陳國瑞), "Jin Rong Jian Li Sha He" Shang Lu Liang Nian Zhi He Zhun Qi An, Wen Ti Chu Zai Na Li? (「金融監理沙盒」上路兩年只核准七案，問題出在哪裡?) [Only 7 Experiments Were Approved Since the FinTech Sandbox Has Been in Effect for 2 Years. What Are the Problems?], GUAN JIAN PING LUN (關鍵評論) [THE NEWS LENS] (Apr. 24, 2020), <https://www.thenewslens.com/article/134230>.

¹²²⁰ Applying to the regulatory sandbox, *supra* note 1050.

¹²²¹ See Ji, *supra* note 1142.

¹²²² See *supra* Section 2.2.4.

5.1.2.2 Lack of Organized Post-experimentation Mechanisms

A lack of organized post-experimentation mechanisms exists in Taiwan's sandbox regime. As studied in Section 2, an important benefit of a sandbox is to reconsider regulations or to bring regulatory changes after the experiments. Regulatory adaptability may accordingly be enhanced. However, in Taiwan, both the FSC and a testing company KGI bank had undergone the situation that it was still difficult to efficiently form any regulatory responses after the experiment; thus, the tested company's services and products could not be launched even though it had already left the sandbox.¹²²³ In other words, it was difficult and costly to bring regulatory changes due to the lack of organized post-experimentation mechanisms. Regulation may thus still be behind FinTech. Scholars thus argued that complete and organized post-experimentation mechanisms need to be established in order to timely and efficiently bring regulatory changes, if needed.¹²²⁴

5.1.2.3 Emphasizing Statutory Laws and Detailed Rules

A characteristic that could be observed in Taiwan's FinTech regulatory framework is emphasizing statutory laws. In fact, Taiwan's FinTech Sandbox Act was regarded as an early case that a sandbox was established through legislating new laws rather than regulators' supervisory powers.¹²²⁵

¹²²³ Zhen-Ling Peng (彭禎伶) & Qiao-Yi Wei (魏喬怡), *Sha He Shi Yan Cheng Gong Fa Gui Gen Bu Shang Kai Ji Yin Jin Rong Xiao Bai Xian Ting* (沙盒實驗成功法規跟不上 凱基銀金融小白先停) [*Regulation Could Not Keep Pace After the Success of the Sandbox Experimentation. The KGI Bank's Project Stopped.*], GONG SHANG SHI BAO (工商時報) [COMMERCIAL TIMES] (Aug. 6, 2020), <https://m.ctee.com.tw/livenews/aj/a91617002020080620245843>.

¹²²⁴ Peng & Tsang, *supra* note 1139.

¹²²⁵ See Tsai et al., *supra* note 1079, at 276. Another example is the STO regulation in Taiwan. It was reported that Taiwan is the first country where new regulation especially for STOs has been crafted, while most of other countries choose to re-interpret existing regulations. *E.g.*, Yi-Ru Ye (葉憶如), *Zheng Quan Xing Dai Bi Jiao Yi Suo Jin Nian Shang Lu* (證券行代幣交易所 今年上路) [*Security Tokens*

Besides, emphasizing prescriptive and detailed rules seems to be observed in Taiwan's overall FinTech regulatory trajectory.¹²²⁶ This emphasis could also be observed in the FinTech Sandbox Act. For instance, it is explicitly required in the FinTech Sandbox Act that only the financial businesses that require permission or approval could apply to enter the experimentation.¹²²⁷ In addition, as mentioned before, only one company conducting the similar or same business could apply. Thus, the FinTech Sandbox Act currently specifies by rules the types of FinTech applications that could apply to enter the sandbox. In the future, there will possibly be a situation that some new FinTech applications need to enter the sandbox. Nevertheless, these new FinTech applications may not be able to do so because they are excluded by these detailed rules with less room for interpretation. It might thus be doubtful that emphasizing statutory laws and detailed rules in Taiwan's FinTech Sandbox Act would bring the same outcome. For instance, as Taiwan's sandbox was established through legislation, it may be difficult or costly in the future if the FinTech Sandbox Act needs to be amended to adapt to the changed circumstances in the era of FinTech. This in-built lack of flexibility seems to be in line with Bernstein's arguments that a long process before the enactment tends to render the statute out of date.¹²²⁸ The costs of amending regulation, however, are vital to economic growth and a factor in the overall efficiency of the legal system.¹²²⁹

Exchanges Will Launch This Year], JING JI RI BAO (經濟日報) [ECONOMIC DAILY NEWS] (Jan. 1, 2020), <https://money.udn.com/money/story/5613/4262474>; *Taiwan's Position on STO Regulations*, ASIA BLOCKCHAIN REVIEW (Sep. 18, 2019), <https://www.asiablockchainreview.com/taiwans-position-on-sto-regulations/>.

¹²²⁶ See Tsai et al., *supra* note 1079, at 282.

¹²²⁷ FinTech Sandbox Act, *supra* note 1072, art. 3, 7.

¹²²⁸ MARVER H. BERNSTEIN, REGULATING BUSINESS BY INDEPENDENT COMMISSION 76-77 (1955).

¹²²⁹ Nuno Garoupa & Mariana Pargendler, *A Law and Economics Perspective on Legal Families*, 7 EUR. J. LEGAL STUD. 36, 59 (2014); Garoupa & Morriss, *supra* note 1088, at 1450, 1485.

5.2 Not Truly and Sufficiently Adaptive

5.2.1 Entering the Sandbox Is Limited Because of the Influence of Financial Incumbents'

The disadvantage identified in Section 5.1.2.1 also renders Taiwan's sandbox not truly and sufficiently adaptive. That is, FinTech firms' entry to the sandbox seems to be limited by the high costs of entering it and the FSC's reliance on financial institutions especially banks. The FSC also seems to trust financial institutions more than FinTech firms. However, for FinTech firms, accessing the sandbox means that testers could gain some advice or guidance from the regulator to help them clarify, for instance, compliance issues, thereby lowering the costs of seeking legal advice.¹²³⁰ Moreover, accessing the sandbox also means that FinTech firms' market entry could be facilitated through amending regulation.¹²³¹ In this light, a prerequisite of realizing these benefits is that FinTech firms' entry to the sandbox is not excessively limited. I explain next why the entry to the sandbox seems to be limited in Taiwan.

5.2.2 Possible Reasons Behind – A Public Choice Perspective

5.2.2.1 Regulation Demanders' Dispersion and Size

This Section provides some potential reasons why Taiwan's sandbox is not truly and sufficiently adaptive as it is not favoring FinTech firms enough. The explanation starts from the demand for FinTech regulation that was mentioned in Section 5.1.1.3 Against the background where the demands for FinTech regulation from different stakeholders could be found in Taiwan, the issues in relation to the supply of regulation then arise. For example, if

¹²³⁰ See *supra* Section 2.2.

¹²³¹ See *id.*

responding to those demands through regulation,¹²³² and if the supply of regulation is aligned with the interests of a certain industry,¹²³³ which is this certain industry in Taiwan?

In Taiwan, financial institutions especially banks seem to be the actual beneficiaries of Taiwan's sandbox. This notion is to a certain extent supported by the disadvantages of Taiwan's sandbox identified in Section 5.1.2.1. While banks and FinTech firms could potentially be competitors as they often provide similar services and products,¹²³⁴ thereby both being interested in influencing FinTech regulation, why are banks ultimately the influencers and beneficiaries? It is possibly because, among other reasons, the group of FinTech firms in Taiwan is more dispersed and contains more members than the group of banks,¹²³⁵ being less effective in influencing regulation.¹²³⁶ According to Bernstein, battles between different

¹²³² Scholars argued that, in spite of the demand for regulation of product quality, there may be, rather than such regulation, firms and the private regulatory agency certifying that firms meet the requirements of product quality. Holcombe & Holcombe, *supra* note 1197, at 685-86. However, the relevant issues are beyond the scope of this Chapter.

¹²³³ E.g., George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MANAGE. SCI. 3, 3 (1971); DENNIS C. MUELLER, PUBLIC CHOICE III 344-45 (2003); Fred S. McChesney, *Rent Extraction and Rent Creation in the Economic Theory of Regulation*, 16 J. LEGAL STUD. 101, 104 (1987).

¹²³⁴ See Kun-Zheng Lin (林坤正), *Lin Kun Zheng: Yin Hang Men Hu Dong Kai, Shen Fang Qing Bing Ru Guan!* (林坤正：銀行門戶洞開，慎防「清兵入關」!) [*Kun-Zheng Lin: The Troy Gate to Army Conquering Banks to Be Opened: Be Wary of "Trojan Horse"!*], CAI XUN (財訊) [WEALTH MAGAZINE] (Sep. 18, 2019), <https://www.wealth.com.tw/home/articles/22295>.

¹²³⁵ According to a FSC's report in 2019, in Taiwan, 29 banks have engaged in FinTech by establishing FinTech-related departments. "Jin Rong Ke Ji Tou Zi" Zhuang Kuang Tong Ji Biao (「金融科技投資」狀況統計表) [Statistics about "FinTech Investment"]., JIN GUAN HUI (金管會) [FSC] (2019), <https://www.fsc.gov.tw/uploaddownloaddoc?file=news/202008201559090.pdf&filedisplay=%E6%96%B0%E8%81%9E%E7%A8%BF%E9%99%84%E4%BB%B61-%E9%87%91%E8%9E%8D%E7%A7%91%E6%8A%80%E6%8A%95%E8%B3%87%E7%8B%80%E6%B3%81%E7%B5%B1%E8%A8%88%E8%A1%A8+v.2.pdf&flag=doc>. In comparison, FinTech companies seem to be much more than banks as, for instance, there are over 100 members in Taiwan FinTech Association. *About Us*, TAIWAN FINTECH ASSOCIATION, <http://www.fintech.org.tw/en/> (last visited Jan. 18, 2021.)

¹²³⁶ See, e.g., Sam Peltzman, *Toward a More General Theory of Regulation*, 19 J.L. ECON. 211, 212-13 (1976); MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION 53 (1971);

stakeholders who have interests of regulation and demand it are often seen.¹²³⁷ The factors in winning such battles examined by scholars such as Stigler, Olson and Peltzman include, among other factors, the size of these stakeholders and the degree of dispersion.¹²³⁸ Therefore, in consequence, FinTech firms in Taiwan seem to be prone to lose.

5.2.2.2 Incumbents' Employment of Retired Government Officials

In addition, the FSC's trust and reliance on financial institutions seem to mirror the FSC's conservative nature and regulatory inertia, which have been criticized by commentators in Taiwan.¹²³⁹ Why do these attitudes exist in Taiwan? A theoretical explanation is that the regulator is captured and influenced by incumbent financial institutions such as banks.¹²⁴⁰

In fact, through looking into the general regulatory trajectory of FinTech in Taiwan, scholars argued that the relevant regulations have possibly undergone the influence exerted by incumbent financial institutions especially banks.¹²⁴¹ It was said that, in Taiwan, the reason for such influence is, for example, the long-standing phenomenon that incumbent banks would employ retired governmental officials.¹²⁴² As a consequence,

Stigler, *supra* note 1233, at 12.

¹²³⁷ See BERNSTEIN, *supra* note 1228, at 251.

¹²³⁸ See Stigler, *supra* note 1233, at 12; Peltzman, *supra* note 1236, at 212-13; OLSON, *supra* note 1236, at 53.

¹²³⁹ See, e.g., Tsai et al., *supra* note 1079, at 285; Lin, *supra* note 1234; Wei & Peng, *supra* note 1184.

¹²⁴⁰ See Antonie Faure-Grimaud & David Martimort, *Regulatory Inertia*, 34 RAND J. ECON. 413, 414 (2003).

¹²⁴¹ See, e.g., Chang-Hsien Tsai, *To Regulate or Not to Regulate? A Comparison of Government Responses to Peer-to-Peer Lending among the United States, China, and Taiwan*, 87 U. CIN. L. REV. 1077, 1082 (2019).

¹²⁴² Jie-Yu Li (黎婕妤), *Gu Li Xiong Wa Jie "Cai Jin Bang"*, *Jin Guan Hui Guan Yuan Tui Xiu Jin Ren Gong Gu Dai Biao* (顧立雄瓦解「財金幫」 金管會官員退休禁任公股代表) [*Li-Xiong Gu Disrupted the "Finance Group": Officials Retiring from the FSC Are Not Allowed to be Government's Representatives of State-Owned Enterprises*], JIN ZHOU KAN (今周刊) [BUSINESS TODAY] (May 23, 2018), <https://www.businesstoday.com.tw/article/category/80392/post/201805230034/%E9>

the FSC has been subverted by incumbent banks when it comes to developing FinTech. After all, FinTech firms have been considered as potential competitors against banks, pushing banks to seek rents. In other words, regulation functions for these incumbents' benefits.¹²⁴³ As a result, to truly enhance FinTech's regulatory adaptability will be a difficult task.

5.3 Summary

This Section studied the advantages and disadvantages of Taiwan's sandbox and found that it is not sufficiently adaptive. Through studying real cases, some good points of Taiwan's sandbox were found as the following. Firstly, it is capable of enabling the regulator to learn, knowing that the tested FinTech is beneficial, less risky and deserving lighter regulation. In other words, the sandbox helps address the regulatory and technological complexities resulting in the information deficits studied in Chapter 3. Secondly, testing FinTech firms may gain trust from consumers in the light of the public demand for regulating FinTech through revealing detailed information to enter the sandbox. The testing of FinTech firms also gains symbolic rewards by showing that they dare to face the regulator. Thirdly, the longer duration of Taiwan's sandbox gives the FSC and the legislative branch more time, while the testing company could stay in the sandbox to operate its business by being exempted from the licensing requirements within the sandbox.

The negative points of Taiwan's sandbox, which render this sandbox not sufficiently adaptive, are as follows. In fact, a prerequisite for realizing the benefits of a sandbox, which is adapting to FinTech and addressing

[%A1%A7%E7%AB%8B%E9%9B%84%E7%93%A6%E8%A7%A3%E3%80%8C%E8%B2%A1%E9%87%91%E5%B9%AB%E3%80%8D%20%E9%87%91%E7%AE%A1%E6%9C%83%E5%AE%98%E5%93%A1%E9%80%80%E4%BC%91%E7%A6%81%E4%BB%BB%E5%85%AC%E8%82%A1%E4%BB%A3%E8%A1%A8.](#)

¹²⁴³ *E.g.*, Stigler, *supra* note 1233, at 3; MUELLER, *supra* note 1233, at 344-45.

complexities and information deficits, is that FinTech firms' entry to the sandbox is not excessively costly or limited. However, on first entering the sandbox it was found costly. Larger financial institutions are more able to bear these costs, being more likely to be approved.

Second, this Section also found that the FSC seems to prefer applicants who are financial institutions or the FinTech firms collaborating with banks to enter the sandbox. It shows that the FSC trust financial institutions more than FinTech firms. It also showed that the FSC in a sense relies on financial institutions when facing FinTech. This phenomenon has been observed and criticized by scholars. Some explanations were provided from the viewpoint of public choice. That is, the FSC seems to be influenced by financial institutions such as banks. Banks hire retired governmental officials. Moreover, the group of FinTech firms in Taiwan is more dispersed and contains more members, being less effective in influencing regulation.

Third, this Section found that a lack of the organized post-experimentation mechanisms exists in Taiwan's sandbox. As a result, it is difficult or costly to bring regulatory changes. A case reflected this situation. Regulation may thus still be falling behind FinTech.

Lastly, this Section found that emphasizing statutory laws and detailed rules characterizes Taiwan's regulatory responses to FinTech, which include the FinTech Sandbox Act. Statutory laws provide legal certainty. Nevertheless, it may be difficult or costly in the future since the FinTech Sandbox Act needs to be amended to adapt to the changed circumstances of FinTech. The FinTech Sandbox Act specifies by rules the types of FinTech applications that could apply to enter the sandbox. In the future, some new FinTech applications may need to enter the sandbox. However, these new FinTech applications cannot do so because they are excluded by these detailed rules with less room for interpretation. In Chapter 7, I will refer to

the studies on rules versus standards to analyze which is more preferable when regulating FinTech.

6. Conclusion

This Chapter found that, by looking into the case of Taiwan's sandbox, having a sandbox does not necessarily guarantee that regulatory adaptability will be well ensured and that complexities and information deficits could be perfectly addressed. Taiwan's sandbox aims to bring better regulatory changes after actually testing FinTech. Other goals and benefits such as promoting financial innovation and competition, facilitating FinTech firms' market entry, signaling for both regulators and the regulated, and helping regulators better understand FinTech are also expected to be realized. However, some disadvantages of Taiwan's sandbox were found. For instance, it is costly and difficult for FinTech firms to enter the sandbox due to the strict criteria of entry and the regulator's reliance on banks. Taiwan's sandbox was also established by legislating a specific law and emphasizing detailed rules. Therefore, amending it in the future to adapt to FinTech might be costly. In addition, a lack of organized post-experimentation mechanisms was also found. This disadvantage renders making regulatory changes after the sandbox costly and difficult.

In the light of the above findings, the question of how to make FinTech regulation better will follow. How to establish the better FinTech regulation? For instance, do principles regulate FinTech adaptively better than rules? Specifically, the issues about complexity and pacing discussed throughout the whole thesis should be considered. Therefore, I will accordingly embark on developing the solution that fits FinTech better in Chapter 7.

Chapter 7

Making FinTech Regulatory Sandboxes More Adaptive

1. Introduction

Further to Chapter 1, the goal of this thesis is to study how to regulate FinTech adaptively. Chapters 2, 3, 4, 5 and 6 accordingly analyzed different research questions in relation to regulating FinTech. These chapters found that FinTech brings changes in complexity, resulting in market failures. Regulation is thus needed. However, when regulating FinTech, the pacing issue arises because the pace of FinTech incurs a disconnection between FinTech and regulation. Regulation might thus be prone to become outdated in the era of FinTech. Therefore, AFR was proposed, and sandboxes exemplify AFR. However, through the case study of Taiwan's sandbox, it was found that a sandbox might not be truly and sufficiently adaptive due to several problems. The problems in relation to sandboxes that were found in Chapter 6 are summarized briefly in the following. This Chapter will select some of these problems to address. Therefore, further to the barriers to adaptive FinTech regulation found in Chapter 6, this Chapter answers the research question – *how to address the barriers?*

The first barrier found in the case of Taiwan is that entering a sandbox might be difficult and may be limited to access. Several reasons were found for that. First, applying to enter Taiwan's sandbox incurs high costs that smaller-sized FinTech firms might have difficulty in bearing. For instance, the application processes are repetitive as the applicants have to go through a process in which the regulator counsels and provides opinions to them regarding their applications. After they apply, they need to be assessed by the regulator again. Such repetitive processes bring excessive burdens to the

companies, thus being one of the reasons why only few companies have entered Taiwan's sandbox. Second, FinTech firms' entry to a sandbox might also be subject to the cooperation with financial institutions such as banks, as the FSC emphasizes that FinTech firms should collaborate with banks to enter the sandbox. Reasons from the perspective of public choice were provided in Chapter 6, emphasizing interest groups' influence on FinTech regulation in Taiwan. Third, a company's application will not be approved when there is already one company in the sandbox conducting similar or the same business. This "one-company" rule decreases the number of applications that could be approved, thereby limiting the entry to the sandbox. It is thus also doubtful if learning from only one company is enough.

The second barrier is that organized post-sandbox mechanisms were found to be insufficient. As a result, bringing regulatory changes according to the results of experiments, which is one of the goals and benefits of sandboxes, would not be fully achieved.

The third barrier that was found is that Taiwan's sandbox was formulated based on detailed rules. For example, in the FinTech Sandbox Act, there are detailed rules specifying the types of FinTech applications that could apply to enter the sandbox. Also, the regulations that could be relaxed in the sandbox are also specified in the FinTech Sandbox Act. In Chapter 6, I argued that the sandbox itself may be prone to become outdated in the future as the rules formulating the sandbox are too specific, detailed, and prescriptive.

Among all the barriers above, this Chapter will address most of them but exclude the problem in relation to interest groups' influence as addressing this issue needs greater elaboration and could be left for future research. The table below lists the problems that will be addressed in this Chapter. These problems are categorized into several groups – entering sandboxes, operation

of sandboxes such as leaving sandboxes, and the formulation of sandboxes.

Table 3: Barriers to Adaptive Sandboxes That Are Selected to Be Addressed

Category	Barriers that Need to Be Addressed
Entering Sandboxes	Barrier 1 – The application processes of a sandbox might be too complicated. Thus, applying to enter a sandbox would incur high costs that smaller-sized FinTech firms have difficulties in bearing.
	Barrier 2 – Entering a sandbox might be restricted. For example, a “one-company” rule was found in Taiwan’s sandbox.
Operation of Sandboxes; Leaving Sandboxes	Barrier 3 – Organized post-sandbox mechanisms are insufficient. As a result, it is difficult to bring regulatory changes after leaving a sandbox.
Formulation of Sandboxes	Barrier 4 – If a sandbox is formulated based on detailed rules, the sandbox might thus be prone to be outdated in the future.

The remainder of this Chapter is organized as follows. Section 2 will address the above-mentioned Barriers 1 and 2 which are both in relation to the entry into sandboxes. To address these problems, theoretical explanations of these problems will be given to find the underlying reasons behind these problems. The measures in other jurisdictions’ sandboxes will also be studied.

Then, solutions and examples will be given. Section 3 will address the above Barriers 3 and 4 which are in relation to the operation and formulation of sandboxes. In this section, examples of how other jurisdictions' sandboxes operate and are formulated will be studied. Building on their experiences and the relevant literature, solutions and examples will be given to solve the problems found. Besides, an additional issue regarding the regulatory learning between jurisdictions in the context of sandboxes will be briefly analyzed in Section 4. In particular, since the case of Taiwan's sandbox reveals the pros and cons of the sandbox and provides lessons about how to address the cons to make a sandbox more adaptive, how could other jurisdictions learn? What are the preconditions for learning? The analysis of this additional issue could be the basis on which future research is based. Section 5 concludes.

2. Addressing the Barriers Regarding Entry into Sandboxes

2.1 Barrier 1 – Application Processes of Sandboxes Might be Too Complicated and Thus Lead to High Costs

2.1.1 The Root Cause – Ensuring Consumer Protection

As explained in Chapter 6 and above, it was found that the application processes of Taiwan's sandbox are complicated, incurring high costs of entering the sandbox that smaller-sized FinTech firms might be unable to bear. For instance, it was found that the application processes of Taiwan's sandbox are repetitive and require the applicants to provide documents for multiple times after applying in order to be approved.¹²⁴⁴ As a result, Taiwan's sandbox has received criticism as its threshold seems to be too high and its processes are too complicated, thereby rendering the amount of the

¹²⁴⁴ See *supra* Chapter 6, Section 5.1.2.1.

FinTech firms that could enter the sandbox small.¹²⁴⁵ If there are insufficient testers in a sandbox, how could the benefits and goals of the sandbox be realized? How could we learn from the experiments? Therefore, the first problem that should be addressed is in relation to the accessibility of sandboxes. That is, how to increase the accessibility of sandboxes to an appropriate extent and lower the application costs faced by smaller-sized FinTech firms?

Before proposing some solutions, it would be useful to look into the reasons why the application processes of Taiwan's sandbox are complicated and thus incur high costs. In fact, one of the reasons may be in relation to the regulator's attitude. According to a commentator, the FSC in Taiwan has the fear that if the tester is a smaller-sized FinTech firm rather than a financial institution, consumer protection may be harmed more when some problems occur during the experiment.¹²⁴⁶ In other words, from the FSC's perspective, a financial institution as the tester is more able to, for instance, provide more protection or compensate consumers.¹²⁴⁷ The FSC is thus not incentivized to promote FinTech innovation by allowing more FinTech firms to enter the sandbox. Allowing financial institutions rather than FinTech firms to enter the sandbox is more preferred by the FSC.¹²⁴⁸ Conceptually speaking, this situation reveals two things.

Firstly, this situation reveals the conflict between promoting innovation and ensuring financial stability and consumer protection. A scholar pointed out that such a conflict is particularly often seen in the context of

¹²⁴⁵ See Guo-Rui Chen (陳國瑞), "Jin Rong Jian Li Sha He" Shang Lu Liang Nian Zhi He Zhun Qi An, Wen Ti Chu Zai Na Li? (「金融監理沙盒」上路兩年只核准七案，問題出在哪裡?) [Only 7 Experiments Were Approved Since the FinTech Sandbox Has Been in Effect for 2 Years. What Are the Problems?], GUAN JIAN PING LUN (關鍵評論) [THE NEWS LENS] (Apr. 24, 2020), <https://www.thenewslens.com/article/134230>.

¹²⁴⁶ See *id.*

¹²⁴⁷ See *id.*

¹²⁴⁸ See *id.*

sandboxes.¹²⁴⁹ It is because, among other reasons, testing FinTech to ultimately encourage innovation as one of the goals might inherently be risky as the dangers of the tested FinTech are not well known. Secondly, this situation also reveals that the FSC chose ensuring financial stability and consumer protection as the goal which is more preferred than promoting innovation. In other words, the FSC is erring on the side of caution, namely ensuring financial stability and consumer protection, rather than including more FinTech firms in the sandbox to promote financial innovation.

2.1.2 Solutions and Examples

Further to the root cause found above, how to address the barrier regarding the complicated application processes that incur high costs? Specifically, how to cope with this issue when both encouraging innovation and ensuring financial stability and consumer protection are focused, but the latter seems to be more emphasized by a regulator as described above? In fact, the emphasis on ensuring financial stability and consumer protection does not seem to be improper as argued in the literature.¹²⁵⁰ However, as shown by the case of Taiwan, if such an emphasis is placed through imposing complicated application processes, the goal of promoting innovation would be unduly sacrificed because only few FinTech firms could enter the sandbox. It would also be doubtful if the goal of learning from the experiments in the sandbox could be achieved. How to strike a balance between promoting innovation and ensuring consumer protection? Several potential solutions are proposed next.

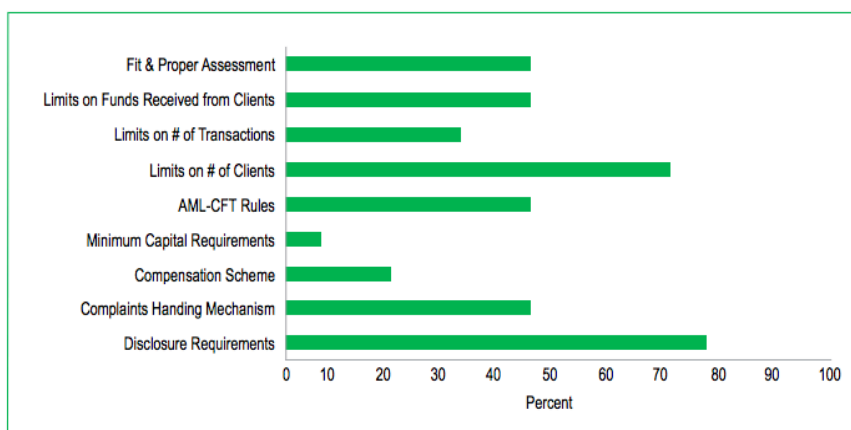
In general, the emphasis on ensuring financial stability and consumer protection without unduly sacrificing innovation could be included through imposing proper limits on the experiments and by providing safeguards

¹²⁴⁹ Hilary J. Allen, *Regulatory Sandboxes*, 87 GEO. WASH. L. REV. 579, 632 (2019).

¹²⁵⁰ *See id.* at 633; Chen, *supra* note 1245.

rather than through complicated application processes.¹²⁵¹ In other words, through imposing proper limits and safeguards, striking a balance between encouraging innovation and ensuring financial stability and consumer protection would be more possible. What are the limits and safeguards? The figure below shows the common limits and safeguards that are used in the sandboxes worldwide.

Figure 8: Common Limits and Safeguards in Sandboxes in the World



Source: WORLD BANK GROUP, *supra* note 1253, at 25.¹²⁵²

¹²⁵¹ See Allen, *supra* note 1249, at 633-34.

¹²⁵² The original source cited by the World Bank Group is “WBG-CGAP Innovation Facilitator survey”. However, I could not find this survey. According to the World Bank, 70 percent of regulators in the world have safeguards to protect the participating consumers in sandboxes. This figure shows that among the surveyed regulators who responded, disclosure requirements and limits on the number of the participating consumers are the most common measures, which are both counted for more than 70 percent of the measures imposed. Other common measures are the assessments of the applications based on certain criteria, limits on the money received from the consumers, AML/CFT measures, and complaints handling mechanisms. Measures such as limits on the number of transactions, minimum capital requirements imposed on the testing companies, and compensation arrangements in case of damages and loss are less common. See WORLD BANK GROUP, *infra* note 1253, at 25; Ivo Jenik, Schan Duff & Sean de Montfort, *Do Regulatory Sandboxes Impact Financial Inclusion? A Look at the Data*, CGAP (Apr. 30, 2019), <https://www.cgap.org/blog/do-regulatory-sandboxes-impact-financial-inclusion-look-data>.

In the figure above, it can be observed that some limits on the number of participating consumers and disclosure requirements are the most commonly used safeguard measures in sandboxes. Thus, first, the experiments in a sandbox could be limited by capping the number of participating consumers. Besides, limiting the testing durations is also a common measure. According to the World Bank, these types of limits are embedded in most of the sandboxes in the world.¹²⁵³ The limits on testing duration and the number of participating consumers also exist in Taiwan's sandbox.¹²⁵⁴

If the above limits are already embedded in a sandbox, second, there could be several further measures of consumer protection. For example, disclosure requirements are also one of the most common safeguard measures. The testers need to reveal information to consumers with respect to, for instance, the scope and the risks of the experiments, and the fees and products involved in the experiments also need to be clearly explained by the testers to consumers.¹²⁵⁵

Third, the termination criteria for experiments should be clearly defined as a safeguard measure. As pointed out by the World Bank, exit strategies for the testing firms with unfeasible business models need to be clear to avoid harming consumers.¹²⁵⁶ A scholar also argued that there should be a mechanism that an experiment would be terminated if the regulator observes

¹²⁵³ See WORLD BANK GROUP, GLOBAL EXPERIENCES FROM REGULATORY SANDBOXES X (2020), <https://documents1.worldbank.org/curated/en/912001605241080935/pdf/Global-Experiences-from-Regulatory-Sandboxes.pdf>.

¹²⁵⁴ See Jin Rong Ke Ji Fa Zhan Yu Chuang Xin Shi Yan Tiao Li (金融科技發展與創新實驗條例) [Financial Technology Development and Innovative Experimentation Act], art. 9 (hereinafter "FinTech Sandbox Act"); Jin Rong Ke Ji Chuang Xin Shi Yan Guan Li Ban Fa (金融科技創新實驗管理辦法) [Regulations Governing Financial Technology Innovative Experimentation], art. 5, 20 (hereinafter "FinTech Sandbox Regulations").

¹²⁵⁵ See WORLD BANK GROUP, *supra* note 1253, at 25.

¹²⁵⁶ WORLD BANK GROUP, *supra* note 1253, at 25.

great risks therein, even though innovation may be slightly inhibited.¹²⁵⁷ The termination measures also exist in Taiwan's sandbox.¹²⁵⁸ Therefore, the above three measures could be seen in most of the sandboxes globally including Taiwan's sandbox.¹²⁵⁹

However, fourth, there are several additional consumer protection measures that need to be imposed or enhanced. For example, consumers' complaints against a sandbox or experiments need to be able to be conveyed.¹²⁶⁰ There could be a survey after experiments to collect consumers' feedback.¹²⁶¹ Taiwan's sandbox seems to be currently lacking these measures. In contrast, a sandbox in Hong Kong stresses that having such consumer complaints handling mechanisms is one of the criteria by which the applications to enter the sandbox will be assessed.¹²⁶² A report discussing the sandboxes in the EU similarly emphasized the importance of having such consumer complaints handling mechanisms.¹²⁶³ However, a more noteworthy implication here is that having such complaints handling mechanisms is not enough; regulators need to be prepared for receiving the complaints and reacting to them. This notion is in line with the argument in a World Bank's report, which pointed out that regulators need to be attuned to the possibility of receiving consumers' complaints.¹²⁶⁴ For example, if the complaints received are in relation to the damage to consumer protection

¹²⁵⁷ Allen, *supra* note 1249, at 633.

¹²⁵⁸ FinTech Sandbox Act, *supra* note 1254, art. 15.

¹²⁵⁹ *E.g., id.* at x, 25; FinTech Sandbox Act, *supra* note 1254, art. 9, 15, 23.

¹²⁶⁰ *See* WORLD BANK GROUP, *supra* note 1253, at 25.

¹²⁶¹ *Id.*

¹²⁶² *Fintech Supervisory Sandbox (FSS)*, HONG KONG MONETARY AUTHORITY, <https://www.hkma.gov.hk/eng/key-functions/international-financial-centre/fintech/fintech-supervisory-sandbox-fss/> (last visited Dec. 8, 2021).

¹²⁶³ BANKING STAKEHOLDERS GROUP, REGULATORY SANDBOXES: A PROPOSAL TO EBA BY THE BANKING STAKEHOLDERS GROUP 12 (July 20, 2017), https://www.eba.europa.eu/sites/default/documents/files/documents/10180/807776/dc1d5046-e211-4b24-aadf-33fc93949017/BSG%20Paper%20on%20Regulatory%20Sandboxes_20%20July%202017.pdf?retry=1.

¹²⁶⁴ WORLD BANK GROUP, *supra* note 1253, at 25.

during experiments, what are the termination rules applied to the experiments? If the regulator receives complaints against the sandbox itself after experiments, how to respond to these complaints? While it is worthwhile considering having the measures that directly focus on the participating consumers such as complaints handling mechanisms, having complete measures to deal with the complaints are also indispensable.

2.2 Barrier 2 – The “One-Company” Rule Renders Entering Sandboxes Limited

2.2.1 The Root Cause – Meeting the Innovation Criterion

The second barrier also relates to the entry to and accessibility of sandboxes. While the first barrier addressed above focuses on the application processes, the barrier studied here focuses on the selection of testers. That is, as described in Section 1, only one company from the same or similar industry could enter Taiwan’s sandbox, namely the “one-company” rule. This one-company rule renders the entry to and accessibility of the sandbox limited. Furthermore, as the regulatory changes after the experiments apply to all the companies in the same industry, it would be doubtful if conducting only one experiment to form the regulatory changes is enough and fair. It would also be doubtful if the regulator could truly learn from one single experiment. This Section will thus address this problem by improving the selection of testers, aiming to facilitate the accessibility of sandboxes as the legal accessibility is an important issue.¹²⁶⁵

Before proposing some solutions in the following section, the root cause of the one-company rule is analyzed here. As stated by the FSC in

¹²⁶⁵ See PHILIP SELZNICK, *THE MORAL COMMONWEALTH: SOCIAL THEORY AND THE PROMISE OF COMMUNITY* 465 (1994); Nuno Garoupa & Andrew P. Morriss, *The Fable of the Codes: The Efficiency of the Common Law, Legal Origins, and Codification Movements*, 2012 U. ILL. L. REV. 1443, 1489-93 (2012).

Taiwan, the reason why the one-company rule is applied is that the tester's business model needs to be "innovative" enough.¹²⁶⁶ It is thus an innovation criterion that has to be met to enter the sandbox. How to determine if a FinTech business is innovative? According to the Regulations Governing Financial Technology Innovative Experimentation, being innovative means:

"The term 'whether the experimentation is innovative' under Subparagraph 2, Article 7 of the Act means the business nature of an innovative experimentation under application is not identical or similar to that of any innovative experimentation already approved by the competent authority..."¹²⁶⁷

Pursuant to the above regulation, the FSC explained that if there is already a tester with the same or similar business model, the one applying to enter the sandbox later would not be considered innovative.¹²⁶⁸ In other words, the FSC mainly determines a FinTech business is innovative by the fact that only one company is solely conducting this FinTech business when applying. Moreover, the FSC also asserted that having only one company with a certain FinTech business in the sandbox could protect this company from being imitated by other companies.¹²⁶⁹

However, is this innovation criterion reasonable? Should we have this innovation criterion? If we have this innovation criterion, how do we fulfil it without unduly limiting the entry to sandboxes? If we do not have it, what

¹²⁶⁶ 「JIN RONG KE JI CHUANG XIN SHI YAN FA GUI」 WEN DA JI (「金融科技創新實驗法規」問答集) [THE FINTECH SANDBOX ACT Q&A] 3, <https://www.fsc.gov.tw/uploaddowndoc?file=news/201804261659470.pdf&filedisplay=%E6%96%B0%E8%81%9E%E7%A8%BF1%E9%99%84%E4%BB%B64-%E9%87%91%E8%9E%8D%E7%A7%91%E6%8A%80%E5%89%B5%E6%96%B0%E5%AF%A6%E9%A9%97%E6%B3%95%E8%A6%8F%E5%95%8F%E7%AD%94%E9%9B%86.pdf&flag=d> (last visited Dec. 10, 2021) [hereinafter THE FINTECH SANDBOX ACT Q&A].

¹²⁶⁷ FinTech Sandbox Regulations, *supra* note 1254, art. 6.

¹²⁶⁸ THE FINTECH SANDBOX ACT Q&A, *supra* note 1266, at 3.

¹²⁶⁹ *Id.*

should the selection criteria focus on? These questions will be answered in Section 2.2.3 by proposing some suggestions. The case of Taiwan's one-company rule described above is merely an example revealing that the innovation criterion is the root cause. In fact, this criterion is also seen in other jurisdictions as studied in the following Section 2.2.2. Therefore, the suggestions that will be proposed could be applied to sandboxes in general. Before making the suggestions, it would be useful to study what the corresponding measures in the sandboxes in other jurisdictions are.

2.2.2 Measures in Other Jurisdictions

Interestingly, not all the sandboxes in the world require being innovative to enter the sandboxes. Even though some sandboxes require meeting an innovation criterion, the assessment criteria differ from Taiwan's one-company rule. In the following, the measures in Hong Kong, Australia, and the UK are studied as examples of not having and having an innovation criterion.

2.2.2.1 Hong Kong

One of Hong Kong's sandboxes does not explicitly require that the testers need to meet an innovation criterion. Besides, this sandbox also emphasizes expanding the accessibility of it for broader stakeholders. In Hong Kong, the sandbox operated by the HKMA (Hong Kong Monetary Authority, the "HKMA") has the assessment criteria for entering the sandbox which mainly focus on, for instance, the scope of the tested services or products, the boundary of the scope, and the consumer protection measures.¹²⁷⁰ Innovation is not explicitly required.

¹²⁷⁰ BAKER MCKENZIE, INTERNATIONAL GUIDE TO REGULATORY FINTECH SANDBOXES 6-7 (2018), https://www.bakermckenzie.com/en/-/media/files/insight/publications/2018/12/guide_intlguideregulatorysandboxes_dec2018.pdf; *Fintech Supervisory Sandbox (FSS)*, *supra* note 1262.

In addition, the upgraded HKMA’s sandbox stresses widening the entry to this sandbox. That is, HKMA’s FinTech sandbox was originally launched in September 2016, and only banks or the FinTech firms collaborating with banks are allowed to enter it.¹²⁷¹ The Sandbox 2.0, which is an upgraded version, was launched in November 2017 to introduce the “Chatroom” function. Accordingly, FinTech firms could consult with the regulator, namely the HKMA, through this Chatroom without going through banks.¹²⁷² FinTech firms’ voice and opinions could thus be directly heard. Hong Kong’s experience shows that requiring innovation is not a must and that expanding the accessibility of sandboxes is more important.

2.2.2.2 Australia and the UK

By contrast, Australia’s and the UK’s sandboxes require that the tested businesses need to be innovative. However, as explained in the following, their assessments of innovation seem to be less rigid than Taiwan’s one-company rule while the innovation criterion could still be satisfied. As a result, those sandboxes could be available for more companies. In other words, having an innovation criterion might be fine. However, it is more important to have an appropriate way to assess whether the innovation criterion is fulfilled.

In Australia, the Australian Government currently operates the enhanced regulatory sandbox (“ERS”) that was launched in September 2020 and replaced the previous sandbox created by Australian Securities and Investments Commission (“ASIC”).¹²⁷³ As commentators pointed out, the

¹²⁷¹ *Id.*

¹²⁷² *Id.*; *Fintech Supervisory Chatroom*, HONG KONG MONETARY AUTHORITY (Nov. 28, 2017), <https://www.hkma.gov.hk/eng/news-and-media/press-releases/2017/11/20171128-4/>.

¹²⁷³ *Enhanced Regulatory Sandbox Regulations*, ASIC, <https://asic.gov.au/for-business/innovation-hub/enhanced-regulatory-sandbox/enhanced-regulatory->

previous sandbox in Australia did not explicitly require satisfying an innovation criterion.¹²⁷⁴ However, the ERS changed this by introducing an “innovation test”.¹²⁷⁵ Nevertheless, this innovation test as a whole only requires that the applicants shall explain why their financial services are new, a new adaptation, or a new improvement of other financial services.¹²⁷⁶ This scope seems to be wide and flexibly without emphasizing the number of companies as the assessment criterion. Therefore, it could be observed that the innovation test in Australia’s ERS is less rigid than Taiwan’s one-company rule, thereby potentially allowing more companies to enter the ERS and being more appropriate.

Similarly, in the UK, the sandbox operated by the FCA also requires “genuine innovation”.¹²⁷⁷ The FCA evaluates the applications by whether the business is new or different from existing businesses in the market.¹²⁷⁸ However, the indicators of genuine innovation seem to be flexible. For instance, according to the FCA, a positive indicator is that there are “few” or no comparable businesses in the market.¹²⁷⁹ A negative indicator is that there are already “numerous” similar businesses in the market.¹²⁸⁰ These measures are different from Taiwan’s one-company rule as the latter deems a FinTech business not to be innovative when there is more than “one” business.

[sandbox-regulations/](#) (last visited Nov. 17, 2021).

¹²⁷⁴ Allen, *supra* note 1249, at 626; BAKER MCKENZIE, *supra* note 1270, at 4-5.

¹²⁷⁵ ASIC, COMPARISON OF KEY FEATURES OF THE ASIC SANDBOX AND THE AUSTRALIAN GOVERNMENT’S ENHANCED REGULATORY SANDBOX 1 (Aug. 25, 2020), <https://download.asic.gov.au/media/5763623/comparison-asic-sandbox-enhanced-regulatory-sandbox-published-25-august-2020.pdf>.

¹²⁷⁶ ASIC, FORM 000 – NOTIFICATION TO USE THE ENHANCED REGULATORY SANDBOX EXEMPTION TO TEST ELIGIBLE FINANCIAL SERVICES 5 (Aug. 2020), <https://download.asic.gov.au/media/5763681/proof-form-000-notification-to-use-enhanced-regulatory-sandbox-exemption-to-test-eligible-financial-services.pdf>.

¹²⁷⁷ *Applying to the regulatory sandbox*, FCA, <https://www.fca.org.uk/firms/innovation/regulatory-sandbox-prepare-application> (last visited Dec. 10, 2021).

¹²⁷⁸ *Id.*

¹²⁷⁹ *Id.*

¹²⁸⁰ *Id.*

Therefore, Australia's and the UK's experiences show that having an innovation criterion is not problematic. However, their measures to assess whether this innovation criterion are less rigid because they do not judge based on the number, namely "one" company, thereby creating more room for interpretation. Entry into the sandboxes is thus not as restricted as in Taiwan's sandbox.

2.2.3 Solutions and Examples

Further to the above description of the measures in other jurisdictions, an innovation requirement for entering a sandbox is not improper. However, the means of assessing innovation should not be as strict as the one-company rule in Taiwan because it results in an unduly high threshold for entering the sandbox. Therefore, it is doubtful if learning from only one experiment is enough to have regulatory changes and if it is fair toward other companies as they could not enter the sandbox. Several solutions are proposed in the following. These solutions focus on the innovation criterion, which is the root cause behind the one-company rule in Taiwan, aiming to lower the threshold for entering a sandbox to a proper extent. Focusing on the innovation criterion in general and referring to other jurisdictions' measures above, these solutions could be applied to a broader extent, which is not limited to the case of Taiwan.

Therefore, further to the questions posed in Section 2.2.1, which are listed again there are two scenarios – having an innovation criterion or not. I study the solutions in these two scenarios. *If we have an innovation criterion, how to fulfill it without unduly limiting the entry to sandboxes? If we do not have an innovation criterion, what should the selection criteria focus on?*

2.2.3.1 Having an Innovation Criterion

Firstly, if an innovation criterion is applied, the means of assessing the innovation should be from a higher-level instead of the rigid one-company rule. The measures in Australia and the UK provide some lessons. In fact, as found in the literature, the reason why the sandboxes in some jurisdictions have an innovation criterion is that promoting innovation is deemed to be one of the goals of sandboxes and one of the principles governing how sandboxes should be crafted.¹²⁸¹ However, satisfying the innovation criterion should not necessarily be based on the fact that there is only one company in the market doing a certain business. Instead, if a business provides a degree of relative advantages,¹²⁸² such a business could be deemed to be innovative. The UK's indicators of genuine innovation exemplify this. That is, unless there are already "numerous" similar businesses, "few" businesses which are similar are still deemed to be innovative.¹²⁸³ It is because these few businesses to a certain degree still provide relative advantages.

2.2.3.2 Not Having an Innovation Criterion

Secondly, if an innovation criterion is not adopted, the selection criteria could focus for instance, more on, consumer protection or whether consumers benefit from experiments.¹²⁸⁴ Therefore, although the threshold for entering a sandbox may be lower due to not having an innovation criterion, this threshold would not be unduly low and could be balanced. The Hong Kong's sandbox mentioned above exemplifies as it emphasizes that having a boundary to the experiment and consumer protection measures is

¹²⁸¹ See Allen, *supra* note 1249, at 626.

¹²⁸² See EVERETT M. ROGERS, *DIFFUSION OF INNOVATION* 15-16 (4th ed., 1995).

¹²⁸³ *Applying to the regulatory sandbox, supra* note 1277.

¹²⁸⁴ Allen, *supra* note 1249, at 627.

the precondition for entering the sandbox.¹²⁸⁵ In addition, as a scholar suggested, the criterion of whether consumers benefit from experiments could be in the form of whether the FinTech business reduces costs, increases efficiency, or offers a wider access to financial services and products, namely financial inclusion.¹²⁸⁶ For instance, in the US, the CFPB's Compliance Assistance Sandbox requires that the applicants shall explain how the services or products offer consumer benefits.¹²⁸⁷ The CFPB's Trial Disclosure Sandbox similarly requires an explanation of how consumer understanding and cost effectiveness of the relevant legal requirements could be improved by experiments.¹²⁸⁸

2.3 Summary

Section 2 studied how to address the barriers regarding the entry into sandboxes. As found in the case of Taiwan, complicated application processes and the one-company rule result in the situation that entering the sandbox is restricted. It is thus doubtful if the benefits of the sandbox could be realized, unless entering the sandbox is fair, and if learning from the sandbox is feasible.

I found that the barrier regarding the complicated application processes incurring high costs results from the fact that the regulator errs on the side of ensuring financial stability and consumer protection rather than promoting innovation. This root cause was found by studying the case of Taiwan. However, as supported by the literature, ensuring financial stability and

¹²⁸⁵ *Fintech Supervisory Sandbox (FSS)*, *supra* note 1270.

¹²⁸⁶ *See* Allen, *supra* note 1249, at 627.

¹²⁸⁷ BUREAU OF CONSUMER FINANCIAL PROTECTION, POLICY ON THE COMPLIANCE ASSISTANCE SANDBOX 38 (Sep. 10, 2019), https://files.consumerfinance.gov/f/documents/cfpb_final-policy-on-cas.pdf.

¹²⁸⁸ BUREAU OF CONSUMER FINANCIAL PROTECTION, POLICY TO ENCOURAGE TRIAL DISCLOSURE PROGRAM 30 (Sep. 10, 2019), https://files.consumerfinance.gov/f/documents/cfpb_final-policy-to-encourage-tdp.pdf.

consumer protection could be achieved through imposing proper limits and safeguards on experiments rather than imposing unreasonably complicated application processes and thus limiting the entry to sandboxes. Several examples of the limits and safeguards were thus proposed as potential solutions. Specifically, several types of safeguards such as limits on the duration of experiments and participants, experiment termination mechanisms, and disclosure requirements were found to exist in sandboxes in the world including in Taiwan's sandbox. However, the literature also shows that several measures directly focusing on the participating consumers such as receiving their complaints and feedback or some consumers surveys are lacking. It was thus recommended to introduce or strengthen this type of measures.

To address the second barrier, which is the accessibility problem created by the one-company rule, it is helpful to find the reason why such a rule is adopted. The reason is that the regulator in Taiwan deemed this rule to be able to ensure that the tested business is innovative because it is the only case. However, the one-company rule resulted in several problems such as unduly limited entry to sandboxes. By studying different jurisdictions' experiences, I found that having an innovation criterion might be fine. However, having a proper means of fulfilling this innovation criterion is critical. Thus, this Section argued that the innovation criterion could be satisfied in a different way rather than by unduly imposing the one-company rule. For instance, focusing on whether the business brings relative advantage rather than the number of the business would thus be helpful. The UK's measures exemplify this. Australia's experience of assessing innovation also exemplifies a less rigid method that creates more room for explanation. Indeed, as the one-company rule and innovation criterion might result in a high threshold for entering sandboxes, simply removing both of them could be considered. By studying other jurisdictions' experiences, a means of duly lowering the threshold for entering a sandbox is focusing on consumer welfare and

protection as selection criteria rather than having an innovation test. This means, in fact, that it has been recommended by scholars because scholars doubted regulators have the expertise and are capable of assessing innovation after all.¹²⁸⁹ The measures in Hong Kong and the US are the examples of this approach.

3. Addressing the Barriers Regarding the Operation and Formulation of Sandboxes

3.1 Barrier 3 – Organized Post-sandbox Mechanisms Are Insufficient

3.1.1 This Barrier Exists in Different Jurisdictions

As mentioned in Section 1, one of the barriers to an adaptive and effective FinTech sandbox could be the lack of organized post-sandbox mechanisms according to the case study of Taiwan's sandbox. As a result, it might be difficult to bring regulatory changes or to authorize the tested businesses after the testers successfully leave the sandbox. In literature, it has been argued that regulation should be capable of responding to its own performance by conducting evaluation and modification.¹²⁹⁰ Meanwhile, regulation should also be able to recognize the changes in the regulatory environment.¹²⁹¹ However, the lack of organized post-sandbox mechanisms renders the adaptation of regulation and learning from experiments difficult. For instance, the testers who already left the sandbox have faced a situation that they still could not conduct their businesses even after successfully

¹²⁸⁹ E.g., Allen, *supra* note 1249, at 626; Dirk A. Zetzsche, Ross P. Buckley, János N. Barberis & Douglas W. Arner, *Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation*, 23 *FORDHAM J. CORP. & FIN. L.* 31, 70 (2017); Anton N. Didenko, *A Better Model for Australia's Enhanced Fintech Sandbox*, 44 *UNSW L.J.* 1078, 1108 (2021).

¹²⁹⁰ Robert Baldwin & Julia Black, *Really Responsive Regulation*, 71 *MOD. L. REV.* 59, 72 (2008); Julia Black & Robert Baldwin, *Really Responsive Risk-Based Regulation*, 32 *LAW & POL'Y* 181, 186 (2010).

¹²⁹¹ Baldwin & Black, *supra* note 1290, at 73-74, 81.

testing the businesses as regulatory changes were not ready yet.¹²⁹² The reason why the regulatory changes were not ready is that the sandbox only focused on the experiments themselves and ignored to a certain extent what to do after the experiments.¹²⁹³ For instance, the rules about how and when to adjust regulations according to the experiment results were not clear. A tester in Taiwan, the KGI bank, had experienced the situation where the company's services and products could not be launched even though the tester had already left the sandbox.¹²⁹⁴ The root cause was the lack of organized post-experimentation mechanisms forming regulatory changes.¹²⁹⁵

Scholars mentioned that the situation where post-sandbox mechanisms are not clear exists not only in Taiwan but also in other jurisdictions.¹²⁹⁶ For instance, a report pointed out that in the UK, most of the companies sought full authorization after leaving the sandbox.¹²⁹⁷ Some companies reconsidered or adjusted their business models according to the lessons learned from the sandbox.¹²⁹⁸ However, commentators pointed out that the exit process in the UK is not clear enough for the testing companies.¹²⁹⁹

¹²⁹² See *supra* Chapter 6, Section 5.1.2.2.

¹²⁹³ See Jin-Lung Peng (彭金隆) & Cheng-Yun Tsang (臧正運), *Wo Guo Jin Rong Ke Ji Chuang Xin Shi Yan Ji Zhi Zhi Jian Shi Yu Gou Jian* (我國金融科技創新實驗機制之檢視與構建) [*Examination and Establishment of Taiwan's FinTech Innovation Experimentation Mechanisms*], FTRC (國立政治大學商學院金融科技研究中心), <http://www.fttc.nccu.edu.tw/wordpresseng/?p=3536> (last visited Dec. 10, 2021).

¹²⁹⁴ Zhen-Ling Peng (彭禎伶) & Qiao-Yi Wei (魏喬怡), *Sha He Shi Yan Cheng Gong Fa Gui Gen Bu Shang Kai Ji Yin Jin Rong Xiao Bai Xian Ting* (沙盒實驗成功法規跟不上 凱基銀金融小白先停) [*Regulation Could Not Keep Pace After the Success of the Sandbox Experimentation. The KGI Bank's Project Stopped.*], GONG SHANG SHI BAO (工商時報) [COMMERCIAL TIMES] (Aug. 6, 2020), <https://m.ctee.com.tw/livenews/aj/a91617002020080620245843>.

¹²⁹⁵ See *id.* Regarding the relevant discussions of this case, see *supra* Chapter 6, Section 5.1.2.2.

¹²⁹⁶ Peng & Tsang, *supra* note 1293.

¹²⁹⁷ DELOITTE, A JOURNEY THROUGH THE FCA REGULATORY SANDBOX: THE BENEFITS, CHALLENGES, AND NEXT STEPS 2, 6 (2018).

¹²⁹⁸ *Id.* at 6.

¹²⁹⁹ *Id.*

Studies thus emphasized the importance of post-sandbox mechanisms.¹³⁰⁰ Therefore, since a more systematic regulatory approach could enable learning and revisions of regulations,¹³⁰¹ it is suggested that post-sandbox mechanisms should be systematically established. What does “systematically” mean? Solutions and examples follow.

3.1.2 Solutions and Examples

In the situation that regulatory changes are needed but not ready upon exiting a sandbox, there could be a waiting period before introducing formal regulatory amendments. This solution was also studied as one of the elements of AFR of FinTech.¹³⁰² Scholars recommended that the successfully tested FinTech could be allowed within, for instance, 2 to 3 years after experiments by giving a temporary conditional authorization.¹³⁰³ Doing so has some benefits. Firstly, the tested FinTech firms do not need to wait until the relevant laws are amended to conduct their businesses. In Chapter 6, it was shown that a FinTech firm suffered from this period and the uncertain legal status of its business even after leaving the sandbox.¹³⁰⁴ Therefore, giving a temporary conditional authorization could be a solution in this phase. Secondly, regulators could also benefit from this 2- to 3-year period as they can re-examine the results of more experiments, formulating the future regulatory adjustments.¹³⁰⁵ Thirdly, there could be more experiments conducted in this 2- to 3-year period; therefore, regulatory

¹³⁰⁰ See, e.g., Peng & Tsang, *supra* note 1293; RADOSTINA PARENTI, REGULATORY SANDBOXES AND INNOVATION HUBS FOR FINTECH: IMPACT ON INNOVATION, FINANCIAL STABILITY AND SUPERVISORY CONVERGENCE 37 (2020), [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652752/IPOL_STU\(2020\)652752_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652752/IPOL_STU(2020)652752_EN.pdf); Ahmad Alaasar, Anne-Laure Mention & Tor Helge Aas, *Exploring How Social Interactions Influence Regulators and Innovators: The Case of Regulatory Sandboxes*, 160 TECHNOL. FORECAST. & SOC. CHANGE 1, 7 (2020).

¹³⁰¹ See John Braithwaite, *The Essence of Responsive Regulation*, 44 U.B.C.L. REV. 475, 513-14 (2011).

¹³⁰² See *supra* Chapter 5, Section 3.2.2.2.

¹³⁰³ Peng & Tsang, *supra* note 1293.

¹³⁰⁴ See *supra* Chapter 6, Section 5.1.2.2.

¹³⁰⁵ Peng & Tsang, *supra* note 1293.

adjustments do not need to be brought after each experiment. Accordingly, the costs of adjusting regulations would not be unduly high because the frequency of adjusting regulations is lower.¹³⁰⁶ Equally important, if more experiments could be conducted before having regulatory amendments, there would be more lessons learned from these experiments. This waiting here in a sense reflects the value of waiting as the enactment costs would be lower if amending regulation is done less often.¹³⁰⁷

From the perspective of learning and knowledge transfer, having organized post-sandbox mechanisms also brings benefits to regulators. That is, scholars argued that there should be some follow-up mechanisms after a sandbox.¹³⁰⁸ For instance, there could be some knowledge sharing mechanisms in order to enable different stakeholders such as other regulatory authorities within a jurisdiction to learn from the experiments.¹³⁰⁹ Examples given in the literature are some channels between different regulatory authorities within a jurisdiction, through which the knowledge gained from sandbox experiments could be transferred.¹³¹⁰ After all, it has been argued in literature that, since FinTech raises complicated and various issues, issues about coordination between different regulators within a jurisdiction would merit attention.¹³¹¹ Therefore, if there are organized post-sandbox mechanisms enabling effective knowledge sharing between domestic regulators, the coordination between them might be facilitated. It is because, among other reasons, the clarity of the FinTech issues that these regulators might jointly engage in would be increased.¹³¹²

¹³⁰⁶ *Id.*

¹³⁰⁷ See Barbara Luppi & Francesco Parisi, *Optimal Timing of Legal Intervention: The Role of Timing Rules*, 122 HARV. L. REV. F. 18, 24, 29 (2009); Jacob E. Gersen & Eric A. Posner, *Timing Rules and Legal Institutions*, 121 HARV. L. REV. 543, 559 (2007).

¹³⁰⁸ *E.g.*, Allen, *supra* note 1249, at 639-40; PARENTI, *supra* note 1300, at 38-39.

¹³⁰⁹ *Id.*

¹³¹⁰ *Id.* at 39-40.

¹³¹¹ CHARLES TAYLOR, CHRISTOPHER WILSON, EIJA HOLTINEN & ANASTASIJA MOROZOVA, IMF, INSTITUTIONAL ARRANGEMENTS FOR FINTECH REGULATION AND SUPERVISION 5-6 (2019).

¹³¹² See PARENTI, *supra* note 1300, at 40.

3.2 Barrier 4 – Sandboxes Formulated by Detailed Rules Might Be More Likely to Be Outdated

3.2.1 Theoretical Explanations

The fourth barrier found in Chapter 6 and selected here is that when a sandbox is formulated based on detailed rules, these rules and thus the sandbox itself might be likely to be outdated in the future. As discussed above in Sections 2.1 and 2.2, the entry rules of Taiwan’s sandbox are prescriptive and detailed, emphasizing complicated application processes and the strict one-company rule. In addition, the laws that could be relaxed during experiments are also explicitly specified in the FinTech Sandbox Act.¹³¹³ These laws are mainly the licensing requirements applied to specific business models.

However, as FinTech is still evolving, it might not be feasible to determine in advance based on specific business models which laws could be relaxed. For instance, it might be possible in the future that a FinTech that enters the sandbox and has a new business model will face difficulties being exempted from laws. It is because this future new business model might not be included in the scope of the exemption that was determined yesterday. Therefore, while sandboxes generally establish a customized regime applying to each tester,¹³¹⁴ Taiwan’s sandbox tends to be more rigid to the extent that this sandbox is formulated based on detailed and prescriptive rules.

Indeed, these detailed and prescriptive rules could provide more regulatory certainty and lower informational costs when interpreting the

¹³¹³ FinTech Sandbox Act, *supra* note 1254, art. 26.

¹³¹⁴ See PARENTI, *supra* note 1300, at 9-10.

sandbox regulation.¹³¹⁵ However, in the context of regulating FinTech in the face of information deficits and complexity, enacting detailed rules for experimenting FinTech would incur higher costs. It is because, for instance, more efforts have to be made to find the information to enact detailed rules. In addition, as described above, when FinTech is still evolving and changing, these rules and thus the sandbox itself would possibly be more outdated and obsolete in the future. This situation reflects scholars' argument that obsolescence matters especially in the situation that regulation needs to be revised more often to adapt to the changing environment.¹³¹⁶ In the context of financial regulation, which is relevant to FinTech, scholars similarly argued that detailed rules might be more easily outdated.¹³¹⁷ Moreover, if these detailed rules need to be amended or new regulations need to be enacted to adapt to the future FinTech, it may be costly.¹³¹⁸ It is because, for instance, revising or enacting detailed rules requires more effort to find the information needed.

According to the above explanations, it seems that relying on detailed rules to establish a sandbox is less preferable as the sandbox would be more likely to be outdated. The case of Taiwan's sandbox mirrors this notion. How are the sandboxes in other jurisdictions formulated? Several examples are studied in the following section.

¹³¹⁵ See, e.g., Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557, 569, 571 (1992); Cass R. Sunstein, *Problems with Rules*, 83 CAL. L. REV. 953, 972-73 (1995).

¹³¹⁶ See Isaac Ehrlich & Richard A. Posner, *An Economic Analysis of Legal Rulemaking*, 3 J. LEGAL STUD. 257, 273-74, 279 (1974).

¹³¹⁷ Julia Black, *Paradoxes and Failures: New Governance Techniques and the Financial Crisis*, 75 MOD. L. REV. 1037, 1044 (2012); Dan Awrey, *Regulating Financial Innovation: A More-Principles-Based Proposal?*, 5 BROOK. J. CORP. FIN. & COM. L. 273, 285, 294 (2011).

¹³¹⁸ See, e.g., Sunstein, *supra* note 1315, at 972-73; Kaplow, *supra* note 1315, at 569, 572, 574; Vincy Fon & Francesco Parisi, *On the Optimal Specificity of Legal Rules*, 3 J. INSTITUTIONAL. ECO. 147, 157 (2007).

3.2.2 Formulation Models of the Sandboxes in Other Jurisdictions

3.2.2.1 The Philippines and the UK

Through observing sandboxes in other jurisdictions, it seems that there are several models for formulating sandboxes. After studying these models Sections 3.2.2.1 and 3.2.2.2, Section 3.2.2.3 will draw a spectrum of the models of the sandboxes in the world.

First, sandboxes could be formulated at a more higher-level and generic way. This model thus allows for more supervisory discretion, deciding the testing parameters on a case-by-case basis.¹³¹⁹ For example, the sandboxes in the Philippines exist in the absence of clear laws, regulations, rules or guidelines.¹³²⁰ Companies which seek to test their products or services need to apply to the regulators under the “test-and-learn” approach in the Philippines.¹³²¹ In this model, the regulator has great discretionary powers to evaluate the applications. These sandboxes in the Philippines thus have been criticized due to the lack of transparency to the companies applying to participate in them.¹³²² However, the regulators in the Philippines could retain more discretion and be more flexible evaluating the applications and determining the testing parameters.¹³²³

In addition, the UK’s sandbox has been seen to operate based on some higher-level principles.¹³²⁴ Besides, the UK’s sandbox was also established without changes to the legislation but within the boundaries of existing

¹³¹⁹ See PARENTI, *supra* note 1300, at 10.

¹³²⁰ See Philip Keller, *Philippines Fintech Push Makes it a Compelling Market to Watch*, REGULATION ASIA (Mar. 19, 2019), <https://www.regulationasia.com/philippines-fintech-push-makes-it-a-compelling-market-to-watch/>; BAKER MCKENZIE, *supra* note 1270, at 10-11.

¹³²¹ *Id.*; Keller, *supra* note 1320.

¹³²² *Id.*

¹³²³ *See id.*

¹³²⁴ See Allen, *supra* note 1249, at 593, 616.

laws.¹³²⁵ The UK’s sandbox seems to be less detailed than Taiwan’s sandbox as the latter was established through enacting detailed new regulations. However, the UK’s sandbox differs from the sandboxes in Philippines to the extent that there are still some guidelines on the FCA’s website ruling the operation of the sandbox.¹³²⁶

3.2.2.2 Australia

Secondly, by contrast, some sandboxes such as Taiwan’s sandbox were established by enacting or amending regulations, being formulated based on more detailed rules. Another similar example seems to be Australia’s new sandbox, namely the ERS, which was mentioned in Section 2.2.2. As described by the ASIC, the ERS was introduced by legislative amendments made in 2020.¹³²⁷ In a document named “Comparison of key features of the ASIC sandbox and the Australian Government’s enhanced regulatory sandbox”, it could be observed that the ERS superseded the previous sandbox by expanding the scope of the sandbox and adding more detailed requirements in terms of, for instance, eligibility, testing parameters, and consumer protection measures.¹³²⁸ A scholar thus argued that the ERS is more complex and might bring more confusion without enough guidance provided by the regulator.¹³²⁹

Therefore, Australia’s new ERS seems to introduce more detailed rules. Will the ERS also be easily outdated in the future? Rather than assertively giving an answer in this Chapter, however, I observed that the ERS has a review mechanism that the sandbox in Taiwan seems to lack. That is, a rule

¹³²⁵ *Id.* at 593.

¹³²⁶ *See Applying to the regulatory sandbox, supra* note 1277.

¹³²⁷ *Enhanced regulatory sandbox regulation*, ASIC, <https://asic.gov.au/for-business/innovation-hub/enhanced-regulatory-sandbox/enhanced-regulatory-sandbox-regulations/> (last visited Nov. 23, 2021).

¹³²⁸ ASIC, *supra* note 1275, at 1-4.

¹³²⁹ Didenko, *supra* note 1289, at 1112-13.

in the ERS sets the “legislative requirement for the Treasury to arrange a review of the enhanced regulatory sandbox after it has been in place for 12 months”.¹³³⁰ Therefore, this review mechanism would provide a chance that the ERS may be systematically reviewed to avoid obsolescence. However, a systematic review mechanism was not found in Taiwan’s FinTech Sandbox Act. As I noted in Chapter 6, one of the key components of AFR is the regular reviews and follow-ups after the implementation of regulation.¹³³¹ The updating of the regulation subsequent to these reviews and follow-ups is based on the information gained during the time when the regulation has been in effect.¹³³² Therefore, as the review mechanism is embedded in the ERS, the ERS might be less prone to be outdated.

3.2.3 A spectrum of the Design Models of Sandboxes

According to the above analyses, a spectrum of the formulation models of sandboxes could be drawn. This spectrum is shown below. Explanations follow.

¹³³⁰ ASIC, *supra* note 1275, at 4.

¹³³¹ *See supra* Chapter 5, Section 3.2.1.

¹³³² *See id.*

Several sandboxes lie between these two endpoints. For instance, the UK's sandbox is more higher-level and principles-based.¹³³³ This sandbox thus looks similar as the sandboxes in Philippines. However, the UK's sandbox is on the right side of Philippines' sandboxes because some guidelines for the UK's sandbox could be found. In comparison with the UK's sandbox, Australia's ERS seems to be a bit closer to the endpoint where Taiwan's sandbox lies. It is because the ERS introduced more detailed rules by amending regulations. However, the ERS differs from Taiwan's sandbox to the extent that, among others, a review mechanism is embedded.

3.2.4 Solutions and Examples

3.2.4.1 Idea of "Principles-Based Regulation"

Based on the above observation and arguments, some solutions might help address the problems stemming from the nature of a sandbox relying on detailed, specific, and prescriptive rules. These solutions were found by looking into the case of Taiwan's sandbox. However, as sandboxes are still being established in some jurisdictions such as some countries in Latin America,¹³³⁴ these solutions could provide some implications and be applied on a more general level. Rather than stating that a detailed sandbox such as Taiwan's sandbox should totally move to the other endpoint, this Chapter argues that this sandbox could move "closer" to that endpoint. That is, sandboxes should generally be formulated in a more "principles-based" manner. This idea is supported by the financial regulation literature which advocates principles-based regulation to regulate financial innovation.¹³³⁵

¹³³³ See Allen, *supra* note 1249, at 593, 616.

¹³³⁴ See Fabiola Seminario, *Regulatory Sandboxes in LatAm: Fintech Test Environments Take Shape*, IUPANA (Mar. 29, 2021), <https://iupana.com/2021/03/29/regulatory-sandbox-in-latam/?lang=en>.

¹³³⁵ E.g., Awrey, *supra* note 1317, at 290-91, 315; Julia Black, Martyn Hopper & Christa Band, *Making A Success of Principles-based Regulation*, 1 L. FIN. MKT. REV. 191, 191, 195, 198 (2007); Cristie Ford, *Principles-Based Securities Regulation in the*

Black et al. defined the principles-based regulation as follows.

“In general terms, Principles-based regulation means moving away from reliance on detailed, prescriptive rules and relying more on high-level, broadly stated rules or Principles to set the standards by which regulated firms must conduct business.”¹³³⁶

Building on the above definition, Awrey advocated “MPBR” (more principles-based regulation, “MPBR”) to regulate modern financial markets and deal with the complexity in them.¹³³⁷ Specifically, Awrey argued that the principles serving as the goals or results that the regulation aims to achieve are essential to MPBR.

“The first element is the identification and articulation by regulators of legal norms—formulated as regulatory principles—which identify the regulatory outcomes (or desired behaviors) they are designed to achieve (or incentivize), and not merely the technical rules and procedures with which regulated actors are expected to comply.”¹³³⁸

3.2.4.2 Towards More Principles-Based Sandboxes

According to the above notions found in literature, in order to move sandboxes from the right endpoint a bit closer to the left one by being more principles-based, two factors among others are critical. In other words, this Chapter found that the meaning of applying “principles-based” in the context of sandboxes is three-fold as follows.

Firstly, the rules governing how sandboxes operate should be less

Wake of the Global Financial Crisis, 55 R.D. MCGILL 1, 12-13 (2010).

¹³³⁶ Black et al., *supra* note 1335, at 191.

¹³³⁷ Awrey, *supra* note 1317, at 273.

¹³³⁸ *Id.* at 286.

detailed, specific, and prescriptive. For instance, to avoid being outdated in the future, the laws that could be relaxed during experiments should not be prescriptively stated by specifying certain business models in Taiwan's FinTech Sandbox Act. The exemptions during experiments could be determined by the regulator and tailored to the different testers' business models. Therefore, a benefit of being less detailed, specific, and prescriptive is that the sandbox itself could better avoid obsolescence. Another benefit is that principles-based regulation provides more flexibility, thereby being easier to adjust and adapt.¹³³⁹ According to studies, detailed rules tend to be either over-inclusive or under-inclusive.¹³⁴⁰ If there is a need to correct these detailed rules to fit the future reality, more efforts would be needed as these detailed rules are more rigid.

Secondly, there should be some principles setting the results that the sandbox aims to achieve, and the less detailed rules and these principles should be closely fastened together. For example, Allen argued that sandboxes should be principles-based to the extent that these sandboxes aim to, for instance, promote innovation, consumer protection, and financial stability.¹³⁴¹ The rules formulating a sandbox should thus function to fulfil at least one of these three principles. In Taiwan's FinTech Sandbox Act, several guiding principles could be found in Article 1.

“This Act is enacted for the purpose of creating a safe environment for experimentation involving innovative financial technologies (referred to as “innovative experimentation” hereunder) to develop technology-based innovative financial products or services, facilitate the development of inclusive financial systems and financial technologies, and put into effect the protection of innovative experimentation

¹³³⁹ See Awrey, *supra* note 1317, at 278.

¹³⁴⁰ Black et al., *supra* note 1335, at 194.

¹³⁴¹ Allen, *supra* note 1249, at 593, 617.

participants (referred to as the “participants” hereunder) and financial consumers.”¹³⁴²

Thus, there are several principles guiding Taiwan’s sandbox – developing innovation, facilitating financial inclusion, and protecting consumers. However, the example mentioned before, which is Taiwan’s sandbox prescriptively limits the laws that could be relaxed during experiments, and does not seem to explicitly serve any of these principles. Rather, as described before, this rule might render the sandbox outdated in the future, thereby hindering innovation.

Lastly, the systematic review mechanism that is embedded in Australia’s ERS could be introduced to improve any sandboxes such as Taiwan’s sandbox. As FinTech is still developing, having, for instance, regular reviews on the operation and performance of a sandbox could help the sandbox adjust and adapt to FinTech’s development.

3.3 Summary

This Section addressed the two barriers regarding the operation and formulation of sandboxes. That is, the operation of Taiwan’s sandbox was found not so effective for forming regulatory changes due to the lack of organized post-sandbox mechanisms. The lack of organized post-sandbox mechanisms also renders the adaptation of regulation and learning from experiments difficult. Besides, Taiwan’s sandbox was formulated based on detailed, prescriptive, and specific rules, thereby being prone to be outdated in the future.

This Chapter found that the lack of organized post-sandbox

¹³⁴² FinTech Sandbox Act, *supra* note 1254, art. 1.

mechanisms exists not only in Taiwan but also in other jurisdictions.¹³⁴³ For instance, the existing process of the UK's sandbox was regarded as unclear.¹³⁴⁴ It was suggested that post-sandbox mechanisms could be systematically established. What does "systematically" mean? For instance, firstly, the successfully tested FinTech could be allowed within, for instance, 2 to 3 years after experiments by giving a temporary conditional authorization.¹³⁴⁵ This period enables those regulated to conduct their businesses after leaving a sandbox without waiting for the formal regulatory changes. In addition, this period gives regulators some time to examine the results of more experiments to bring regulatory changes. Furthermore, as regulatory changes do not need to be brought after each experiment, the costs of adjusting regulations would not be unduly high. This reflects the value of waiting. Secondly, systematic post-sandbox mechanisms could also include some follow-up mechanisms after a sandbox. For example, channels between different regulators within a jurisdiction could be built to share the information regarding the experiments results, thereby jointly learning from the experiments. Such measures are thus beneficial especially from the perspective of knowledge sharing and transfer between different regulators within a jurisdiction.¹³⁴⁶

With respect to the barrier in the formulation of sandboxes, this Chapter found in literature that utilizing detailed, specific, and prescriptive rules might render a sandbox more easily obsolete in the future. Furthermore, if a sandbox is obsolete, the costs of revising the sandbox rules might be higher because the frequency of revising would be higher when FinTech is continuously and rapidly developing and changing. In order to address the above problems, I studied the formulation models of the sandboxes in several jurisdictions. I found that there are several main models.

¹³⁴³ Peng & Tsang, *supra* note 1293.

¹³⁴⁴ DELOITTE, *supra* note 1297, at 6.

¹³⁴⁵ Peng & Tsang, *supra* note 1293.

¹³⁴⁶ PARENTI, *supra* note 1300, at 39-40.

Firstly, the Philippines' sandboxes represent the most generic and higher-level model as the sandboxes are based on only a generic approach without specific laws, regulations, rules or guidelines. Secondly, the UK's sandbox seems to be less generic than Philippines' sandboxes but still higher-level as guidelines and principles were relied upon to operate the sandbox. Thirdly, Australia's ERS seems to be a bit more detailed than the sandboxes in both the Philippines and the UK as more complex rules were utilized to establish the ERS. However, the ERS has a review mechanism mandating reviewing the ERS after a certain period of time. The ERS was established by amending regulations. Fourthly, Taiwan's sandbox might represent the most specific and detailed model because this sandbox was established through enacting new and specific regulations which specify different aspects of the sandbox. Besides, a review mechanism is not included.

According to the above findings, this Chapter argued that the idea of "principles-based regulation", which has been advocated by scholars to regulate financial innovation, could be applied to address the barriers to adaptive and effective FinTech sandboxes. That is, this Chapter argued that Taiwan's sandbox could be moved from the endpoint of the formulation model spectrum towards another endpoint, becoming a "more principles-based sandbox". As found in literature, this idea is three-fold. Firstly, the rules governing how sandboxes operate should be less detailed, specific, and prescriptive. Measures in other countries' sandboxes which are closer to another endpoint of the spectrum such as the UK's sandbox could be adopted. Secondly, there should be some principles setting the results that the sandbox aims to achieve, and the aforementioned less detailed rules and these principles should be closely fastened together. Lastly, the systematic review mechanism that is embedded in Australia's ERS could also be introduced.

4. An Additional Issue – Regulatory Learning Between Jurisdictions in the Context of Sandboxes

4.1 Establishing a Network as One of the Possible Means of Mutual Learning

Focusing on the case of Taiwan and addressing the problems found in Taiwan’s sandbox, the above sections revealed the lessons learned with respect to the entry to sandboxes, the operation of sandboxes, and the formulation of sandboxes. As sandboxes exist not only in Taiwan but also in other jurisdictions, are there opportunities for mutual learning between jurisdictions in the context of regulating FinTech and operating sandboxes? If so, how? What are the preconditions for learning? This Section focuses on these issues.

In fact, there might be different ways to realize the mutual learning between jurisdictions in the context of regulating FinTech and operating sandboxes. However, by resorting to the literature, establishing a network to do so has been emphasized as a possible way.¹³⁴⁷ The FCA, which is the financial regulator in the UK pioneering the establishment of a sandbox to regulate FinTech, also emphasized the importance of having such a cross-border network within which regulators in different jurisdictions could cooperate and share experiences.¹³⁴⁸ Therefore, the following analyses center on such a network through which learning between jurisdictions could be realized.

4.3 The Global Financial Innovation Network, the “GFIN”

¹³⁴⁷ See, e.g., WORLD BANK GROUP, *supra* note 1253, at 14-15.

¹³⁴⁸ *Global Financial Innovation Network (GFIN)*, FCA, <https://www.fca.org.uk/firms/innovation/global-financial-innovation-network> (last visited Nov. 25, 2021).

In fact, such a network has already been built, and Taiwan’s financial regulator, namely the FSC, is one of the members. The mutual learning on regulating FinTech and operating sandboxes is thus possible through this network. However, it is not clear in the available information how Taiwan’s experience was shared or how Taiwan learned from other countries through this network. As Taiwan’s experience was analyzed in this study, and lots of information was gained, Section 4.3 will study how Taiwan’s experience and the corresponding findings could be shared and learned by exploring the preconditions for learning. A brief introduction of the network that has already been built is first given in the following paragraph.

The GFIN (Global Financial Innovation Network, the “GFIN”) was launched in January 2019.¹³⁴⁹ The introduction of the GFIN followed the UK’s FCA’s proposal of establishing a global sandbox. The GFIN aims to support financial innovation by, for instance, helping innovative firms interact with regulators, aiding cross-border experiments, and facilitating the sharing of regulating experiences between member regulators.¹³⁵⁰ With respect to sharing regulating experiences between member regulators, it has, for instance, a workstream of “collaboration”, which is a network and channel on which member regulators could share their experiences in regulating.¹³⁵¹ As of today, the GFIN has 49 members, which are financial regulators or supervisors in different jurisdictions.¹³⁵² Among them, the UK’s FCA currently leads and chairs.¹³⁵³ Taiwan’s financial regulator, namely the FSC, joined the GFIN on May 1, 2019.¹³⁵⁴ By participating in

¹³⁴⁹ *Id.*

¹³⁵⁰ *Id.*

¹³⁵¹ *Collaboration Workstream*, COLLABORATION FOR DEVELOPMENT WORLD BANK, <https://collaboration.worldbank.org/content/sites/collaboration-for-development/en/groups/gfin/groups/collaboration.html> (last visited Oct. 21, 2021).

¹³⁵² *Our Members*, GFIN, <https://www.thegfin.com/members#MembersMain> (last visited Oct. 21, 2021).

¹³⁵³ *Global Financial Innovation Network (GFIN)*, *supra* note 1349.

¹³⁵⁴ *Jin Guan Hui Cheng Wei Quan Qiu Jin Rong Chuang Xin Lian Meng (GFIN) Hui Yuan Xiang Guan Zi Xun Jie Lu* (金管會成為全球金融創新聯盟(GFIN)會員相關資訊揭露) [*Revealing Information Regarding the FSC’s Participation in the GFIN*],

this international organization and sharing experiences with other countries, the FSC aimed to foster FinTech's development in Taiwan.¹³⁵⁵

It is worth mentioning that the GFIN is one of the networks of financial regulators that are related to FinTech. Aiming to support financial innovation and combat the associated risks such as money laundering risks,¹³⁵⁶ the FATF (Financial Action Task Force, the "FATF") is also an example of such networks. Specifically, the FATF aims to increase the knowledge sharing and to enhance the collaboration of governments in the context of applying AML/CFT obligations to new technologies through,¹³⁵⁷ for instance, issuing recommendations.¹³⁵⁸ The FATF was established in 1989, and it currently comprises 39 members, which are mostly governments in jurisdictions.¹³⁵⁹ As the GFIN and the FATF are both examples of international institutional arrangements about FinTech, both of them have been simultaneously mentioned and discussed in literature when studying regulation of FinTech.¹³⁶⁰ However, the GFIN will be focused in the following section as it is in relation to both regulating FinTech and sandboxes.

JIN RONG JIAN DU GUAN LI WEI YUAN HUI (金融監督管理委員會) [FINANCIAL SUPERVISORY COMMISSION] (June 25, 2019), https://www.fsc.gov.tw/ch/home.jsp?id=726&parentpath=0,7,478&mcustomize=one_messages_view.jsp&dataserno=201907220001&dttable=O20160223020901.

¹³⁵⁵ *Quan Qiu Jin Rong Chuang Xin Lian Meng (GFIN)* (全球金融創新聯盟(GFIN)) [*Global Financial Innovation Network (GFIN)*], WAI JIAO BU (外交部) [MINISTRY OF FOREIGN AFFAIRS, REPUBLIC OF CHINA (TAIWAN)], https://subsite.mofa.gov.tw/igo/News_Content.aspx?n=163B8937FBE0F186&sms=53182B822F41930C&s=E6FAB19CF6108374 (last visited Oct. 21, 2021).

¹³⁵⁶ DELOITTE, FINTECH: REGULATORY CHALLENGES AND FINANCIAL CRIME EXPOSURE 7 (2018), https://www2.deloitte.com/content/dam/Deloitte/de/Documents/finance/Deloitte_Fintech.pdf.

¹³⁵⁷ *Id.*

¹³⁵⁸ *See History of the FATF*, FATF, <https://www.fatf-gafi.org/about/historyofthefatf/> (last visited Dec. 10, 2021).

¹³⁵⁹ *Id.*; *FATF Members and Observers*, FATF, <https://www.fatf-gafi.org/about/membersandobservers/> (last visited Dec. 10, 2021).

¹³⁶⁰ *See, e.g.*, TAYLOR ET AL., *supra* note 1311, at 7; DELOITTE, *supra* note 1356, at 7, 10; JEREMY MUIR, MINTERELLISONRUDDWATTS, REGULATION OF FINTECH: JURISDICTION ANALYSIS 9-10 (May 20, 2019), <https://www.treasury.govt.nz/sites/default/files/2019-06/minterellison-fintech.pdf>.

4.3 Preconditions of Sharing and Learning Through the GFIN

As described above, the GFIN is already established, and ideally, member regulators' experiences such as Taiwan's experience could be shared on this network. However, as mentioned before, I found little information regarding how Taiwan's experience was shared. Therefore, this Section aims to explore several preconditions that should be fulfilled in order to share and learn through the GFIN. Building on these preconditions, future research could study, for instance, whether these preconditions are fulfilled in a specific jurisdiction, and if they are not, how the gap influences the effectiveness of sharing and learning through the GFIN.

By resorting to the literature, several preconditions were found. They are explained in the following. Firstly, the openness of a legal system to embrace financial innovation and technology is vital to sharing and learning through the GFIN. This idea was inspired by some studies. For example, a study stated that the openness such as multiculturalism of a legal system is critical for learning other countries' non-discrimination laws because such laws would increase cultural diversity.¹³⁶¹ In other words, if a legal system is not friendly to other cultures, it would possibly be difficult for this legal system to learn from other legal systems' non-discrimination laws, of which multiculturalism is an important component. The above concepts seem to be applicable also when learning experiences of regulating FinTech and operating a sandbox.

When regulating FinTech, some of the common goals of using sandboxes are encouraging financial innovation and competition and

¹³⁶¹ See Dagmar Schiek, *Enforcing (EU) Non-discrimination Law: Mutual Learning between British and Italian Labour Law?*, 28 INT'L J. COMP. LABOUR L. IND. RELAT. 489, 509 (2012).

facilitating FinTech firms' market entry as described in Chapter 6.¹³⁶² Technology and innovation are also the key components and the nature of FinTech.¹³⁶³ Therefore, it is possible to imagine that if technology and innovation are more welcomed or valued in a legal system, learning from other countries' experiences of operating sandboxes as the means of regulating FinTech would be more necessary and thus smoother.

In addition, the openness of a legal system to embrace financial innovation and technology as suggested above seems to reflect the factor of legal culture emphasized by scholars. For example, as argued by Watson, the legal culture influences the extent to which borrowing other's experiences.¹³⁶⁴ In the context of FinTech, the openness of a legal system to embrace financial innovation and technology seems to exemplify that legal culture discussed by Watson. It is because the degree of such openness might determine, for instance, whether and why one jurisdiction could learn from other jurisdictions' experiences of operating sandboxes to regulate and encourage FinTech? If having a sandbox, what is the extent to which learning other countries' experiences of operating sandboxes?

Secondly, in addition to the above preconditions, namely the openness of a legal system and the legal culture to embrace financial innovation and technology, there are several preconditions internally regarding the GFIN itself. For example, with respect to the operation of the GFIN, its operation should be in favor of exchanging and sharing information between the member regulators about their experiences of regulating FinTech. For instance, the frequency of the members' meetings, which is currently once a year,¹³⁶⁵ could be a bit higher as FinTech is developing rapidly. This idea

¹³⁶² See Chapter 6, Section 2.2.

¹³⁶³ See generally Chapter 2.

¹³⁶⁴ Alan Watson, *Legal Change: Sources of Law and Legal Cultural*, 131 U. PA. L. REV. 1121, 1154 (1983); Alan Watson, *From Legal Transplants to Legal Formants*, 43 AM. J. COMP. L. 469, 469 (1995).

¹³⁶⁵ GFIN, TERMS OF REFERENCE FOR MEMBERSHIP AND GOVERNANCE OF THE GLOBAL

was inspired by some studies on policy learning because those studies argued that, among other factors, the frequency of the interaction and communication between the relevant actors is critical to policy learning.¹³⁶⁶ Thus, the internal operation of the GFIN should be in favor of exchanging and sharing information through this network to ensure mutual learning.

4.4 Summary

This Section briefly studied the issue of regulatory learning between jurisdictions in the context of regulating FinTech and operating sandboxes. While GFIN was already established as the network through which member regulator' experiences could be shared, it is not clear from the available information how Taiwan's experience could be shared through GFIN. This Chapter thus found several preconditions for sharing and learning through GFIN. For instance, the openness of a legal system and the legal culture to embrace financial innovation and technology are vital. The more a jurisdiction embraces financial innovation and technology, the more it may need and be willing to learn from other jurisdictions. The operation of this network, namely the GFIN, such as the frequency of members' meetings should be in favor of exchanging and sharing information. Further issues such as the relationship between fulfilling or not fulfilling these preconditions and the effectiveness of sharing and learning through the GFIN, however, would be left for future research.

5. Conclusion

FINANCIAL INNOVATION NETWORK 7 (last visited Oct. 22, 2021), <https://static1.squarespace.com/static/5db7cdf53d173c0e010e8f68/t/5db92a0d519a7150a9072bc6/1572416023693/gfin-terms-of-reference.pdf>.

¹³⁶⁶ See Paul A. Sabatier, *An Advocacy Coalition Framework of Policy Change and the Role of Policy-Oriented Learning Therein*, 21 POL'Y SCI. 129, 130-31 (1988); Paul A. Sabatier & Christopher M. Weible, *The Advocacy Coalition Framework: Innovations and Clarifications*, in THEORIES OF THE POLITICAL PROCESS 189, 206 (2007).

As pointed out by the World Bank, the methods for regulating FinTech consist, among other things, of wait-and-see, test-and-learn, regulatory sandboxes, and enacting regulations.¹³⁶⁷ Based on all the analyses in this study, I interpret these tools as observing, learning, acting, and learning while acting. First, we observe FinTech when not fully understanding it, knowing its benefits and risks. Second, we understand FinTech better from, for instance, experimenting it in a sandbox to address the complexities and the accompanying market failures. Third, we act through, for example, enacting or amending regulations after experiments to again cope with complexities and market failures. Last, we learn by acting when, for instance, agilely adapting regulations and continuously exploring and collecting information. Sandboxes play an important role in this process. The operation of each sandbox in the world is different. However, to address the barriers to flexible, adaptive and effective FinTech sandboxes, this Chapter proposed how to do so with respect to improving the entry, operation, and formulation of sandboxes.

¹³⁶⁷ WORLD BANK GROUP, *supra* note 1253, at 2; MATTHEW SAAL, DOROTHEE DELORT & HELEN GRADSTEIN, WORLD BANK GROUP, REGULATING FINTECH 21 (2018), <https://thedocs.worldbank.org/en/doc/954471553198980567-0130022019/original/NFISSession7Fintech.pdf>.

Chapter 8

Summary and Conclusions

1. FinTech – Complexity, Information Deficits, and the Pacing Issue

1.1 FinTech Results in Complexity and Information Deficits or Asymmetry

FinTech, which stands for finance and technology, has been defined in the literature in a more literal approach as the provision of financial services and products based on technology.¹³⁶⁸ The rise of new market players and FinTech's dynamic nature, namely the changing landscape and rapid development, have been emphasized in the literature when defining FinTech.¹³⁶⁹ Besides, there has also been a more historical way of defining FinTech, which stresses the different stages of FinTech's development in history from 1866 till now.¹³⁷⁰ The COVID-19 pandemic seems to mark the latest watershed moment from which FinTech is gaining momentum again.¹³⁷¹

¹³⁶⁸ E.g., Douglas W. Arner, János Barberis & Ross P. Buckley, *FinTech, RegTech, and the Reconceptualization of Financial Regulation*, 37 NW. J. INT'L L. & BUS. 371, 373 (2017); PwC, *BLURRED LINES: HOW FINTECH IS SHAPING FINANCIAL SERVICES 3* (March 2016), <https://www.pwc.de/de/newsletter/finanzdienstleistung/assets/insurance-inside-ausgabe-4-maerz-2016.pdf>.

¹³⁶⁹ See, e.g., Iris H-Y Chiu, *FinTech and Disruptive Business Models in Financial Products, Intermediation and Markets – Policy Implications for Financial Regulators*, 21 J. TECH. L. & POL'Y 55, 66-67 (2016); Dan Awrey & Kristin van Zwieten, *The Shadow Payment System*, 43 J. CORP. L. 775, 777 (2018); Michael Munger, *Coase and the "Sharing Economy"*, in *FOREVER CONTEMPORARY: THE ECONOMICS OF RONALD COASE* 187, 189 (Cento Veljanovski ed., 2015); PwC, *supra* note 1368, at 20.

¹³⁷⁰ Douglas W. Arner, János Barberis & Ross P. Buckley, *The Evolution of FinTech: A New Post-Crisis Paradigm*, 47 GEO. J. INT'L L. 1271, 1274-76, 1286-87 (2016).

¹³⁷¹ See Douglas W. Arner, János N. Barberis, Julia Walker, Ross P. Buckley, Andrew M. Dahdal & Dirk A. Zetsche, *Digital Finance & COVID-19 Crisis* 2, 5, 23 (University

However, through the lens of technological change,¹³⁷² the aforementioned utilization of technology in financial markets, namely FinTech, may further give rise to complexity and information deficits or asymmetry, thereby meriting attention. Blockchain technology was the example analyzed in this study.¹³⁷³ After the invention and introduction of a technology such as blockchain technology, this technology and its applications create, for instance, product or process innovations in the financial markets.¹³⁷⁴ However, as argued in the literature, innovations might bring complexity and failures in financial markets.¹³⁷⁵ This situation seems also to occur in the context of FinTech such as blockchain-based applications as described in more detail later. Indeed, regulation has been dealing with the complexities and market failures as argued by scholars.¹³⁷⁶ Nonetheless, the emergence of FinTech such as blockchain technology brings some changes in complexity and information deficits or asymmetry in financial markets. Thus, there might be some problems that traditional

of Hong Kong Faculty of Law Research Paper No. 2020/017, UNSW Law Research), <https://ssrn.com/abstract=3558889>.

¹³⁷² See JOSEPH A. SCHUMPETER, BUSINESS CYCLES 80-81, 84 (1939); Thomas S. Robertson, *The Process of Innovation and the Diffusion of Innovation*, 31 J. MKTG. 14, 14 (1967); EVERETT M. ROGERS, DIFFUSION OF INNOVATION 5-6 (4th ed., 1995); Adam B. Jaffe, Richard G. Newell & Robert N. Stavins, *Environmental Policy and Technological Change*, 22 ENV'T & RES. ECON. 41, 43-44 (2002).

¹³⁷³ See *supra* Chapters 2 and 3.

¹³⁷⁴ See *supra* Chapter 2. According to Tufano, “innovation” in financial markets involves both invention and diffusion of new products, services and ideas, consisting of, among other types, product and process innovations. Peter Tufano, *Financial Innovation*, in HANDBOOK OF THE ECONOMICS OF FINANCE: VOLUME 1A CORPORATE FINANCE 307, 310-11 (George M. Constantinides, Milton Harris, René M. Stulz eds., 2003).

¹³⁷⁵ See, e.g., ROGERS, *supra* note 1372, at 16; Steven L. Schwarcz, *Rethinking the Disclosure Paradigm in a World of Complexity*, 1 U. ILL. L. REV. 1, 2, 19, 37 (2004); W. Brian Arthur, *Complexity Economics: A Different framework for Economic Thought*, in COMPLEXITY AND THE ECONOMY 1, 5, 7 (2015); W. Brian Arthur, *Complexity and the Economy*, 284 SCIENCE 107, 107 (1999)

¹³⁷⁶ E.g., Dan Awrey, *Complexity, Innovation, and the Regulation of Modern Financial Markets*, 2 HARV. BUS. L. REV. 235, 243, 251-52, 288 (2012); Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 WASH. U. L. REV. 211, 216-36, 262-63 (2009).

regulation may not be able to cope with perfectly.¹³⁷⁷

It is worth mentioning here that whilst FinTech might bring changes in complexity and information deficits or asymmetry, FinTech also has several benefits, thereby being deemed to be a double-edged sword.¹³⁷⁸ For instance, on the one hand, it was found that the markets based on blockchain technology seem to rely on a truth-discovery mechanism established by this technology, aiming to create a technical transparency based on its pseudonymous nature.¹³⁷⁹ On the other hand, through studying various drivers of complexity,¹³⁸⁰ it was found that the actual usage of blockchain technology in financial markets might still result in several problems. Specifically, with respect to the driver *opacity*, blockchain technology might cause more complexities due to the potential fraud, cheating, cyber-attacks, money laundering or other types of financial crimes. They are conducted by obfuscating the transaction data and thereby creating the anonymity of blockchain-based transactions. Also, the relevant information to assess these concerns is not, or could not be, fully known by consumers or investors as blockchain technology is still a relatively young concept. Information deficits or asymmetry could thus be caused by blockchain technology. In addition, with respect to the driver *fragmentation*, blockchain technology increases fragmentation and thus complexity as, for instance, new types of instruments and market players emerge.¹³⁸¹

Besides the information asymmetry associated with anonymity as described above, information asymmetry or deficits possibly occur from

¹³⁷⁷ See *supra* Chapter 3.

¹³⁷⁸ See, e.g., Awrey, *supra* note 1376, at 243-44; Chiu, *supra* note 1369, at 63.

¹³⁷⁹ See, e.g., Sinclair Davidson, Primavera De Filippi & Jason Potts, *Economics of Blockchain* 5 (2016), <https://ssrn.com/abstract=2744751>; Hossein Nabilou & André Prüm, *Ignorance, Debt and Cryptocurrencies: The Old and New in the Law and Economics of Concurrent Currencies*, 5 J. FIN. REG. 29, 62 (2019).

¹³⁸⁰ See *supra* Chapter 3, Section 3.2.

¹³⁸¹ See *supra* Chapter 3, Section 3.2.3.

another driver of complexity, namely *regulation*. It is one of the drivers in studies particularly because the application of regulation may be confusing.¹³⁸² In the context of FinTech, that is, the dangers of the new products, services or players are not fully clear for both consumers and regulators as they are new. The legal status and the regulations applicable to these new products, services or players are also uncertain.¹³⁸³ In other words, the information regarding, for instance, whether and how to apply regulation to these new products, services or players is insufficient, resulting in more complexities. This situation seems to epitomize the discussion in the literature that financial innovation historically caused this type of information deficit and uncertainty, resulting in failures in financial markets.¹³⁸⁴

Moreover, in the context of FinTech, both regulators and those regulated might suffer from these information deficits. For example, as argued in the literature, regulators may adopt more one-size-fits-all regulation due to the information insufficiency; as a result, regulators might face adverse selection and moral hazard, thereby being unable to regulate effectively.¹³⁸⁵ This situation might also happen in the context of FinTech. For instance, if regulators choose more one-size-fits-all, inflexible and static regulation to regulate FinTech when the benefits and dangers of FinTech are not clear yet, it would be difficult to distinguish between the safer and riskier FinTech. Those Regulated such as FinTech firms may also suffer because, for instance, they would have difficulties entering the markets due to unclear compliance conditions and the higher costs of seeking advice to clarify these issues.

¹³⁸² See Awrey, *supra* note 1376, 255-56.

¹³⁸³ See, e.g., Michael Mendelson, *From Initial Coin Offerings to Security Tokens: A U.S. Federal Securities Law Analysis*, 22 STAN. TECH. L. REV. 52, 93 (2019).

¹³⁸⁴ See Schwarcz, *supra* note 1376, at 231, 236.

¹³⁸⁵ Jean Tirole, *Market Failure and Public Policy*, 105 AM. ECON. REV. 1665, 1670-71 (2015).

1.2 The Pacing Issue Arises When Regulating FinTech

As a matter of fact, the complexities and the associated information deficits or asymmetry described above seem to suggest that there is a disconnection between regulation and FinTech. This disconnection was explained from the perspective of law and technology to the extent that regulation tends to be outdated when technology develops rapidly.¹³⁸⁶ In other words, when talking of regulating FinTech, not only the above complexities and information deficits which are the results or impacts of FinTech, but also the pacing issue are worth studying.

This study also found that the school of law and technology further suggested something insightful.¹³⁸⁷ That is, first, regulators are said to be faced with information insufficiency if they regulate in the early stage of technology as the information about the technology is lacking in this stage; second, it becomes more difficult to regulate when technology develops more firmly and thus becomes more ingrained at the later stage even though more information about this technology might be gained.¹³⁸⁸ Therefore, some law and technology studies suggested regulating earlier, namely before the technology is too developed to be regulated easily, even though the information about this technology is not fully clear at this stage.¹³⁸⁹ The core

¹³⁸⁶ See, e.g., Gary E. Marchant, *The Growing Gap Between Emerging Technologies and the Law*, in *THE GROWING GAP BETWEEN EMERGING TECHNOLOGIES AND LEGAL-ETHICAL OVERSIGHT* 19, 23 (Gary E. Marchant, Braden R. Allenby & Joseph R. Herkert eds., 2011); Wulf A. Kaal, *Dynamic Regulation of the Financial Services Industry*, 48 *WAKE FOREST L. REV.* 791, 800 (2013); Lyria Bennett Moses, *How to Think about Law, Regulation and Technology: Problems with Technology as a Regulatory Target*, 5 *LAW INNOVATION & TECH.* 1, 8 (2013). Regarding the complete explanation, see *supra* Chapter 5.

¹³⁸⁷ See *supra* Chapter 5, Section 2.1.1.

¹³⁸⁸ E.g., Moses, *supra* note 1386, at 8; Audley Genus & Andy Stirling, *Collingridge and the Dilemma of Control: Towards Responsible and Accountable Innovation*, 47 *RES. POL'Y* 61, 63 (2018). The studies discussing Collingridge dilemma cited a book authored by David Collingridge in 1980 – “The Social Control of Technology”. DAVID COLLINGRIDGE, *SOCIAL CONTROL OF TECHNOLOGY* (1980). I was unfortunately not able to get access to this book.

¹³⁸⁹ See, e.g., Bert-Jaap Koops, *Ten Dimensions of Technology Regulation. Finding Your*

value and the goal of acting at the early stage to respond to FinTech will be exploring and collecting information.

In addition, by resorting to several law and economics studies,¹³⁹⁰ this study found that the pacing issue is relevant to the question of how to find an optimal timing of regulatory intervention by considering several factors. The critical factors found are, among others, (1) the obsolescence costs, (2) the costs of enacting and revising regulation, and (3) the possibility to mitigate the information deficits in the face of complexities. That is, even though obsolescence costs seem to exist in every type of regulatory timing, is there a regulatory approach that might be less subject to such obsolescence? Besides, while regulation tends to be outdated in the era of FinTech, an equally important question is how to design the regulation of FinTech by lowering the costs of enacting and revising it? Another equally important question is how to deal with this information asymmetry or deficits? Building on the above findings, this study then analyzed how to address the complexity, information asymmetry or deficits, and the pacing issue by properly designing the regulation of FinTech?

2. Regulatory Approaches to FinTech – AFR and Sandboxes

2.1 The Limitation of Particular Regulatory Approaches

The above pacing issue was exemplified through examining several

Bearings in the Research Space of An Emerging Discipline, in DIMENSIONS OF TECHNOLOGY REGULATION 311, 317 (Morag Goodwin, Bert-Jaap Koops & Ronald Leenes eds., 2010).

¹³⁹⁰ E.g., Jacob E. Gersen & Eric A. Posner, *Timing Rules and Legal Institutions*, 121 HARV. L. REV. 543, 569 (2007); Barbara Lippi & Francesco Parisi, *Optimal Timing of Legal Intervention: The Role of Timing Rules*, 122 HARV. L. REV. F. 18, 22-23, 26, 28 (2009); Francesco Parisi & Nita Ghei, *Legislate Today or Wait Until Tomorrow? An Investment Approach to Lawmaking* 8 (Minn. L. Stud. Res. Paper No. 07-11, 2007), <https://ssrn.com/abstract=981275>.

regulations of FinTech that could currently be found in jurisdictions.¹³⁹¹ For instance, it was found that PSD2 (the second Payment Services Directive, “PSD2”) in the EU did not fully consider the development of FinTech in terms of the growth and influence of some players such as FinTech firms and BigTechs when the regulation was formulated.¹³⁹² Besides, analyses of this study also theoretically found that several regulatory approaches that may potentially be suitable to regulate FinTech were imperfect.¹³⁹³ First, while responsive regulation could be utilized flexibly,¹³⁹⁴ it might not be perfect when the changes in the regulatory landscape such as the advance of technology are not fully considered.¹³⁹⁵ It was also found that there are paucities of the criteria that take technology’s development into account and of a scheme coping with complexities.¹³⁹⁶ Second, whilst applying self-regulation might be useful to deal with complexities and the pacing issue,¹³⁹⁷ one of the prerequisites is that those regulated really have superior information. However, this study found that obtaining such information is also the aim of those regulated due to the complexities.¹³⁹⁸ Moreover, it was argued that dealing with complexities through self-regulation might incur rent-seeking, thereby leading to unfulfilled public interest regulatory

¹³⁹¹ See *supra* Chapter 4.

¹³⁹² See, e.g., BRAD CARR, DANIEL PUJAZON & PABLO URBIOLA, INST. INT’L FIN., RECIPROcity IN CUSTOMER DATA SHARING FRAMEWORKS 2 (July 2018), https://www.iif.com/portals/0/Files/private/32370132_reciprocity_in_customer_data_sharing_frameworks_20170730.pdf; Fabiana Di Porto & Gustavo Ghidini, “*I Access Your Data, You Access Mine*”: *Requiring Data Reciprocity in Payment Services*, 51 INT’L REV. INTELL. PROP. & COMPETITION L. 307, 319-21 (2020); Nydia Remolina, *Open Banking: Regulatory Challenges for a New Form of Financial Intermediation in a Data-Driven World* 29-30, 46 (SMU Centre for AI & Data Governance Research Paper No. 2019/05, 2019), <https://ssrn.com/abstract=3475019>. Regarding the complete explanation, see *supra* Chapter 4, Section 2.2.4.

¹³⁹³ See *supra* Chapter 5, Sections 2.3, 2.4 and 2.5.

¹³⁹⁴ See IAN AYRES & JOHN BRAITHWAITE, *RESPONSIVE REGULATION: TRANSCENDING THE DEREGULATION DEBATE* 26, 110-11, 129-30 (1992).

¹³⁹⁵ See Robert Baldwin & Julia Black, *Really Responsive Regulation*, 71 MOD. L. REV. 59, 73-74 (2008).

¹³⁹⁶ See *supra* Chapter 5, Section 2.3.2.

¹³⁹⁷ See DAVID COLANDER & ROLAND KUPERS, *COMPLEXITY AND THE ART OF PUBLIC POLICY: SOLVING SOCIETY’S PROBLEMS FROM THE BOTTOM UP* 21-22, 61-62, 230 (2014).

¹³⁹⁸ See *supra* Section 1.1 and Chapter 3.

goals.¹³⁹⁹ Third, smart regulation has observed criticism that the changes in the regulatory landscape are not fully considered.¹⁴⁰⁰ Regulation needs to be capable of learning.¹⁴⁰¹

2.2 AFR and Sandboxes Can Help

Drawing on the above findings, AFR (adaptive financial regulation, “AFR”) was proposed in this study as the alternative regulatory approach to FinTech, and sandboxes exemplify AFR as they both center on experimentation.¹⁴⁰² AFR could be defined as a regulatory approach which emphasizes regulatory adjustments and enables regulation to learn over time by these adjustments and by collecting information.¹⁴⁰³ This approach thus allows regulation and regulators to adapt to the changes in the regulatory landscape such as technological development.¹⁴⁰⁴ Therefore, from a higher perspective, dynamism features AFR, as opposed to directive or pure command-and-control regulation.¹⁴⁰⁵

In practice, AFR realizes the above regulatory adjusting and learning by truly experimenting FinTech. Experimentation thus features AFR. The

¹³⁹⁹ See George Leef, *Complexity and Command-and-Control*, 38 REG. 54, 55 (2015).

¹⁴⁰⁰ Peter Van Gossun, Bas Arts & Kris Verheyen, *From “Smart Regulation” to “Regulatory Arrangements”*, 43 POL’Y SCI. 245, 249 (2010).

¹⁴⁰¹ See *id.* at 251-52.

¹⁴⁰² See *supra* Chapter 5, Section 3.2.

¹⁴⁰³ Lori S. Benneer & Jonathan B. Wiener, *Adaptive Regulation: Instrument Choice for Policy Learning over Time* 7-8 (Feb. 12, 2019), <https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/files/Regulation%20-%20adaptive%20reg%20-%20Benneer%20Wiener%20on%20Adaptive%20Reg%20Instrum%20Choice%20019%2002%2012%20clean.pdf>

¹⁴⁰⁴ See, e.g., *id.*; Jonathan B. Wiener, *Better Regulation in Europe*, 59 CURRENT L. PROBS. 447, 449, 513-14 (2006); Lawrence G. Baxter, *Adaptive Regulation in the Amoral Bazaar*, 128 S. AFR. L.J. 253, 265 (2011); Chris Brummer, *Disruptive Technology and Securities Regulation*, 84 FORD. L. REV. 977, 1048 (2015); Simon A. Levin & Andrew W. Lo, *Opinion: A New Approach to Financial Regulation*, 112 PNAS 12543, 12544 (2015).

¹⁴⁰⁵ Lawrence G. Baxter, *Adaptive Financial Regulation and RegTech: A Concept Article on Realistic Protection for Victims of Bank Failures*, 66 DUKE L.J. 567, 589, 594-97 (2016); Baxter, *supra* note 894, at 254.

operation of sandboxes which is explained next exemplifies this notion. As argued in the literature, when facing increasing complexities in financial markets, it is important that regulators could have a system to collect information on an on-going rather than a one-time basis.¹⁴⁰⁶ The emergence of AFR seems to be realizing such a system as information could be gained through the experiments. In fact, various regulatory instruments are emphasized and complement each other in AFR.¹⁴⁰⁷ In particular, the use of regulatory instruments such as information regulation, product regulation, conduct regulation, and command-and-control regulation is widespread in experimentation.¹⁴⁰⁸ Regulatory instruments with a higher degree of intervention such as entry regulation are emphasized more after the experimentation.¹⁴⁰⁹

As mentioned above, sandboxes epitomize AFR as experiments are conducted therein. Sandboxes have been defined in literature as a mechanism providing an environment where FinTech could be tested “with fewer regulatory constraints, real consumers, less risk of enforcement action, and ongoing guidance from regulators”.¹⁴¹⁰ Sandboxes have been established in various jurisdictions, following the pioneering UK’s sandbox.¹⁴¹¹ This study found several benefits that sandboxes can bring.¹⁴¹² First, regulators are enabled to better understand FinTech, and reconsidering regulatory responses as testers would systematically provide information in experiments.¹⁴¹³ Second, sandboxes help testers clarify compliance issues

¹⁴⁰⁶ Henry T.C. Hu, *Misunderstood Derivatives: The Causes of Informational Failure and the Promise of Regulatory Incrementalism*, 102 YALE L.J. 1457, 1503 (1993).

¹⁴⁰⁷ See *supra* Chapter 5, Section 3.3.

¹⁴⁰⁸ See *id.*

¹⁴⁰⁹ See *supra* Chapter 5, Section 3.3.2.

¹⁴¹⁰ Hilary J. Allen, *Regulatory Sandboxes*, 87 GEO. WASH. L. REV. 579, 600 (2019).

¹⁴¹¹ E.g., *id.* at 596; LATHAM & WATKINS, WORLD-FIRST REGULATORY SANDBOX OPEN FOR PLAY IN THE UK 1 (May 9, 2016), <https://www.lw.com/thoughtLeadership/LW-world-first-regulatory-sandbox-open-for-play-in-UK>.

¹⁴¹² See *supra* Chapter 6, Section 2.2.

¹⁴¹³ See, e.g., Douglas W. Arner, János Barberis & Ross P. Buckley, *FinTech, RegTech, and the Reconceptualization of Financial Regulation*, 37 NW. J. INT’L L. & BUS. 371, 381 (2017); RADOSTINA PARENTI, REGULATORY SANDBOXES AND INNOVATION HUBS

through tailored guidance, lowering the costs of seeking legal advice.¹⁴¹⁴ These two benefits reflect that the information deficits brought by FinTech may be mitigated by sandboxes through exploring and collecting information, as expected. Third, testers could be exempted during experiments from certain regulatory requirements especially licensing requirements.¹⁴¹⁵ Fourth, sandboxes encourage financial innovation and competition by facilitating market entry as, for instance, regulatory amendments introducing lighter regulations may follow the experiments.¹⁴¹⁶ Fifth, entering a sandbox may bring a reputational value, namely “symbolic rewards”,¹⁴¹⁷ to FinTech firms. Sixth, having a sandbox in a jurisdiction could be a “legal marketing” tool for the government.¹⁴¹⁸

2.3 Barriers to Effective and Adaptive AFR and Sandboxes – A Case Study of Taiwan’s Sandbox

Further to the above findings, this study argued that sandboxes could ideally regulate FinTech adaptively. However, this study also found several

FOR FINTECH: IMPACT ON INNOVATION, FINANCIAL STABILITY AND SUPERVISORY CONVERGENCE 14 (2020), [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652752/IPOL_STU\(2020\)652752_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652752/IPOL_STU(2020)652752_EN.pdf).

¹⁴¹⁴ See Hilary J. Allen, *Experimental Strategies for Regulating Fintech*, 3 J.L. INNOVATION 1, 20 (2020); *The Role of Regulatory Sandbox In Fintech Innovation*, FINEXTRA (Sep. 10, 2018), <https://www.finextra.com/blogposting/15759/the-role-of-regulatory-sandboxes-in-fintech-innovation>. The costs of seeking legal advice are vital. Nuno Garoupa & Andrew P. Morriss, *The Fable of the Codes: The Efficiency of the Common Law, Legal Origins, and Codification Movements*, 2012 U. ILL. L. REV. 1443, 1476 (2012).

¹⁴¹⁵ See, e.g., *Regulatory sandbox*, FCA, <https://www.fca.org.uk/firms/innovation/regulatory-sandbox> (last visited Dec. 14, 2021); Allen, *supra* note 1037, at 596.

¹⁴¹⁶ See, e.g., Sharmista Appaya & Mahjabeen Haji, *Four years and counting: What we’ve learned from regulatory sandboxes*, WORLD BANK BLOGS (Nov. 18, 2020), <https://blogs.worldbank.org/psd/four-years-and-counting-what-weve-learned-regulatory-sandboxes>.

¹⁴¹⁷ See P.N. Grabosky, *Regulation by Reward: On the Use of Incentives as Regulatory Instruments*, 17 LAW & POL’Y 257, 261 (1995).

¹⁴¹⁸ See Oscar Borgogno & Giuseppe Colangelo, *Regulating FinTech: From Legal Marketing to the Pro-Competitive Paradigm* 13-14, 16-17 (2020), <https://ssrn.com/abstract=3563447>.

barriers to effective and adaptive sandboxes by looking into the case of Taiwan’s sandbox as an example.¹⁴¹⁹ The barriers found by studying Taiwan’s sandbox were mostly addressed in this study, and only the barrier in relation to interest groups’ influence is left for future research. Section 6 of this Chapter will explain this future research. The following table summarizes the barriers of sandboxes that were found and selected to be addressed in this study. As I will explain in Section 5 below, the barrier regarding the influence of interest groups that was found in Chapter 6 and the explanation and solution from the perspective of public choice is excluded and left for future research.

Table 4: Barriers to Adaptive and Effective AFR and Sandboxes That Were Found and Selected to Be Addressed

Category	Barriers that Need to Be Addressed
Entering Sandboxes	Barriers 1 – The application processes of a sandbox might be too complicated. Thus, applying to enter a sandbox would incur high costs that smaller-sized FinTech firms have difficulties in bearing.
	Barriers 2 – Entering a sandbox might be restricted. For example, a “one-company” rule was found in Taiwan’s sandbox.
Operation of Sandboxes; Leaving	Barriers 3 – Organized post-sandbox mechanisms are insufficient. As a result, it is difficult to bring regulatory changes after leaving a sandbox.

¹⁴¹⁹ See *supra* Chapter 6, Section 5.2.

Sandboxes	
Formulation of Sandboxes	Barriers 4 – If a sandbox is formulated based on detailed rules, the sandbox might thus be prone to become outdated in the future.

The above Sections 1, 2.1, and 2.2 presented the main research trajectory of this study, which starts from the analyses of FinTech itself to the regulatory issues of FinTech. Therefore, the following Section 3 will show how the first three research questions were answered in this research trajectory. However, the issue in Section 2.3 regarding the barriers to adaptive and effective sandboxes presented above was not yet addressed. Accordingly, Section 4 will then propose recommendations to solve these barriers and answer the fourth research question.

3. Answering Research Questions 1, 2, and 3

The research questions that were the focuses of this study are:

- (1) *Should FinTech be regulated? Why? If so, are traditional regulatory approaches suitable?*
- (2) *How to regulate FinTech adaptively to deal with the pacing issue?*
- (3) *What are the barriers to adaptive and effective FinTech regulation?*
- (4) *How to address the barriers?*

Drawing from the notions in Sections 1 and 2 of this Chapter, this section

provides answers to the above first, second, and third research questions. The fourth research question will be answered in Section 4 of this Chapter.

3.1 Should FinTech be regulated? Why? If so, are traditional regulatory approaches suitable?

Through analyzing the nature of FinTech, this study found that when FinTech brings more complexities and information deficits, FinTech should be regulated. As shown in both Section 1.1 of this Chapter and in Chapter 3, analyzing the changes in complexity that are brought by FinTech helps identify where could be the information deficits. This notion is built on the observation that the concepts of complexity have been applied in studies discussing the innovation and regulation in modern financial markets.¹⁴²⁰ Complexities were deemed in the literature to not only add advantages to the markets but also to potentially result in market failures.¹⁴²¹ FinTech introduces innovation into modern financial markets and brings advantages on the one hand.¹⁴²² On the other hand, FinTech was found to jeopardize the markets as some information is lacking, thus adding complexity.¹⁴²³ Specifically, the lack of information regarding FinTech itself in terms of, for instance, its dangers, disconnects FinTech and regulation to the extent that FinTech could not be perfectly covered by regulation. This disconnection has been regarded as the pacing issue.¹⁴²⁴ Due to this disconnection between FinTech and regulation, traditional regulatory approaches which are more directive and thus static are not perfectly capable of regulating FinTech. A regulatory approach that features dynamism was found more suitable to

¹⁴²⁰ See generally Schwarcz, *supra* note 1375; Schwarcz, *supra* note 1376; Awrey, *supra* note 1376.

¹⁴²¹ E.g., *id.* at 243-44; Schwarcz, *supra* note 1376, at 214.

¹⁴²² See *supra* Chapter 2.

¹⁴²³ See *supra* Section 1.1 and Chapter 3.

¹⁴²⁴ See, e.g., Moses, *supra* note 1386, at 7; ROGER BROWNSWORD & MORAG GOODWIN, LAW AND TECHNOLOGIES OF THE TWENTY-FIRST CENTURY: TEXT AND MATERIALS 65 (2012).

regulate FinTech.

3.2 How to regulate FinTech adaptively to deal with the pacing issue?

Therefore, this study found that regulating FinTech adaptively and dealing with the pacing issue need an alternative approach in which dynamism is embedded. AFR and sandboxes, which exemplify AFR, are recommended as the more suitable approach. Through studying how AFR ideally looks, this study further found several core factors of adaptive and effective FinTech regulation.¹⁴²⁵

For instance, first, the missing information could be explored and collected through AFR as FinTech is truly experimented there, thus mitigating the information deficits. Sandboxes are the mechanism which is practically realizing such experiments. Therefore, the associated core factor here is that these experiments are accessible and feasible. Second, through the experiments, regulators learn whether and how to make regulatory responses to FinTech such as regulatory adjustments, thereby adapting to and keeping pace with FinTech's development. Accordingly, the core factor in relation to the regulatory adjustments is that there are appropriate mechanisms bringing regulatory learning and adjustments. Third, whilst AFR and sandboxes could be the ideal regulatory approach to FinTech, they themselves may be outdated. The core factor is thus that AFR and sandboxes themselves are able to better resist obsolescence.

3.3 What are the barriers to adaptive and effective FinTech regulation?

Echoing the aforementioned core factors, this study found that the barriers to adaptive and effective FinTech regulation such as sandboxes tend to happen with respect to the entry into, operation of, and formulation of

¹⁴²⁵ See *supra* Chapter 5.

sandboxes. Specifically, through studying the case of Taiwan’s sandbox as an example, it was found how those types of barriers might manifest themselves. That is, emphasizing consumer protection and the innovation entry criterion by improperly imposing limits on the entry into sandboxes, ignoring post-sandbox mechanisms, and relying on detailed, specific and prescriptive rules to formulate sandboxes were found to be the barriers in practice. In addition, the influence of interest groups was also found to be a potential barrier to adaptive and effective FinTech regulation including sandboxes.

4. Recommendations and Answering Research Question 4

This Section provides recommendations to address the aforementioned barriers, making sandboxes more effective and adaptive. The fourth research question is thus answered here.

(4) *How to address the barriers?*

4.1 Striking a Balance Between Promoting Innovation and Ensuring Consumer Protection Through Imposing Proper Measures

The first barrier that needs to be addressed is in relation to the accessibility of sandboxes. It is because, as found through studying the case of Taiwan’s sandbox, the accessibility of sandboxes might be limited due to the complicated application processes causing a high threshold.¹⁴²⁶ The underlying reason is that the regulator aims to ensure consumer protection by imposing a complicated application process. In other words, the regulator is erring on the side of caution, namely ensuring financial stability and consumer protection, rather than including more FinTech firms in the sandbox. It might thus be doubtful if the regulator could truly learn from the

¹⁴²⁶ See *supra* Chapter 6, Section 5.1.2.1 and Chapter 7, Section 2.1.

limited number of experiments.

However, through studying various consumer protection measures, this study suggested imposing proper limits and safeguards instead of an unduly high threshold. Doing so could thus strike a balance between encouraging innovation and ensuring financial stability and consumer protection. Common measures are capping the number of participating consumers, imposing disclosure requirements, limiting the testing duration, and clearly defining termination criteria.¹⁴²⁷ However, this study recommended that the measures that are more directly related to consumers such as consumer complaints handling mechanisms should also be enhanced. Moreover, this study recommended that regulators need to be prepared for receiving the complaints and reacting to them. For example, if the received complaints are regarding the damage to consumer protection during experiments, what are the termination rules applied to these experiments? If the regulator receives complaints against the sandbox itself after experiments, how to respond to these complaints?

4.2 Facilitating the Entry to Sandboxes by Improving the Selection Criteria

The second barrier that needs to be addressed is also related to the accessibility of sandboxes but focuses on the selection of testers. It was found that there are various criteria for the selection of testers in the sandboxes in different jurisdictions, and one of the criteria in some jurisdictions is that the tested business needs to be innovative.¹⁴²⁸ However, as shown by the case study of Taiwan's sandbox, whether the innovation

¹⁴²⁷ See, e.g., WORLD BANK GROUP, GLOBAL EXPERIENCES FROM REGULATORY SANDBOXES x, 25 (2020), <https://documents1.worldbank.org/curated/en/912001605241080935/pdf/Global-Experiences-from-Regulatory-Sandboxes.pdf>; Allen, *supra* note 1037, at 633.

¹⁴²⁸ See *supra* Chapter 7, Section 2.2.2.

criterion is fulfilled is unduly and rigidly determined by the number of similar businesses. That is, the regulator mainly determines whether a FinTech business is innovative by the fact that only “one” company is solely conducting this FinTech business when applying.¹⁴²⁹ As the root cause is the innovation criterion, this study proposed several recommendations regarding this innovation criterion by looking into the corresponding measures in Hong Kong, Australia, and the UK. It was shown that such an innovation criterion does not need to be compulsory. Thus, if we have an innovation criterion, how to fulfill it without unduly limiting the entry into sandboxes? If we do not have an innovation criterion, what should the selection criteria focus on?

This study recommended that, first, if having an innovation criterion, the means of assessing the innovation should be from a higher-level instead of rigidly focusing on the number of participants. For instance, if a business provides a degree of relative advantages,¹⁴³⁰ such a business could be deemed to be innovative. Second, if an innovation criterion is not adopted, the selection criteria could place more emphasis on, for instance, consumer welfare and protection.¹⁴³¹ The rules in Hong Kong’s and the US CFPB’s (Consumer Financial Protection Bureau, the “CFPB”) sandboxes exemplify this point. Therefore, although the threshold for entering a sandbox may be lower due to not having an innovation criterion, this threshold would not be unduly low and could be balanced.

¹⁴²⁹ See 「JIN RONG KE JI CHUANG XIN SHI YAN FA GUI」 WEN DA JI (「金融科技創新實驗法規」問答集) [THE FINTECH SANDBOX ACT Q&A] 3, <https://www.fsc.gov.tw/uploaddownloaddoc?file=news/201804261659470.pdf&filedisplay=%E6%96%B0%E8%81%9E%E7%A8%BF1%E9%99%84%E4%BB%B64-%E9%87%91%E8%9E%8D%E7%A7%91%E6%8A%80%E5%89%B5%E6%96%B0%E5%AF%A6%E9%A9%97%E6%B3%95%E8%A6%8F%E5%95%8F%E7%A D%94%E9%9B%86.pdf&flag=d> (last visited Dec. 10, 2021) [hereinafter THE FINTECH SANDBOX ACT Q&A]; Jin Rong Ke Ji Chuang Xin Shi Yan Guan Li Ban Fa (金融科技創新實驗管理辦法) [Regulations Governing Financial Technology Innovative Experimentation], art. 6 [hereinafter “FinTech Sandbox Regulations”]. Regarding more details about this rule, see *supra* Chapter 6, Section 5.1.2.1.

¹⁴³⁰ See ROGERS, *supra* note 1372, at 15-16.

¹⁴³¹ Allen, *supra* note 1037, at 627.

4.3 Establishing Systematic Post-Sandbox Mechanisms to Incentivize Those Regulated to Provide Information and to Bring Regulatory Adjustments

The third barrier that needs to be addressed is the lack of post-sandbox mechanisms that was found not only in Taiwan's sandbox but also in other sandboxes.¹⁴³² While the regulatory adjustments with more regulatory leniency would benefit those regulated, they may be insufficiently incentivized to provide information if they cannot expect such regulatory adjustments.¹⁴³³ The lack of organized post-sandbox mechanisms, as a result, renders the formulation of regulatory adjustments after the sandbox difficult. It is also doubtful if the adaptation of regulation and learning from experiments are possible.

This study thus suggested that post-sandbox mechanisms should be systematically established to incentivize the regulated to provide information and to accordingly bring regulatory adjustments, if needed. The practical recommendation is that the successfully tested FinTech could be allowed within, for instance, 2 to 3 years after experiments by giving a temporary conditional authorization.¹⁴³⁴ This solution brings some benefits. Firstly, the tested FinTech firms do not need to wait until the relevant laws are amended to conduct their business. Secondly, regulators could also benefit from this 2- to 3-year period as they can re-examine the results of more experiments, formulating the future regulatory adjustments.¹⁴³⁵ Thirdly, regulatory

¹⁴³² See *supra* Chapter 6, Section 5.1.2.2 and Chapter 7, Section 3.1.1.

¹⁴³³ See *supra* Chapter 5, Section 4.2.3.1.

¹⁴³⁴ Jin-Lung Peng (彭金隆) & Cheng-Yun Tsang (臧正運), *Wo Guo Jin Rong Ke Ji Chuang Xin Shi Yan Ji Zhi Zhi Jian Shi Yu Gou Jian* (我國金融科技創新實驗機制之檢視與構建) [*Examination and Establishment of Taiwan's FinTech Innovation Experimentation Mechanisms*], FTRC (國立政治大學商學院金融科技研究中心), <http://www.ftcr.nccu.edu.tw/wordpresseng/?p=3536> (last visited Dec. 10, 2021).

¹⁴³⁵ *Id.*

adjustments do not need to be brought after each experiment in this period, thereby lowering the costs of adjusting regulations because the frequency of adjusting regulations is lower.¹⁴³⁶ This waiting here in a sense reflects the value of waiting.¹⁴³⁷ Besides, if more experiments could be conducted before having regulatory amendments, there would be more lessons learned from these experiments. The knowledge transferred between authorities in a jurisdiction could also be facilitated.¹⁴³⁸

4.4 Towards More Principles-based Sandboxes

The last barrier that needs to be addressed concerns the formulation of sandboxes because it was found that a sandbox is likely to become obsolete in the future if it is formulated based on detailed, specific, and prescriptive rules.¹⁴³⁹ Moreover, while these detailed rules could provide more regulatory certainty and lower information costs when interpreting,¹⁴⁴⁰ they might incur higher costs when revising them is more frequent while FinTech is rapidly developing.¹⁴⁴¹ By studying the sandboxes in the Philippines, the UK, and Australia and comparing them with the sandbox in Taiwan, this study found that there are several models to formulate sandboxes. A spectrum of the formulation models was formed and shown by Figure 9 in Chapter 7.

Accordingly, this study recommended “more principles-based sandboxes” to cope with the outdated problem mentioned above.¹⁴⁴² As this

¹⁴³⁶ *Id.*

¹⁴³⁷ See Barbara Luppi & Francesco Parisi, *supra* note 1390, at 24, 29; Gersen & Posner, *supra* note 1390, at 559.

¹⁴³⁸ PARENTI, *supra* note 1413, at 39-40.

¹⁴³⁹ See *supra* Chapter 6, Section 5.1.2.3 and Chapter 7, Section 3.2.

¹⁴⁴⁰ See, e.g., Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557, 569, 571 (1992); Cass R. Sunstein, *Problems with Rules*, 83 CAL. L. REV. 953, 972-73 (1995).

¹⁴⁴¹ See, e.g., *id.*, at 972-73; Kaplow, *supra* note 1315, at 569, 572, 574; Vincy Fon & Francesco Parisi, *On the Optimal Specificity of Legal Rules*, 3 J. INSTITUTIONAL. ECO. 147, 157 (2007).

¹⁴⁴² This idea is supported by studies. E.g., Dan Awrey, *Regulating Financial Innovation: A More-Principles-Based Proposal?*, 5 BROOK. J. CORP. FIN. & COM. L. 273, 290-91,

suggestion generally concerns how a sandbox should be crafted, this suggestion would provide insights not only for Taiwan's sandbox but for all the other sandboxes. First, the rules governing how sandboxes operate should be more from a higher-level. Having such rules could provide more flexibility, being easier to adjust and adapt, and better at avoiding obsolescence.¹⁴⁴³ As argued in the literature, detailed rules tend to be either over-inclusive or under-inclusive and more rigid.¹⁴⁴⁴ Thus, having fewer detailed, specific, and prescriptive rules could also avoid the excessive efforts that are needed to correct the detailed rules to fit the future reality. Second, more principles-based sandboxes also mean that there should be some principles setting the results and targets that the sandbox aims to achieve. Specifically, the previously mentioned higher-level rules formulating sandboxes should be closely fastened with these targeting principles together. Last, a systematic review mechanism should be introduced to assess the performance of a sandbox itself. Having such a mechanism might help the sandbox to adjust and adapt to FinTech's development as the adjusting requirement is embedded.

Indeed, sandboxes that are more principles-based may have some limitations. For instance, first, interpreting principles that have a lower degree of legal specificity may be more costly than interpreting rules that are with more certainty.¹⁴⁴⁵ However, as explained above and in Chapter 5, the higher costs when interpreting regulation should be considered together with the increase or decrease of other types of costs. For example, the higher interpreting costs brought by principles-based sandboxes might be compensated by the decrease of revising costs in the case of obsolescence.

315 (2011); Julia Black, Martyn Hopper & Christa Band, *Making A Success of Principles-based Regulation*, 1 L. FIN. MKT. REV. 191, 191, 195, 198 (2007); Cristie Ford, *Principles-Based Securities Regulation in the Wake of the Global Financial Crisis*, 55 R.D. MCGILL 1, 12-13 (2010).

¹⁴⁴³ See Awrey, *supra* note 1442, at 278.

¹⁴⁴⁴ See Black et al., *supra* note 1442, at 194.

¹⁴⁴⁵ See, e.g., Kaplow, *supra* note 1440, at 569, 571-72.

The detailed comparison of different types of costs could be left for future studies. Second, sandboxes that are more principles-based need more regulators' discretionary power to operate. This feature might create an opportunity for corruption. An interesting observation at the moment is that two countries implementing more principles-based sandboxes, which are the Philippines and the UK,¹⁴⁴⁶ may present different stories with respect to corruption. The Philippines and the UK are ranked respectively as the 115th and 11th country on the CPI (Corruption Perceptions Index, the "CPI") among 180 countries.¹⁴⁴⁷ This raises the questions of whether bribery can more often be observed in either country and how that affects the regulation of FinTech. According to scholars, after all, corruption could negatively influence the effectiveness of regulation in developing countries.¹⁴⁴⁸ However, by looking at the UK's sandbox, an emphasis on transparency can be observed. Measures of revealing the information regarding the decision process can be found. For instance, the eligibility criteria are clearly indicated, the lists of accepted firms are publicized, and the reasons why these firms are accepted are clearly explained.¹⁴⁴⁹ This indicates that enhancing transparency will be important if sandboxes are more principles-based.

5. Limitations

This study has several limitations. Firstly, the recommendations of this study are conditional to a certain extent. This study recommended the regulatory approach dealing with complexity, information deficits, and the

¹⁴⁴⁶ See *supra* Chapter 7, Section 3.2.2.1.

¹⁴⁴⁷ *Corruption Perceptions Index*, TRANSPARENCY INTERNATIONAL, <https://www.transparency.org/en/cpi/2020/index/gbr> (last visited May 1, 2022).

¹⁴⁴⁸ Michael Faure, Morag Goodwin & Franziska Weber, *Bucking the Kuznets Curve: Designing Effective Environmental Regulation in Developing Countries*, 51 VA. J. INT'L L. 95, 116 (2010).

¹⁴⁴⁹ See *Regulatory Sandbox accepted firms*, FCA, <https://www.fca.org.uk/firms/innovation/regulatory-sandbox/accepted-firms> (last visited May 1, 2022).

spacing issue to regulate FinTech and proposed how to cope with the barriers. However, the factors with respect to interest groups and regulators were not fully considered. That is, as found in Chapter 6, the perspective of public choice may explain why a sandbox or general FinTech regulation is not sufficiently adaptive and effective.¹⁴⁵⁰ These reasons center on, first, the influence of incumbents in financial markets whose interests in affecting FinTech regulation override FinTech firms' interests.¹⁴⁵¹ The group of FinTech firms contains more smaller-sized and dispersed members, thereby being less effective in influencing regulation.¹⁴⁵² A sandbox or FinTech regulation may thus function for these incumbents' benefits. Second, the regulators' attitude would also be relevant if they appear to be over-conservative, reactive, and subject to regulatory inertia.¹⁴⁵³ Regulators' incentives to truly promote FinTech might be insufficient.¹⁴⁵⁴ For instance, the FSC in Taiwan seems to prefer applicants who are financial institutions or the FinTech firms collaborating with banks to enter the sandbox.¹⁴⁵⁵ Since the above problems were not extensively addressed in this study, the regulatory approach proposed by this study may still be subject to interest groups' influence and regulators' attitudes. While regulation should respond to broader interests,¹⁴⁵⁶ the question of how to achieve it will be left for future research. The following Section 6 will give a preliminary description of this future research.

Secondly, as FinTech is still developing, this study was not able to discuss all the types of FinTech applications. Rather, some examples of

¹⁴⁵⁰ See *supra* Chapter 6, Section 5.2.2.

¹⁴⁵¹ See *supra* Chapter 6, Section 5.2.2.1.

¹⁴⁵² See, e.g., Sam Peltzman, *Toward a More General Theory of Regulation*, 19 J.L. ECON. 211, 212-13 (1976); MANCUR OLSON, *THE LOGIC OF COLLECTIVE ACTION* 53 (1971); George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MANAGE. SCI. 3, 12 (1971).

¹⁴⁵³ See *supra* Chapter 6, Section 5.2.2.2.

¹⁴⁵⁴ See *supra* Chapter 5, Section 4.2.2. and Chapter 7, Section 2.1.1.

¹⁴⁵⁵ See *supra* Chapter 6, Section 5.1.2.1.

¹⁴⁵⁶ PHILIP SELZNICK, *THE MORAL COMMONWEALTH: SOCIAL THEORY AND THE PROMISE OF COMMUNITY* 465-66, 472 (1994).

FinTech applications were selected. For instance, Chapters 2 and 3 selected the FinTech applications capitalizing on blockchain technology as the examples when analyzing FinTech's nature and influence. If other types of FinTech applications were selected, the insights would possibly be different. For instance, if online payments were chosen as the example, the complexities and market failures found would be different as its players, business model, and instruments differ. However, the pacing issue may generally exist at the intersection of regulation and technology despite the different types of FinTech. Moreover, the recommendations proposed by this study are from a higher-level and more generalized as both AFR and sandboxes apply to FinTech in general. Therefore, it seems that the choices of FinTech applications might not excessively bias the recommendations.

Thirdly, comprehensively studying the regulatory approaches to FinTech in all the jurisdictions does not seem to be feasible in this study. In fact, regulatory approaches to FinTech in jurisdictions seem to be diverse. For instance, the OB (open banking, "OB") regulation discussed in Chapter 4 could either be in a mandatory or voluntary approach in different jurisdictions.¹⁴⁵⁷ The operation of sandboxes in different jurisdictions also differs to the extent that, for example, the rules governing them are more generic or more detailed as studied in Chapter 7, how they operate, or the types of FinTech allowed to enter.¹⁴⁵⁸ The above differences between regulatory approaches to FinTech in jurisdictions might influence, among others, which barriers to effective FinTech regulation would be found and how to address them. In addition, some important existing regulations relevant to FinTech such as the GDPR (General Data Protection Regulation, the "GDPR")¹⁴⁵⁹ were not covered by this study. The selection of Taiwan as

¹⁴⁵⁷ See *supra* Chapter 4, Section 2.2.3.1. Regarding this matter, I, together with Prof. Chang-Hsien Tsai, will publish a book to further study OB regulations in both mandatory and voluntary approaches.

¹⁴⁵⁸ See *supra* Chapter 7, Section 3.2.2.

¹⁴⁵⁹ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal

a case study in Chapter 6 could also not fully generate strong conclusions. However, this study ultimately gave recommendations from a higher perspective to a certain degree in spite of the above limitations. For instance, AFR was proposed, contributing to regulation theory in the context of FinTech. Besides, this study pointed out that barriers to effective and adaptive FinTech regulation could be found in the aspects of the entry into, operation of, and formulation of FinTech regulation, thereby increasing the generality of the recommendations. Equally important, FinTech is still evolving, while FinTech regulation and sandboxes are still being developed in jurisdictions. The recommendations thus provide some directions towards what in the future FinTech regulation should be developing.

Fourthly, not all the aspects of regulating FinTech could be covered in this study. Whilst the recommendations center more on the design of FinTech regulation, the aspect of, for instance, enforcement was not studied. The recommendations in this study may be conditional owing to the aspects which were not analyzed. For instance, in a more principles-based sandbox, which was suggested in this study, several further topics were not analyzed. For example, how can the rules of this sandbox be followed? What are the incentives and threats for the testers in this principles-based sandbox? How to ensure the compliance with the rules of this sandbox by considering those incentives and threats?¹⁴⁶⁰ Those questions and aspects were not explicitly answered and addressed in this study. However, the recommendations in this study regarding the design of FinTech regulation could be the starting point for a future study concerning those aspects.

Lastly, quantitative analysis is not included in this study. This study is

data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), 2016 O.J. (L 119) 1.

¹⁴⁶⁰ For relevant theoretical discussions, see, e.g., Albert J. Reiss, Jr., *Consequences of Compliance and Deterrence Models of Law Enforcement for the Exercise of Police Discretion*, 47 LAW & CONTEMP. PROBS. 83, 91-93 (1984).

purely qualitative. For instance, the concept of complexity was applied in this study,¹⁴⁶¹ and this concept could be explained more quantitatively according to the literature.¹⁴⁶² However, this study qualitatively applied this concept by literally referring to the state of being complicated because this way was also found in literature.¹⁴⁶³

6. Future Research

Future research could focus on, firstly, the impact of interest groups and the role of regulators when adaptively regulating FinTech. As mentioned in Section 5 above, one of the limitations of this study regards these issues. The regulators' attitudes towards FinTech were also found to be another potential obstacle to effectively and adaptively regulating FinTech,¹⁴⁶⁴ but this issue was not analyzed. The issue regarding the impact of interest groups on FinTech regulation was also not fully addressed while this impact was found in the case study of Taiwan.¹⁴⁶⁵ Therefore, finding solutions to these problems from the perspective of public choice could be the focus of the future research.

Future research could also focus on the solutions proposed. For instance, the solutions could be developed through rethinking the aspect of regulators such as the crafting of regulators' decision-making procedure that better resists the influence of private interests.¹⁴⁶⁶ Introducing professionals to recraft the structure of regulators may also be worth studying as a possible

¹⁴⁶¹ See *supra* Chapter 3.

¹⁴⁶² See, e.g., Stefano Battiston et al., *Complexity Theory and Financial Regulation*, 351 SCIENCE 818, 818-19 (2016).

¹⁴⁶³ Schwarcz, *supra* note 1375, at 2. Regarding the explanation of the concept of complexity, see *supra* Chapter 3, Section 1.

¹⁴⁶⁴ See *supra* Chapter 6, Section 5.2.2.2.

¹⁴⁶⁵ See *supra* Chapter 6, Section 5.2.2.1.

¹⁴⁶⁶ ANTHONY I. OGUS, *Regulation: Legal Form and Economic Theory* 111 (Hart Publishing, 2004)

means.¹⁴⁶⁷ In addition to the aspect of regulators, the aspect of those regulated, particularly FinTech firms, is also worth focusing on. Specifically, as studied in Chapter 5, FinTech firms are also interested in influencing FinTech regulation like financial incumbents.¹⁴⁶⁸ Therefore, will equalizing the influence of different interest groups, which was argued in literature,¹⁴⁶⁹ be a possible solution also in the context of FinTech? If so, how? These issues could be covered in future research.

Secondly, this study briefly analyzed several conditions that might need to be fulfilled in order to share experiences in regulating FinTech between jurisdictions.¹⁴⁷⁰ Therefore, the future research could study the potential of mutual learning between jurisdictions. In addition, in this study, some existing examples of the network through which jurisdictions' experiences in regulating FinTech could be shared were mentioned.¹⁴⁷¹ Thus, the future research could discuss different networks that are playing an important role in the era of FinTech and analyze how they are able to generate learning from real practice.

¹⁴⁶⁷ *Id.* at 113.

¹⁴⁶⁸ *See supra* Chapter 6, Section 5.2.2.1.

¹⁴⁶⁹ James Kwak, *Cultural Capture and the Financial Crisis*, in PREVENTING REGULATORY CAPTURE: SPECIAL INTEREST INFLUENCE AND HOW TO LIMIT IT 71, 96 (Daniel Carpenter & David A. Moss eds., Cambridge University Press 2014).

¹⁴⁷⁰ *See supra* Chapter 7, Section 4.

¹⁴⁷¹ *See supra* Chapter 7, Section 4.2.

References

Books

- ARMOUR, JOHN; AWREY, DAN; DAVIES, PAUL; ENRIQUES, LUCA; GORDON, JEFFERY N. COLIN MAYER & JENNIFER PAYNE, PRINCIPLES OF FINANCIAL REGULATION (2016).
- ARTHUR, W. BRIAN. THE NATURE OF TECHNOLOGY: WHAT IT IS AND HOW IT EVOLVES (2009).
- ARTHUR, W. BRIAN. COMPLEXITY AND THE ECONOMY (2015).
- AYRES, IAN; BRAITHWAITE, JOHN. RESPONSIVE REGULATION: TRANSCENDING THE DEREGULATION DEBATE (1992).
- BALDWIN, ROBERT; CAVE, MARTIN; LODGE, MARTIN. UNDERSTANDING REGULATION: THEORY, STRATEGY, AND PRACTICE (1st ed., 2012).
- BEN-SHAHAR, OMRI; SCHNEIDER, CARL E. MORE THAN YOU WANTED TO KNOW: THE FAILURE OF MANDATED DISCLOSURE (1st ed. 2014).
- BENSTON, GEORGE J. REGULATING FINANCIAL MARKETS: A CRITIQUES AND SOME PROPOSALS (1998).
- BERNSTEIN, MARVER H. REGULATING BUSINESS BY INDEPENDENT COMMISSION (1955).
- BROWNSWORD, ROGER; GOODWIN, MORAG. LAW AND TECHNOLOGIES OF THE TWENTY-FIRST CENTURY: TEXT AND MATERIALS (2012).
- CALABRESI, GUIDO. A COMMON LAW FOR THE AGE OF STATUTES (1982).
- CHOI, STEPHEN J.; PRITCHARD, A.C. SECURITIES REGULATIONS: CASES AND ANALYSIS (3rd ed. 2012).
- COFFEE, JOHN C. JR.; SALE, HILLARY A. SECURITIES REGULATIONS: CASES AND MATERIALS (12th ed. 2012).
- COLLINGRIDGE, DAVID. SOCIAL CONTROL OF TECHNOLOGY (1980).
- COOTER, ROBERT; ULEN, THOMAS. LAW & ECONOMICS (6th ed. 2012).
- COX, JAMES D.; HILLMAN, ROBERT W.; LANGEVOORT, DONALD C. SECURITIES REGULATION: CASES AND MATERIALS (8th ed. 2016).
- GOODHART, CHARLES; HARTMANN, PHILIPP; LLEWELLYN, DAVID; ROJAS-SUÁREZ, LILIANA; WEISBROD, STEVEN. FINANCIAL REGULATION: WHY, HOW AND WHERE NOW? (1st ed.

- 1998).
- GORTON, GARY B. MISUNDERSTANDING FINANCIAL CRISES: WHY WE DON'T SEE THEM COMING (2012).
- HOLMSTRÖM, BENGT; TIROLE, JEAN. INSIDE AND OUTSIDE LIQUIDITY (2011).
- KNIGHT, FRANK H. RISK, UNCERTAINTY AND PROFIT (Reprints of Econ. Classics, 1964).
- COLANDER DAVID; KUPERS, ROLAND. COMPLEXITY AND THE ART OF PUBLIC POLICY: SOLVING SOCIETY'S PROBLEMS FROM THE BOTTOM UP (2014).
- LO, ANDREW W. ADAPTIVE MARKETS: FINANCIAL REVOLUTION AT THE SPEED OF THOUGHT (2017).
- MISHKIN, FREDERIC S. THE ECONOMICS OF MONEY, BANKING, AND FINANCIAL MARKETS (11th ed., Global ed., 2016).
- MUELLER, DENNIS C. PUBLIC CHOICE III (2003).
- NONET, PHILLIPPE; SELZNICK, PHILIP LAW AND SOCIETY IN TRANSITION: TOWARD RESPONSIVE LAW (2009).
- OGUS, ANTHONY I. REGULATION: LEGAL FORM AND ECONOMIC THEORY (Hart Publ'g 2004) (1994).
- OLSON, MANCUR. THE LOGIC OF COLLECTIVE ACTION (1971).
- PARISI, FRANCESCO. THE LANGUAGE OF LAW AND ECONOMICS (2013).
- ROGERS, EVERETT M. DIFFUSION OF INNOVATION (4th ed., 1995).
- SCHUMPETER, JOSEPH A. BUSINESS CYCLES (1939).
- SCHUMPETER, JOSEPH A. CAPITALISM, SOCIALISM & DEMOCRACY (Published in Taylor & Francis e-Library, 2003).
- SELZNICK, PHILIP. THE MORAL COMMONWEALTH: SOCIAL THEORY AND THE PROMISE OF COMMUNITY (1994).
- STIGLER, GEORGE J. THE THEORY OF PRICE (4th ed. 1987).
- SUNSTEIN, CASS R. WHY NUDGE?: THE POLITICS OF LIBERTARIAN PATERNALISM (2014).
- THALER, RICHARD H.; SUNSTEIN, CASS R. NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS (2008).
- YIN, ROBERT K. CASE STUDY RESEARCH: DESIGN AND METHODS (3rd ed., 2003).

Book Chapters

- Arthur, W. Brian. *Complexity Economics: A Different framework for Economic Thought*, in COMPLEXITY AND THE ECONOMY 1 (2015).
- Bradford, Steven. *Crowdfunding and the Federal Securities Law*, 2012 COLUM. BUS. L. REV. 1 (2012).
- Braithwaite, John. *Types of Responsiveness*, in REGULATORY THEORY: FOUNDATIONS AND APPLICATIONS 117 (Peter Drahos ed., 2017).
- Bromley, Lynn. *A Seat at the Table – Bringing the Voice of FinTech to the US Regulatory Process*, in THE REGTECH BOOK: THE FINANCIAL TECHNOLOGY HANDBOOK FOR INVESTORS, ENTREPRENEURS AND VISIONARIES IN REGULATION 93 (Janos Barberis, Douglas W. Arner, Ross P. Buckley eds., Aug. 2019).
- Butler, Tom; O’Brien, Leona, *Understanding RegTech for Digital Regulatory Compliance*, in DISRUPTING FINANCE: FINTECH AND STRATEGY IN THE 21ST CENTURY 85 (Theo Lynn, John G. Mooney, Pierangelo Rosati & Mark Cummins eds., 2018).
- Corrales, Marcelo; Fenwick, Mark; Forgó, Nikolaus. *Disruptive Technologies Shaping the Law of the Future*, in NEW TECHNOLOGY, BIG DATA AND THE LAW 1 (Marcelo Corrales, Mark Fenwick & Nikolaus Forgó eds., 2017).
- Deakin, Simon. *The Evolution of Theory and Method in Law and Finance*, in THE OXFORD HANDBOOK OF FINANCIAL REGULATION 13 (Niamh Moloney et al. eds., 2015).
- Dermine, Jean. *Digital Disruption and Banking Lending*, in FINTECH AND BANKING. FRIENDS OR FOES? 63 (Giorgio Barba, Giacomo Calzolari & Alberto Franco Pozzolo eds., 2017).
- Fenwick, Mark; Wrzka, Stefan. *The Flexibility of Law and Its Limits in Contemporary Business Regulation*, in FLEXIBILITY IN MODERN BUSINESS LAW: A COMPARATIVE ASSESSMENT 1 (2016).
- Ferrarini, Guido *Regulating FinTech: Crowdfunding and Beyond*, in FINTECH AND BANKING. FRIENDS OR FOES? 121 (Giorgio Barba, Giacomo Calzolari & Alberto Franco Pozzolo eds., 2017).
- Frame, W. Scott; Wall, Larry; White, Lawrence J. *Technological Change and Financial Innovation in Banking: Some Implications for FinTech*, in THE OXFORD HANDBOOK

- OF BANKING 263 (Allen N. Berger, Philip Molyneux & John O. S. Wilson eds., 3rd ed., 2019).
- Gaudet, Lyn M.; Marchant, Gary E. *Administrative Law Tools for More Adaptive and Responsive Regulation*, in THE GROWING GAP BETWEEN EMERGING TECHNOLOGIES AND LEGAL-ETHICAL OVERSIGHT (Gary E. Marchant, Braden R. Allenby & Joseph R. Herkert eds., 2011).
- Gunningham, Neil; Sinclair, Darren. *Smart Regulation*, in REGULATORY THEORY: FOUNDATIONS AND APPLICATIONS 133 (Peter Drahos ed., 2017).
- Koops, Bert-Jaap. *Ten Dimensions of Technology Regulation. Finding Your Bearings in the Research Space of An Emerging Discipline*, in DIMENSIONS OF TECHNOLOGY REGULATION 311 (Morag Goodwin, Bert-Jaap Koops & Ronald Leenes eds., 2010).
- Lindsey, Lawrence B. *The CRA as a Means to Provide Public Goods*, in REVISITING THE CRA: PERSPECTIVES ON THE FUTURE OF THE COMMUNITY REINVESTMENT ACT 160 (2009).
- Marchant, Gary E. *The Growing Gap Between Emerging Technologies and the Law*, in THE GROWING GAP BETWEEN EMERGING TECHNOLOGIES AND LEGAL-ETHICAL OVERSIGHT 19 (Gary E. Marchant, Braden R. Allenby & Joseph R. Herkert eds., 2011).
- Munger, Michael. *Coase and the “Sharing Economy”*, in FOREVER CONTEMPORARY: THE ECONOMICS OF RONALD COASE 187 (Cento Veljanovski ed., 2015).
- Nicoletti, Bernado. *The Future: Financial Services as Platforms*, in THE FUTURE OF FINTECH: INTEGRATING FINANCE AND TECHNOLOGY IN FINANCIAL SERVICES (2017).
- Ogus, Anthony. *Self-Regulation*, in ENCYCLOPEDIA OF LAW & ECONOMICS 587 (Boudewijn Bouckaert & Gerrit De Geest eds., 1999).
- Richardson, Benjamin J.; Razzaque, Jona. *Public Participation in Environmental Decision-making*, in ENVIRONMENTAL LAW FOR SUSTAINABILITY 165 (B. Richardson & S. Wood eds., 2006).
- Sabatier, Paul A.; Weible, Christopher M. *The Advocacy Coalition Framework: Innovations and Clarifications*, in THEORIES OF THE POLITICAL PROCESS 189 (2007).
- Tufano, Peter. *Financial Innovation*, in HANDBOOK OF THE ECONOMICS OF FINANCE: VOLUME 1A CORPORATE FINANCE 307 (George

- M. Constantinides, Milton Harris, René M. Stulz eds., 2003).
- van Erp, Judith; Faure, Michael; Nolkaemper, André; Philipsen, Niels. *Conclusion, in SMART MIXES IN RELATION TO TRANSBOUNDARY ENVIRONMENTAL HARM* 329 (Judith van Erp, Michael Faure, André Nolkaemper & Niels Philipsen eds., 2019).
- Vezzoso, Simonetta. *Fintech, Access to Data, and the Role of Competition Policy, in COMPETITION AND INNOVATION* 30 (V. Bagnoli ed., 2018).

Journal Articles

- Agrawal, Ajay K.; Catalini, Christian; Goldfarb, Avi. *Some Simple Economics of Crowdfunding*, 14 INNOVATION POL'Y & ECON. 63 (2014).
- Akerlof, George A. *The Market for "Lemons": Quality Uncertainty and the Market Mechanism*, 84 Q.J. ECON. 488 (1970).
- Allen, Hilary J. *Regulatory Sandboxes*, 87 GEO. WASH. L. REV. 579 (2019).
- Allen, Hilary J. *Experimental Strategies for Regulating Fintech*, 3 J.L. & INNOVATION 1 (2020)
- Arner, Douglas W.; Barberis, János; Buckley, Ross P. *The Evolution of FinTech: A New Post-Crisis Paradigm*, 47 GEO. J. INT'L L. 1271, 1289 (2016).
- Arner, Douglas W.; Barberis, János; Buckley, Ross P. *FinTech, RegTech, and the Reconceptualization of Financial Regulation*, 37 NW. J. INT'L L. & BUS. 371 (2017).
- Arthur, W. Brian. *Complexity and the Economy*, 284 SCIENCE 107 (1999).
- Awrey, Dan. *The FSA, Integrated Regulation, and the Curious Case of OTC Derivatives*, 13 U. PENN. J. BUS. L. 1 (2011).
- Awrey, Dan. *Regulating Financial Innovation: A More Principles-Based Proposal?*, 5 BROOK. J. CORP. FIN. & COM. L. 273 (2011).
- Avgouleas, Emiliós; Kiayias, Aggelos. *The Promise of Blockchain Technology for Global Securities and Derivative Markets: The New Financial Ecosystem and the 'Holy Grail' of Systemic Risk Containment*, 20 EUR. BUS. ORG. L. REV. 81 (2019).
- Awrey, Dan. *Complexity, Innovation, and the Regulation of Modern Financial Markets*, 2 HARV. BUS. L. REV. 235 (2012).
- Awrey, Dan; van Zwieten, Kristin. *The Shadow Payment System*, 43 J. CORP. L. 775

- (2018).
- Baldwin, Robert; Black, Julia. *Really Responsive Regulation*, 71 MOD. L. REV. 59 (2008).
- Battiston, Stefano et al. *Complexity Theory and Financial Regulation*, 351 SCIENCE 818 (2016).
- Baxter, Lawrence G. *Adaptive Regulation in the Amoral Bazaar*, 128 S. AFR. L.J. 253 (2011).
- Baxter, Lawrence G. *Betting Big: Value, Caution and Accountability in an Era of Large Banks and Complex Finance*, 31 REV. BANKING & FIN. L. 765 (2012).
- Baxter, Lawrence G. *Adaptive Financial Regulation and RegTech: A Concept Article on Realistic Protection for Victims of Bank Failures*, 66 DUKE L.J. 567 (2016).
- Ben-Shahar, Omri & Schneider, Carl E. *The Failure of Mandated Disclosure*, 159 U. PENN. L. REV. 647 (2011).
- Besley, Timothy. *How Do Market Failures Justify Interventions in Rural Credit Markets?*, 9 THE WORLD BANK RESEARCH OBSERVER 27 (1994).
- Black, Julia. Martyn Hopper & Christa Band, *Making Success of Principles-based Regulation*, 1 L. & FIN. MKT. 191 (2007).
- Black, Julia. *Constructing and Contesting Legitimacy and Accountability in Polycentric Regulatory Regimes*, 2 REGUL. & GOV. 137 (2008).
- Black, Julia; Baldwin, Robert. *Really Responsive Risk-Based Regulation*, 32 LAW & POL'Y 181 (2010).
- Black, Julia. *Paradoxes and Failures: New Governance Techniques and the Financial Crisis*, 75 MOD. L. REV. 1037 (2012).
- Braithwaite, John. *Responsive Regulation and Developing Economies*, 34 WORLD DEVELOPMENT 884 (2006).
- Braithwaite, John; Coglianese, Cary; Levi-Faur, David. *Can Regulation and Governance Make a Difference?*, 1 REGUL. & GOV. 1 (2007).
- Braithwaite, John. *The Essence of Responsive Regulation*, 44 U.B.C. L. REV. 475 (2011).
- Brown, Elizabeth F.; Buckley, Edward F. *A Preliminary Look at State Structures for Regulating Financial Services*, 87 U. CIN. L. REV. 891 (2019).
- Brummer, Chris. *Disruptive Technology and Securities Regulation*, 84 FORD. L. REV. 977 (2015).

- Buckley, Ross P.; Malady, Louise. *The New Regulatory Frontier: Building Consumer Demand for Digital Financial Services – Part I*, 131 *BANKING L.J.* 834 (2014).
- Calabresi, Guido *Transaction Costs, Resource Allocation, and Liability Rules: A Comment*, 11 *J.L. & ECON.* 67 (1968).
- Campbell-Verduyn, Malcolm. *Bitcoin, Crypto-coins, and Global Anti-money Laundering Governance*, 69 *CRIME, LAW & SOCIAL CHANGE* 283 (2018).
- Carlin, Bruce I. *Strategic Price Complexity in Retail Financial Markets*, 91 *J. FIN. ECON.* 278 (2009).
- Catalini, Christian. *Blockchain Technology and Cryptocurrencies: Implications for the Digital Economy, Cybersecurity, and Government*, 19 *GEORGET. J. INT. AFF.* 36 (2018).
- Chiu, Iris H-Y. *FinTech and Disruptive Business Models in Financial Products, Intermediation and Markets – Policy Implications for Financial Regulators*, 21 *J. TECH. L. & POL'Y* 55 (2016).
- Coase, R.H. *The Nature of the Firm*, 4 *ECONOMICA* 386 (1937).
- Coase, R.H. *The Federal Communications Commission*, 2 *J.L. & ECON.* 1 (1959).
- Coase, R.H. *The Problem of Social Cost*, 3 *J.L. & ECON.* 1 (1960).
- Coffee, John C. Jr.; Sale, Hillary A. *Redesigning the SEC: Does the Treasury Have a Better Idea?*, 95 *VIR. L. REV.* 707 (2009).
- Coglianese, Cary. *Optimizing Regulation for and Optimizing Economy*, 4 *J.L. & PUB. AFF.* 1 (2018).
- Crosby, Michael; Pattanayak, Nachiappan; Verma, Pradan Sanjeev; Kalyanaraman, Vignesh. *BlockChain Technology: Beyond Bitcoin*, 2 *APPLIED INNOVATION REV.* 6 (2016).
- de la Mano, Miguel; Padilla, Jorge. *Big Tech Banking*, 14 *J. COMPETITION L. & ECON.* 494 (2019).
- Debler, Julianna. *Foreign Initial Coin Offering Issuers Beware: The Securities and Exchange Commission is Watching*, 51 *CORNELL INT'L L.J.* 245 (2018).
- Di Porto, Fabiana; Ghidini, Gustavo. *"I Access Your Data, You Access Mine": Requiring Data Reciprocity in Payment Services*, 51 *INT'L REV. INTELL. PROP. & COMPETITION L.* 307 (2020).

- Diamond, Douglas W. & Dybvig, Philip H. *Bank Runs, Deposit Insurance, and Liquidity*, J. POLITICAL ECON. 401 (1983).
- Diamond, Douglas W. *Financial Intermediation and Delegated Monitoring*, 51 REV. ECON. STUD. 393 (1984).
- Diamond, Douglas W.; Rajan, Raghuram G. *Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking*, 109 J. POLITICAL ECON. 287 (2001).
- Ehrlich, Isaac; Posner, Richard A. *An Economic Analysis of Legal Rulemaking*, 3 J. LEGAL STUD. 257 (1974).
- Eyassu, Selam E. *Overview of Blockchain Legislative and Adoption: Status and Challenges*, 20 ISSUES IN INFORMATION SYSTEMS 12 (2019).
- Faure, Michael. *The complementary roles of liability, regulation and insurance in safety management: theory and practice*, 17 J. RISK RESEARCH 689 (2014).
- Faure, Michael; Visscher, Louis; Weber, Franziska. *Liability for Unknown Risks: A Law and Economics Perspective*, 7 J. EUR. TORT L. 198 (2016).
- Faure-Grimaud, Antonie; Martimort, David. *Regulatory Inertia*, 34 RAND J. ECON. 413 (2003).
- Fenwick, Mark; Kaal, Wulf A.; Vermeulen, Erik P. M. *Regulation Tomorrow: What Happens When Technology Is Faster than the Law?*, 6 AM. U. BUS. L. REV. 561 (2017).
- Friedman, Benjamin M.; Laibson, David I. *Economic Implications of Extraordinary Movements in Stock Prices*, 2 BROOKINGS PAPERS ON ECON. ACTIVITY 137 (1989).
- Fon, Vincy; Parisi, Francesco. *On the Optimal Specificity of Legal Rules*, 3 J. INSTITUTIONAL. ECO. 147 (2007).
- Ford, Cristie. *Principles-Based Securities Regulation in the Wake of the Global Financial Crisis*, 55 R.D. MCGILL 1 (2010).
- Garoupa, Nuno; Morriss, Andrew P. *The Fable of the Codes: The Efficiency of the Common Law, Legal Origins, and Codification Movements*, 2012 U. ILL. L. REV. 1443 (2012).
- Garoupa, Nuno Garoupa; Pargendler, Mariana. *A Law and Economics Perspective on Legal Families*, 7 EUR. J. LEGAL STUD. 36 (2014).
- Gawer, Annabelle; Henderson, Rebecca. *Platform Owner Entry and Innovation in*

- Complementary Markets: Evidence from Intel*, 16 J. ECON. & MGMT. STRATEGY 1 (2007).
- Gersen, Jacob E.; Posner, Eric A. *Timing Rules and Legal Institutions*, 121 HARV. L. REV. 543 (2007).
- Gilson, Ronald J.; Kraakman, Reinier H. *Market Efficiency after the Financial Crisis: It's Still a Matter of Information Costs*, 100 VIR. L. REV. 313 (2014).
- Goldstein, Itay; Jiang, Wei; Karolyi, G. Andrew. *To FinTech and Beyond*, 32 REV. FIN. STUD. 1647 (2019).
- Gomber, Peter; Koch, Jascha-Alexander; Siering, Michael. *Digital Finance and FinTech: Current Research and Future Research Directions*, 87 J. BUS. ECON. 537 (2017).
- Gomber, Peter; Kauffman, Robert J.; Parker, Chris; Weber, Bruce W. *On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services*, 35 J. MGMT. INFO. SYS. 220 (2018).
- Gorton, Gary. *The Development of Opacity in U.S. Banking*, 31 YALE J. ON REG. 825 (2014).
- Grabosky, P.N. *Regulation by Reward: On the Use of Incentives as Regulatory Instruments*, 17 LAW & POL'Y 257 (1995).
- Haber, Stuart; Stornetta, W. Scott *How to Time-stamp a Digital Document*, 3 J. CRYPTOLOGY 99 (1991).
- Hagreen, Samuel. *The JOBS Act: Exempting Internet Portals from the Definition of Broker-Dealer*, 90 DENVER U. L. REV. ONLINE 73 (2013).
- Haldane, Andrew G.; May, Robert M. *Systemic Risk in Banking Ecosystems*, 469 NATURE 351 (2011).
- Hazen, Thomas Lee. *Crowdfunding or Fraudfunding? Social Networks and the Securities Laws – Why the Specially Tailored Exemption Must be Conditioned on Meaningful Disclosure*, 90 N.C. L. REV. 1735 (2012).
- Hill, Julie Anderson. *Virtual Currencies & Federal Law*, 18 J. CONSUMER & COM. L. 65 (2014).
- Holcombe, Randall G.; Holcombe, Lora P. *The Market for Regulation*, 142 J. INST. THEOR. ECON. 684 (1986).
- Hornstein, Donald T. *Complexity Theory, Adaption, and Administrative Law*, 54 DUKE

- L.J. 913 (2005).
- Hu, Henry T.C. *Misunderstood Derivatives: The Causes of Informational Failure and the Promise of Regulatory Incrementalism*, 102 YALE L.J. 1457 (1993).
- Huang, Robin Hui. *Online P2P Lending and Regulatory Responses in China: Opportunities and Challenges*, 19 EUR. BUS. ORG. L. REV. 63 (2018).
- Jaffe, Adam B.; Newell, Richard G.; Stavins, Robert N. *Environmental Policy and Technological Change*, 22 ENV'T & RES. ECON. 41 (2002).
- Judge, Kathryn. *Fragmentation Nodes: A Study in Financial Innovation, Complexity, and System Risk*, 64 STAN. L. REV. 657 (2012).
- Judge, Kathryn. *Intermediary Influence*, 82 U. CHI. L. REV. 573 (2015).
- Judge, Kathryn. *Information Gaps and Shadow Banking*, 103 VIR. L. REV. 411 (2017).
- Kaal, Wulf A. *Dynamic Regulation of the Financial Services Industry*, 48 WAKE FOREST L. REV. 791 (2013).
- Kaplow, Louis. *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557 (1992).
- Karkkainen, Bradley C. *Collaborative Ecosystem Governance: Scale, Complexity, and Dynamism*, 21 VA. ENV'T L. L.J. 189 (2002).
- Kidd, Jeremy. *FinTech: Antidote to Rent-Seeking?*, 93 CHI.-KENT L. REV. 165 (2018).
- Kirman, Alan. *Complexity and Economic Policy: A Paradigm Shift or a Change in Perspective? A Review Essay on David Colander and Roland Kupers's Complexity and the Art of Public Policy*, 54 J. ECON. LIT. 534 (2016).
- Kirschenbaum, Joshua; Véron, Nicolas. *A better European Union architecture to fight money laundering*, 19 POL'Y CONTRIBUTION 1 (2018).
- Langevoort, Donald C. *Statutory Obsolescence and the Judicial Process: The Revisionist Role of the Courts in Federal Banking Regulation*, 85 MICH. L. REV. 672 (1987).
- Leef, George. *Complexity and Command-and-Control*, 38 REG. 54 (2015).
- Levin, Simon A.; Lo, Andrew W. *Opinion: A New Approach to Financial Regulation*, 112 PNAS 12543 (2015).
- Llewellyn, David T. *Regulation of Retail Investment Services*, 15 ECON. AFF. 12 (1995).
- Lin, Tom C.W. *Infinite Financial Intermediation*, 50 WAKE FOREST L. REV. 643 (2015).
- Lin, Yong-Ru (林咏儒). *Tan Tao Jin Rong Xin Chuang P2P Zai Wo Guo Fa Zhan Suo Mian Lin De Xi Qian Fang Zhi Gui Fan Ji Jian Li Feng Xian—Yi Ying Tao Zhi Fu*

- An Wei Li* (探討金融新創 P2P 在我國發展所面臨的洗錢防制規範及監理風險—以櫻桃支付案為例) [*Analysis of the AML Regulations and Regulatory Risks Faced When Developing Innovative Financial P2P—A Case Study on CharryPay*], 71 QI HUO REN (期貨人) [TAIWAN FUTURES] 70 (2019).
- Lo, Andrew W. *Regulatory Reform in the Wake of the Financial Crisis of 2007-2008*, 1 J. FIN. ECON. POL'Y 4 (2009).
- Luppi, Barbara; Parisi, Francesco. *Optimal Timing of Legal Intervention: The Role of Timing Rules*, 122 HARV. L. REV. F. 18 (2009).
- Macey, Jonathan R. *Administrative Agency Obsolescence and Interest Group Formation: A Case Study of the SEC at Sixty*, 15 CARDOZO L. REV. 909 (1993).
- Mandel, Gregory N. *Regulating Emerging Technologies*, 1 L. INNOVATION & TECH. 75 (2009).
- Magnuson, William. *Regulating FinTech*, 71 VAND. L. REV. 1167 (2018).
- Maume, Philipp & Fromberger, Mathias. *Regulation of Initial Coin Offerings: Reconciling U.S. and E.U. Securities Law*, 19 CHI. J. INT'L L. 548 (2019).
- McChesney, Fred S. *Rent Extraction and Rent Creation in the Economic Theory of Regulation*, 16 J. L. STUD. 101 (1987).
- McCray, Lawrence E.; Oye, Kenneth A.; Petersen, Arthur C. *Planned Adaptation in Risk Regulation: An Initial Survey of US Environmental, Health, and Safety Regulation*, 77 TECH. FORECASTING & SOC. CHANGE 951 (2010).
- Mendelson, Michael. *From Initial Coin Offerings to Security Tokens: A U.S. Federal Securities Law Analysis*, 22 STAN. TECH. L. REV. 52 (2019).
- Moses, Lyria Bennett. *How to Think about Law, Regulation and Technology: Problems with Technology as a Regulatory Target*, 5 LAW INNOVATION & TECH. 1 (2013).
- Moses, Lyria Bennett. *Agents of Change: How the Law Copes with Technological Change*, 20 GRIFFITH L. REV. 763 (2011).
- Mullineux, Andy. *Banking for the public good*, 36 INT'L REV. FIN. ANALYSIS 87 (2014).
- Nabilou, Hossein; Prüm, André. *Ignorance, Debt and Cryptocurrencies: The Old and New in the Law and Economics of Concurrent Currencies*, 5 J. FIN. REG. 29 (2019).
- Omarova, Saule T. *Rethinking the Future of Self-Regulation in the Financial Industry*, 35 BROOK. J. INT'L L. 665 (2010).

- Omarova, Saule T. *Dealing with Disruption: Emerging Approaches to Fintech Regulation*, 61 J.L. & POL'Y 25 (2020).
- Omarova, Saule T. *Technology v. Technocracy: Fintech as a Regulatory Challenge*, 6 J. FIN. REG. 75 (2020).
- Parisi, Francesco; Fon, Vincy; Ghei, Nita. *The Value of Waiting in Lawmaking*, 18 EUR. J. L. ECON. 131 (2004).
- Paccos, Alessio M. *Financial Intermediation in the Securities Markets Law and Economics of Conduct of Business Regulation*, 20 INT'L REV. L. & ECON. 479 (2000).
- Pekmezovic, Alma; Walker, Gordon. *The Global Significance of Crowdfunding: Solving the SME Funding Problem and Democratizing Access to Capital*, 7 WM. & MARY BUS. L. REV. 347 (2016).
- Peltzman, Sam. *Toward a More General Theory of Regulation*, 19 J. L. ECON. 211 (1976).
- Peng, Jin-Lung; Tsang, Cheng-Yun. *FinTech Regulation and A Review of Taiwan's Financial Regulatory Sandbox Framework*, 38 MGMT. REV. 89 (2019).
- Pistor, Katharina. *A Legal Theory of Finance*, 41 J. COMP. ECON. 315 (2013).
- Polinsky, A. Mitchell. *Economic Analysis as a Potentially Defective Product: A Buyer's Guide to Posner's "Economic Analysis of Law"*, 87 HARV. L. REV. 1655 (1974).
- Posner, Eric A.; Weyl, E. Glen. *An FDA for Financial Innovation: Applying the Insurable Interest Doctrine to Twenty-First-Century Financial Markets*, 107 NW. U. L. REV. 1307 (2013).
- Razzano, Matthew J. *An Unsafe Sandbox: FinTech Innovation at the Expense of Consumer Protection?*, 2019 U. ILL. L. REV. ONLINE 132 (2019).
- Recent Guidance, *Securities Regulation – Financial Technology – SEC Provides Analytical Tools for Assessing Digital Assets. – SEC, Framework for "Investment Contract" Analysis of Digital Assets (2019)*, 132 HARV. L. REV. 2418, 249 (2019).
- Ringe, Wolf-Georg; Ruof, Christopher. *Regulating Fintech in the EU: The Case for a Guided Sandbox*, 11 EUR. J. OF RISK REG. 604 (2020).
- Robertson, Thomas S. *The Process of Innovation and the Diffusion of Innovation*, 31 J. MKTG. 14 (1967).
- Rohr, Jonathan; Wright, Aaron. *Blockchain-Based Token Sales, Initial Coin Offerings, and the Democratization of Public Capital Markets*, 70 HASTINGS L.J. 463 (2019).

- Ruhl, J.B. *Regulation by Adaptive Management—Is It Possible?*, 7 MINN. J.L. SCI. & TECH. 21 (2005).
- Sabatier, Paul A. *An Advocacy Coalition Framework of Policy Change and the Role of Policy-Oriented Learning Therein*, 21 POL'Y SCI. 129 (1988).
- Schiek, Dagmar. *Enforcing (EU) Non-discrimination Law: Mutual Learning between British and Italian Labour Law?*, 28 INT'L J. COMP. LABOUR L. IND. RELAT. 489 (2012).
- Schwarcz, Steven L. *The Alchemy of Asset Securitization*, 1 STAN. J.L. BUS. & FIN. 133 (1994).
- Schwarcz, Steven L. *Rethinking the Disclosure Paradigm in a World of Complexity*, 1 U. ILL. L. REV. 1 (2004).
- Schwarcz, Steven L. *Regulating Complexity in Financial Markets*, 87 WASH. U. L. REV. 211 (2009).
- Schwartz, Andrew A. *Keep It Light, Chairman White: SEC Rulemaking Under the CROWDFUND Act*, 66 VAND. L. REV. EN BANC 43 (2013).
- Shavell, Steven. *The Optimal Structure of Law Enforcement*, 36 J.L. & ECON. 255 (1993).
- Stigler, George J. *Imperfections in the Capital Markets*, 75 J. POL. ECON. 287 (1967).
- Stigler, George J. *The Theory of Economic Regulation*, 2 BELL J. ECON. & MANAGE. SCI. 3 (1971).
- Stiglitz, Joseph E. *Information and the Change in the Paradigm in Economics*, 92 AM. ECON. REV. 460 (2002).
- Sunstein, Cass R. *Problems with Rules*, 83 CAL. L. REV. 953 (1995).
- Sunstein, Cass R.; Thaler, Richard H. *Libertarian Paternalism Is Not an Oxymoron*, 70 U. CHI. L. REV. 1159 (2003).
- Tsai, Chang-Hsien; Peng, Kuan-Jung. *The FinTech Revolution and Financial Regulation: The Case of Online Supply-Chain Financing*, 4 ASIAN J. L. & SOC'Y 109 (2017).
- Tsai, Chang-Hsien. *To Regulate or Not to Regulate? A Comparison of Government Responses to Peer-to-Peer Lending among the United States, China, and Taiwan*, 87 U. CIN. L. REV. 1077 (2019).
- Tsai, Chang-Hsien; Lin, Ching-Fu; Liu, Han-Wei. *The Diffusion of the Sandbox Approach to Disruptive Innovation and Its Limitations*, 53 CORNELL INT'L L.J. 261 (2020).

- Tsang, Cheng-Yun (臧正運). *Cong Guo Ji Fa Zhan Qu Shi Lun Wo Guo Tui Dong Kai Fang Yin Hang Ying You Zhi Si Kao* (從國際發展趨勢論我國推動開放銀行應有之思考) [*Rethinking Promoting Open Banking in Taiwan from the Perspective of the International Development Trajectory*], 34 JIN RONG LIAN HE ZHENG XIN (金融聯合徵信) [JOINT CREDIT INFO. CTR.] 4 (2019).
- Tullock, Gordon. *The Welfare Costs of Tariffs, Monopolies, and Theft*, 5 ECON. INQUIRY 224 (1967).
- Utset, Manuel A. *Complex Financial Institutions and System Risk*, 45 GA. L. REV. 779 (2011).
- Van Gossum, Peter; Arts, Bas; Verheyen, Kris. *From “Smart Regulation” to “Regulatory Arrangements”*, 43 POL’Y SCI. 245 (2010).
- Van Loo, Rory. *Making Innovation More Competitive: The Case of FinTech*, 65 UCLA L. REV. 232 (2018).
- Watson, Alan. *Legal Change: Sources of Law and Legal Cultural*, 131 U. PA. L. REV. 1121, 1154 (1983); Alan Watson, *From Legal Transplants to Legal Formants*, 43 AM. J. COMP. L. 469 (1995).
- Wiener, Jonathan B. *Better Regulation in Europe*, 59 CURRENT L. PROBS. 447, 449 (2006).
- Williamson, Oliver E. *Transaction-Cost Economics: The Governance of Contractual Relations*, 22 J.L. & ECON. 233 (1979).
- Wood, Jacob; Jang, Haejin; Lenskiy, Artem; Khan, Gohar Feroz. *The Diffusion and Adoption of Bitcoin: A Practical Survey of Business*, 11 INT’L BUS. MANAG. 1278 (2017).
- Wroldsen, John S. (Jack). *The Social Network and the Crowdfund Act: Zuckerberg, Saverin, and Venture Capitalists’ Dilution of the Crowd*, 15 VAND. J. ENT. & TECH. L. 583 (2013).
- Wymeersch, Eddy. *The Structure of Financial Supervision in Europe: About Single Financial Supervisors, Twin Peaks and Multiple Financial Supervisors*, 8 EUR. BUS. ORG. L. REV. 237 (2007).
- Yang, Yueh-Ping; Tsang, Chen-Yun. *RegTech and the New Era of Financial Regulators: Envisaging More Public-Private-Partnership Models of Financial Regulators*, 21 U. PA. J. BUS. L. 354 (2018).

- Yermack, David. *Corporate Governance and Blockchains*, 21 REV. FIN. 7 (2017).
- Zetzsche, Dirk A.; Buckley, Ross P.; Barberis, János N.; Arner, Douglas W. *Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation*, 23 FORDHAM J. CORP. & FIN. L. 31 (2017).
- Zetzsche, Dirk A.; Buckley, Ross P.; Arner, Douglas W.; Barberis, János N. *From Fintech to Techfin: The Regulatory Challenges of Data-Driven Finance*, 14 N.Y.U. J.L. & BUS. 393 (2018).
- Zetzsche, Dirk A.; Buckley, Ross P.; Arner, Douglas W. *The Distributed Liability of Distributed Ledgers: Legal Risks of Blockchain*, 2018 U. ILL. L. REV. 1361 (2018).
- Zetzsche, Dirk A.; Buckley, Ross P.; Arner, Douglas W. *The Rise of TechFins: Regulatory Challenges*, in FINTECH: LAW AND REGULATION 280 (2019).
- Zetzsche, Dirk; Birdthistle, William A.; Arner, Douglas W.; Buckley, Ross P. *Digital Finance Platforms: Toward A New Regulatory Paradigm*, 23 U. PENN. J. BUS. L. 1 (2020).

Reports

- AHLUWALIA, BOBBY; IMRAN, SAAD. SECURITY TOKEN OFFERINGS: THE EVOLUTION OF CAPITAL FORMATION (Nov. 20, 2018), <https://drive.google.com/file/d/1CIwOko6mgw3HM3rsolkhdjwi7LuMk-ya/view>.
- ARNER, DOUGLAS W.; BARBERIS, JÁNOS; BUCKLEY, ROSS P. CFA INSTITUTE RESEARCH FOUNDATION, FINTECH AND REGTECH IN A NUTSHELL, AND THE FUTURE IN A SANDBOX (2017), <https://www.cfainstitute.org/-/media/documents/article/rtf-brief/rfbr-v3-n4-1.ashx>.
- BAILEY, BRAD J. CAIA ASSOCIATION, FUTURE OF FINTECH IN CAPITAL MARKETS (2016).
- BAKER MCKENZIE, INTERNATIONAL GUIDE TO REGULATORY FINTECH SANDBOXES (2018), https://www.bakermckenzie.com/en/-/media/files/insight/publications/2018/12/guide_intlguideregulatorysandboxes_dec_2018.pdf.
- BAKER MCKENZIE, A GUIDE TO REGULATORY FINTECH SANDBOXES INTERNATIONALLY (2020), <https://www.bakermckenzie.com/>

[/media/files/insight/publications/2020/05/a_guide_to_regulatory_fintech_sandboxes_internationally_8734.pdf?la=en.](#)

BANKING STAKEHOLDERS GROUP, REGULATORY SANDBOXES: A PROPOSAL TO EBA BY THE BANKING STAKEHOLDERS GROUP (July 20, 2017), [https://www.eba.europa.eu/sites/default/documents/files/documents/10180/807776/dc1d5046-e211-4b24-aadf-33fc93949017/BSG%20Paper%20on%20Regulatory%20Sandboxes_20%20July%202017.pdf?retry=1.](https://www.eba.europa.eu/sites/default/documents/files/documents/10180/807776/dc1d5046-e211-4b24-aadf-33fc93949017/BSG%20Paper%20on%20Regulatory%20Sandboxes_20%20July%202017.pdf?retry=1)

BASEL COMM. ON BANKING SUPERVISION, BASEL III: A GLOBAL REGULATORY FRAMEWORK FOR MORE RESILIENT BANKS AND BANKING SYSTEMS (2010), [https://www.bis.org/publ/bcbs189.pdf.](https://www.bis.org/publ/bcbs189.pdf)

BASEL COMM. ON BANKING SUPERVISION, GLOBAL SYSTEMICALLY IMPORTANT BANKS: UPDATED ASSESSMENT METHODOLOGY AND THE HIGHER LOSS ABSORBENCY REQUIREMENT (July 2013), [https://www.bis.org/publ/bcbs255.pdf.](https://www.bis.org/publ/bcbs255.pdf)

BNP PARIBAS, WORLD PAYMENTS REPORT 2018 (2018), [https://worldpaymentsreport.com/wp-content/uploads/sites/5/2018/10/World-Payments-Report-2018.pdf.](https://worldpaymentsreport.com/wp-content/uploads/sites/5/2018/10/World-Payments-Report-2018.pdf)

CARR, BRAD; PUJAZON, DANIEL; URBIOLA, PABLO. INST. INT'L FIN., RECIPROCITY IN CUSTOMER DATA SHARING FRAMEWORKS (July 2018), [https://www.iif.com/portals/0/Files/private/32370132_reciprocity_in_customer_data_sharing_frameworks_20170730.pdf.](https://www.iif.com/portals/0/Files/private/32370132_reciprocity_in_customer_data_sharing_frameworks_20170730.pdf)

CHRISTIANSEN, BRIAN; MAALOUF, KHALIL; BRANDT, PATRICK; SEVE, MARGOT; PIQUET, FRANCOIS; SANDMAN, JOSEPH; SEIDNER, GREG. A LOOK AT US AND EU FINTECH REGULATORY FRAMEWORK (Feb. 16, 2018), [https://www.skadden.com/-/media/files/publications/2018/02/a_look_at_us_and_eu_fintech_regulatory_frameworks.pdf.](https://www.skadden.com/-/media/files/publications/2018/02/a_look_at_us_and_eu_fintech_regulatory_frameworks.pdf)

CMA, TOWARDS THE CMA: CMA GUIDANCE (July 15, 2013), [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/212285/CMA1 - Towards the CMA.pdf.](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/212285/CMA1_-_Towards_the_CMA.pdf)

CMA, RETAIL BANKING MARKET INVESTIGATION: FINAL REPORT (Aug. 9, 2016), <https://assets.publishing.service.gov.uk/media/57ac9667e5274a0f6c00007a/retail->

- [banking-market-investigation-full-final-report.pdf](#).
- CMA, ANNUAL REPORT ON CONCURRENCY (Apr. 10, 2019), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/811431/ACR_PV2406.pdf.
- CMA & FCA, MEMORANDUM OF UNDERSTANDING BETWEEN THE COMPETITION AND MARKETS AUTHORITY AND THE FINANCIAL CONDUCT AUTHORITY – CONCURRENT COMPETITION POWERS (July 2019), <https://www.fca.org.uk/publication/mou/fca-cma-concurrent-competition-powers-mou.pdf>.
- CUERVO, CRISTINA; MOROZOVA, ANASTAIIA; SUGIMOTO, NOBUYASU INTERNATIONAL MONETARY FUND, REGULATION OF CRYPTO ASSETS (2019).
- DAVIES, STEVE ET AL., STRATEGY& & PWC, 4TH ICO / STO REPORT: A STRATEGIC PERSPECTIVE 1 (Mar., 2019), <https://cryptovalley.swiss/wp-content/uploads/ch-20190308-strategyand-ico-sto-report-q1-2019.pdf>.
- DELOITTE, THE FUTURE OF POST-TRADE: A GLIMPSE INTO THE FUTURE (2017), <https://www2.deloitte.com/content/dam/Deloitte/de/Documents/strategy/Future-of-Post-Trade-Glimpse-Paper.pdf>.
- DELOITTE, THE FUTURE OF OPERATIONAL RISK IN FINANCIAL SERVICES: A NEW APPROACH TO RISK CAPITAL MANAGEMENT (2018), https://www2.deloitte.com/content/dam/Deloitte/cy/Documents/financial-services/CY_FS_The-future-of-operational-risk-in-financial-services_Noexp.pdf.
- DELOITTE, A JOURNEY THROUGH THE FCA REGULATORY SANDBOX: THE BENEFITS, CHALLENGES, AND NEXT STEPS (2018).
- DELOITTE, FINTECH: REGULATORY CHALLENGES AND FINANCIAL CRIME EXPOSURE (2018), https://www2.deloitte.com/content/dam/Deloitte/de/Documents/finance/Deloitte_FinTech.pdf.
- DI CASTRI, SIMONE; HOHL, STEFAN; KULENKAMPPF, AREND; PRENIO, JERMY. BANK OF INTERNATIONAL SETTLEMENTS. THE SUPTECH GENERATIONS (Oct. 2019), <https://www.bis.org/fsi/publ/insights19.pdf>.
- DNB & AFM, MORE ROOM FOR INNOVATION IN THE FINANCIAL SECTOR – MARKET ACCESS, AUTHORISATIONS AND SUPERVISION: NEXT STEPS AFM-DNB (Dec. 2016), https://www.afm.nl/~/_profimedia/files/onderwerpen/innovation-

[hub/publicaties/2016/room-for-innovation-in-financial-sector.pdf?la=en](https://publicaties/2016/room-for-innovation-in-financial-sector.pdf?la=en).

DOYLE, MARGARET; SHARMA, RAHUL; ROSS, CHRISTOPHER; SONNAD, VISHWANATH. DELOITTE. HOW TO FLOURISH IN AN UNCERTAIN FUTURE: OPEN BANKING (2017).

EBA WORKING GROUP ON ELECTRONIC ALTERNATIVE PAYMENTS, UNDERSTANDING THE BUSINESS RELEVANCE OF OPEN APIs AND OPEN BANKING FOR BANKS: INFORMATION PAPER (2016).

ECKENRODE, JIM; FRIEDMAN, SAM. DELOITTE. FINTECH BY THE NUMBERS: INCUMBENTS, STARTUPS, INVESTORS ADAPT TO MATURING SYSTEM (2017).

EGGERS, WILLIAM D. MIKE TURLEY & PANKAJ KISHNANI, DELOITTE, THE FUTURE OF REGULATION: PRINCIPLES FOR REGULATING EMERGING TECHNOLOGIES (2018).

EUROPEAN COMMISSION, FINTECH ACTION PLAN: FOR A MORE COMPETITIVE AND INNOVATIVE EUROPEAN FINANCIAL SECTOR (2018), https://eur-lex.europa.eu/resource.html?uri=cellar:6793c578-22e6-11e8-ac73-01aa75cd71a1.0001.02/DOC_1&format=PDF.

EUROPEAN SECURITIES AND MARKETS AUTHORITY, EUROPEAN BANKING AUTHORITY & EUROPEAN INSURANCE AND OCCUPATIONAL PENSIONS AUTHORITY, REPORT – FINTECH: REGULATORY SANDBOXES AND INNOVATION HUBS (2018).

EY, THE REVISED PAYMENT SERVICES DIRECTIVE (PSD2): WHAT YOU NEED TO KNOW (2018).

EY, REGULATORY TECHNOLOGY (REGTECH): NAVIGATING THE RIGHT TECHNOLOGY TO MANAGE THE EVOLVING REGULATORY ENVIRONMENT (2019), https://assets.ey.com/content/dam/ey-sites/ey-com/en_us/topics/financial-services/ey-regulatory-technology-regtech.pdf.

FATF, GUIDANCE FOR A RISK-BASED APPROACH: VIRTUAL ASSETS AND VIRTUAL ASSET SERVICE PROVIDERS (June 2019), <https://www.fatf-gafi.org/media/fatf/documents/recommendations/RBA-VA-VASPs.pdf>.

FCA, THE FCA'S ROLE UNDER THE PAYMENT SERVICES REGULATIONS 2017 AND THE ELECTRONIC MONEY REGULATIONS 2011 (June 2019).

FINANCIAL CONDUCT AUTHORITY, GUIDANCE ON CRYPTOASSETS (Jan. 2019), <https://www.fca.org.uk/publication/consultation/cp19-03.pdf>.

FINANCIAL STABILITY BOARD, SHADOW BANKING: STRENGTHENING THE OVERSIGHT AND

- REGULATION (Oct. 27, 2011), http://www.fsb.org/wp-content/uploads/r_111027a.pdf?page_moved=1.
- FSB, FINANCIAL STABILITY IMPLICATIONS FROM FINTECH: SUPERVISORY AND REGULATORY ISSUES THAT MERIT AUTHORITIES' ATTENTION (June 27, 2017), <https://www.fsb.org/wp-content/uploads/R270617.pdf>.
- FSB, BIGTECH IN FINANCE: MARKET DEVELOPMENTS AND POTENTIAL FINANCIAL STABILITY IMPLICATIONS (Dec. 9, 2019), <https://www.fsb.org/wp-content/uploads/P091219-1.pdf>.
- G20 HIGH-LEVEL PRINCIPLES FOR DIGITAL FINANCIAL INCLUSION, GLOBAL PARTNERSHIP FOR FINANCIAL INCLUSION (2016), <https://www.gpfi.org/sites/gpfi/files/documents/G20%20High%20Level%20Principles%20for%20Digital%20Financial%20Inclusion%20-%20Full%20version-.pdf>.
- GAI, PRASANNA; KEMP, MALCOLM; SERRANO, ANTONIO SÁNCHEZ; SCHNABEL, ISABEL, ESRB, REPORTS OF THE ADVISORY SCIENTIFIC COMMITTEE: REGULATORY COMPLEXITY AND THE QUEST FOR ROBUST REGULATION (June 2019), https://www.esrb.europa.eu/pub/pdf/asc/esrb.asc190604_8_regulatorycomplexityquestrobustregulation~e63a7136c7.en.pdf.
- GOVERNMENT OFFICE FOR SCIENCE, FINTECH FUTURES: THE UK AS A WORLD LEADER IN FINANCIAL TECHNOLOGIES (2015), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/413095/gs-15-3-fintech-futures.pdf.
- HE, DONG ET AL., IMF. VIRTUAL CURRENCIES AND BEYOND: INITIAL CONSIDERATIONS (2014), <https://www.imf.org/external/pubs/ft/sdn/2016/sdn1603.pdf>.
- HOUBEN, ROBBY; SNYERS, ALEXANDER. CRYPTOCURRENCIES AND BLOCKCHAIN: LEGAL CONTEXT AND IMPLICATIONS FOR FINANCIAL CRIME, MONEY LAUNDERING AND TAX EVASION (2018), <https://www.europarl.europa.eu/cmsdata/150761/TAX3%20Study%20on%20cryptocurrencies%20and%20blockchain.pdf>.
- INTERNATIONAL MONETARY FUND & WORLD BANK GROUP, FINTECH: THE EXPERIENCE SO FAR (June 2019), <https://www.imf.org/-/media/Files/Publications/PP/2019/PPEA2019024.ashx>.

- KPMG, REGULATION AND SUPERVISION OF FINTECH (Mar. 2019), <https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/03/regulation-and-supervision-of-fintech.pdf>.
- INTERNATIONAL MONETARY FUND & WORLD BANK GROUP, FINTECH: THE EXPERIENCE SO FAR (2019), <https://documents1.worldbank.org/curated/en/130201561082549144/pdf/Fintech-The-Experience-so-Far-Executive-Summary.pdf>.
- LATHAM & WATKINS, WORLD-FIRST REGULATORY SANDBOX OPEN FOR PLAY IN THE UK (May 9, 2016), <https://www.lw.com/thoughtLeadership/LW-world-first-regulatory-sandbox-open-for-play-in-UK>.
- MALAN, DANIEL. WORLD ECONOMIC FORUM. VALUES AND THE FOURTH INDUSTRIAL REVOLUTION: CONNECTING THE DOTS BETWEEN VALUE, VALUES, PROFIT AND PURPOSE (Sep. 2016), http://www3.weforum.org/docs/WEF_Values_and_the_Fourth_Industrial_Revolution_WHITEPAPER.pdf.
- MONETARY AUTHORITY OF SINGAPORE, CONSULTATION PAPER: REVIEW OF THE RECOGNIZED MARKET OPERATORS REGIME (May 22, 2018).
- MOURMOURAS, JOHN (IANNIS). FIN-REGTECH: REGULATORY CHALLENGES WITH EMPHASIS ON EUROPE (2019), <https://www.bis.org/review/r190318m.pdf>.
- MOYLE, ANDREW; MACLEAN, FIONA. LATHAM & WATKINS. WORLD-FIRST REGULATORY SANDBOX OPEN FOR PLAY IN THE UK (May 9, 2016), <https://www.lw.com/thoughtLeadership/LW-world-first-regulatory-sandbox-open-for-play-in-UK>.
- NAKAMOTO, SATOSHI BITCOIN: A PEER-TO-PEER ELECTRONIC CASH SYSTEM (2008), <https://bitcoin.org/bitcoin.pdf>.
- OECD, INITIAL COIN OFFERINGS (ICOs) FOR SME FINANCING (2019).
- OPEN BANKING WORKING GROUP, THE OPEN BANKING STANDARD: UNLOCKING THE POTENTIAL OF OPEN BANKING TO IMPROVE COMPETITION, EFFICIENCY AND STIMULATE INNOVATION (2016).
- PARENTI, RADOSTINA. REGULATORY SANDBOXES AND INNOVATION HUBS FOR FINTECH: IMPACT ON INNOVATION, FINANCIAL STABILITY AND SUPERVISORY CONVERGENCE

- (2020),
[https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652752/IPOL_STU\(2020\)652752_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652752/IPOL_STU(2020)652752_EN.pdf).
- PWC, BLURRED LINES: HOW FINTECH IS SHAPING FINANCIAL SERVICES (March 2016),
<https://www.pwc.de/de/newsletter/finanzdienstleistung/assets/insurance-inside-ausgabe-4-maerz-2016.pdf>.
- SAAL, MATTHEW; DELORT, DOROTHEE; GRADSTEIN, HELEN. WORLD BANK GROUP, REGULATING FINTECH (2018),
<https://thedocs.worldbank.org/en/doc/954471553198980567-0130022019/original/NFISSession7Fintech.pdf>.
- SANTHANA, PRAKASH; BISWAS, ABHISHEK. DELOITTE. BLOCKCHAIN RISK MANAGEMENT: RISK FUNCTIONS NEED TO PLAY AN ACTIVE ROLE IN SHAPING BLOCKCHAIN STRATEGY (2017).
- STRACHAN, DAVID ET AL. DELOITTE. A JOURNEY THROUGH THE FCA REGULATORY SANDBOX: THE BENEFITS, CHALLENGES, AND NEXT STEPS 5 (2018),
<https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/financial-services/deloitte-uk-fca-regulatory-sandbox-project-innovate-finance-journey.pdf>.
- SCHWINGER, ROBERT A. NORTON ROSE FULBRIGHT, CHANGING SECURITIES LAW AND REGULATIONS FOR THE DIGITAL TOKEN AGE (2019),
<https://www.nortonrosefulbright.com/en-us/-/media/files/nrf/nrfweb/knowledge-pdfs/changing-securities-laws-and-regulations-pdf.pdf?revision=40337045-7c23-4355-ad00-06987abd30ec>.
- SHAH, SHRUPTI; BRODY, RACHEL; OLSON, NICK. DELOITTE. THE REGULATOR OF TOMORROW: RULEMAKING AND ENFORCEMENT IN AN ERA OF EXPONENTIAL CHANGE (2015),
https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/public-sector/Regulator-of-tomorrow_vFINAL.pdf.
- STAMEGNA, CARLA; KARAKAS, CEMAL. EUROPEAN PARLIAMENT, FINTECH (FINANCIAL TECHNOLOGY) AND THE EUROPEAN UNION: STATE OF PLAY AND OUTLOOK (2019),
[https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/635513/EPRS_BRI\(2019\)635513_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/635513/EPRS_BRI(2019)635513_EN.pdf).
- TAIT, JOYCE; BANDA, GEOFFREY. PROPORTIONATE AND ADAPTIVE GOVERNANCE OF

INNOVATIVE TECHNOLOGIES: THE ROLE OF REGULATIONS, GUIDELINES AND STANDARDS, <https://www.bsigroup.com/LocalFiles/en-GB/BIS/Innovate%20UK%20and%20emerging%20technologies/Summary%20Report%20-%20Adaptive%20governance%20-%20WEB.pdf>.

UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE, FINANCIAL REGULATION: COMPLEX AND FRAGMENTED STRUCTURE COULD BE STREAMLINED TO IMPROVE EFFECTIVENESS (Feb. 2016), <https://www.gao.gov/assets/680/675400.pdf>.

WORLD BANK GROUP, DISTRIBUTED LEDGER TECHNOLOGY (DLT) AND BLOCKCHAIN (2017).

WORLD BANK GROUP & ASSOCIATION OF SOUTHEAST ASIAN NATIONS, ADVANCING DIGITAL FINANCIAL INCLUSION IN ASEAN: POLICY AND REGULATORY ENABLERS 72 (2019), <https://documents1.worldbank.org/curated/en/856241551375164922/pdf/134953-WorldBankASEANDigitalFinancialInclusioninASEANpublicationJan.pdf>.

WORLD BANK GROUP, GLOBAL EXPERIENCES FROM REGULATORY SANDBOXES (2020), <https://documents1.worldbank.org/curated/en/912001605241080935/pdf/Global-Experiences-from-Regulatory-Sandboxes.pdf>.

YAGA, DYLAN; MELL, PETER; ROBY, NIK; SCARFONE, KAREN. NAT'L INST. OF STANDARDS AND TECH., U.S. DEP'T OF COMMERCE, BLOCKCHAIN TECHNOLOGY OVERVIEW (2018).

Working Papers

Anginer, Deniz; Demirguc-Kunt, Asli; Zhu, Min. *How Does Bank Competition Affect Systemic Stability?* (Public Research Working Paper No. 5981, 2012), <http://documents.worldbank.org/curated/en/943621468167965155/pdf/WPS5981.pdf>.

Ante, Lennart; Fiedler, Ingo. *Cheap Signals in Security Token Offerings* (BRL Working Paper Series No. 1, 2019), <https://ssrn.com/abstract=3356303>.

Arner, Douglas W.; Barberis, János N.; Walker, Julia; Buckley, Ross P.; Dahdal, Andrew M.; Zetsche, Dirk A. *Digital Finance & COVID-19 Crisis* (University of Hong Kong Faculty of Law Research Paper No. 2020/017, UNSW Law Research),

<https://ssrn.com/abstract=3558889>.

Arner, Douglas W.; Buckley, Ross P.; Charamba, Kuzi; Sergeev, Artem; Zetzsche, Dirk. *BigTech and Platform Finance: Governing FinTech 4.0 for Sustainable Development* (UNSW Law Research Paper No. 21-57, 2021; University of Hong Kong Faculty of Law Research Paper No. 2021/043), <https://ssrn.com/abstract=3915275>.

Babich, Volodymyr; Hilary, Gilles. *Distributed Ledgers and Operations: What Operations Management Researchers Should Know about Blockchain Technology* (2019), <https://ssrn.com/abstract=3131250>.

Benbear, Lori S.; Wiener, Jonathan B. *Adaptive Regulation: Instrument Choice for Policy Learning over Time* (Feb. 12, 2019), <https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/files/Regulation%20-%20adaptive%20reg%20-%20Benbear%20Wiener%20on%20Adaptive%20Reg%20Instrum%20Choice%202019%2002%2012%20clean.pdf>.

Borgogno, Oscar; Colangelo, Giuseppe. *Regulating FinTech: From Legal Marketing to the Pro-Competitive Paradigm* (2020), <https://ssrn.com/abstract=3563447>.

Bromberg, Lev; Godwin, Andrew; Ramsay, Ian. *Fintech Sandboxes: Achieving a Balance between Regulation and Innovation* (2017), <https://ssrn.com/abstract=3090844>.

Buckley, Ross P.; Arner, Douglas W.; Zetzsche, Dirk A. *Sustainability, FinTech and Financial Inclusion* (European Banking Institute Working Paper Series 2019/41; UNSW Law Research Paper No. 19-63; University of Hong Kong Faculty of Law Research Paper No. 2019/038, May 22, 2019), <https://ssrn.com/abstract=3387359>.

Catalini, Christian; Gans, Joshua S. *Some Simple Economics of Blockchain* (NBER Working Paper No. 22952, 2016), <https://www.nber.org/papers/w22952.pdf>.

C  l  rier, Claire; Vall  e, Boris. *What Drives Financial Complexity? A Look into the Retail Market for Structured Products* (July 1, 2013), <https://ssrn.com/abstract=2082106>.

C  l  rier, Claire; Vall  e, Boris. *The Motives for Financial Complexity: An Empirical Investigation* (Oct. 27, 2014), <http://bogan.dyson.cornell.edu/ibhf/docs/Symposium%20Papers/FinancialComplexity.pdf>.

- Colangelo, Giuseppe; Borgogno, Oscar. *Data, Innovation and Transatlantic Competition in Finance: The Case of the Access to Account Rule* (European Union Law Working Papers No. 35, 2018), https://www-cdn.law.stanford.edu/wp-content/uploads/2018/09/colangelo_borgogno_eulawwp35.pdf.
- Conley, John P. *Blockchain and the Economics of Crypto-tokens and Initial Coin Offering* (Vand. U. Dep't. Econ. Working Papers 17-00008, June 6, 2017), <http://www.accessecon.com/Pubs/VUECON/VUECON-17-00008.pdf>.
- Cornelli, Giulio et al. *Inside the Regulatory Sandbox: Effects on Fintech Funding* (BIS Working Papers No. 901, November 2020), <https://www.bis.org/publ/work901.pdf>
- Davidson, Sinclair; De Filippi, Primavera; Potts, Jason. *Economics of Blockchain* (2016), <https://ssrn.com/abstract=2744751>.
- Enriques, Luca; Romano, Alessandro; Wetzer, Thom. *Network-Sensitive Financial Regulation* (European Corporate Governance Institute (ECGI) - Law Working Paper No. 451/2019; Oxford Legal Studies Research Paper No. 43/2019, 2019), <https://ssrn.com/abstract=3387708>.
- Frost, Jon; Gambacorta, Leonardo; Huang, Yi; Shin, Hyun Song; Zbinden, Pablo. *BigTech and the Changing Structure of Financial Intermediation* (BIS Working Papers No. 779, Apr. 2019), <https://www.bis.org/publ/work779.pdf>.
- Hacker, Philipp; Thomale, Chris. *Crypto-Securities Regulation: ICOs, Token Sales and Cryptocurrencies under EU Financial Law* (Nov. 22, 2017), <https://ssrn.com/abstract=3075820>.
- Holmström, Bengt. *Understanding the Role of Debt in the Financial System* (BIS Working Papers No. 479, Jan. 2015), <https://www.bis.org/publ/work479.pdf>.
- Hughes, Sarah Jane. "Gatekeepers" Are Vital Participants in Anti-Money- Laundering Laws and Enforcement Regimes as Permission-less Blockchain-Based Transactions Pose Challenges to Current Means to "Follow the Money" (Indiana Legal Studies Research Paper No. 408, 2019), <https://ssrn.com/abstract=3436098>
- Kaal, Wulf A. *Dynamic Regulation for Innovation* (U. of St. Thomas (Minnesota) Legal Studies Research Paper No. 16-22, 2016), <https://ssrn.com/abstract=2831040>.
- Lee, Patricia H. *Crowdfunding Capital in the Age of Blockchain Based Tokens*, 92 ST. JOHN'S L. REV. (2019), <https://ssrn.com/abstract=3299093>.

- Mehrling, Perry. *The Inherent Hierarchy of Money* (2012), https://ieor.columbia.edu/files/seasdepts/industrial-engineering-operations-research/pdf-files/Mehrling_P_FESeminar_Sp12-02.pdf.
- Parisi, Francesco; Ghei, Nita. *Legislate Today or Wait Until Tomorrow? An Investment Approach to Lawmaking* (Minn. L. Stud. Res. Paper No. 07-11, 2007), <https://ssrn.com/abstract=981275>.
- Philippon, Thomas. *On FinTech and Financial Inclusion* (BIS Working Papers No. 841, Feb. 2020), <https://www.bis.org/publ/work841.pdf>.
- Remolina, Nydia. *Open Banking: Regulatory Challenges for a New Form of Financial Intermediation in a Data-Driven World* (SMU Centre for AI & Data Governance Research Paper No. 2019/05, 2019), <https://ssrn.com/abstract=3475019>.
- Stulz, René M. *FinTech, BigTech, and Future of Banks* (Fisher College of Bus. Working Paper Series No. 2019-03-020, Sep. 2019), <https://ssrn.com/abstract=3455297>.
- Valcke, Peggy; Vandezande, Niels; Van de Velde, Nathan. *The Evolution of Third Party Payment Providers and Cryptocurrencies under the EU's Upcoming PSD2 and AMLD4* (SWIFT Inst. Working Paper No. 2015-001, 2015), <http://ssrn.com/abstract=2665973>.
- Vezzoso, Simonetta. *A Pro-Competition Data Sandbox for the Digital World* (May 6, 2019), <https://ssrn.com/abstract=3383541>.
- Zachariadis, Markos; Ozcan, Pinar *The API Economy and Digital Transformation in Financial Services: The Case of Open Banking* (SWIFT Inst. Working Paper No. 2016-001, 15 June 2017), <https://ssrn.com/abstract=2975199>.
- Zetsche, Dirk A.; Arner, Douglas W.; Buckley, Ross P.; Weber, Rolf H. *The Future of Data-Driven Finance and RegTech: Lessons from EU Big Bang II* (Eur. Bank. Inst. Working Paper Series 2019/35; UNSW L. Research Paper No. 19-22; U. Lux. L. Working Paper No. 005-2019; U. H.K. Faculty L. Research Paper No. 2019/004), <https://ssrn.com/abstract=3359399>.
- Zunzunegui, Fernando. *Digitalisation of Payment Services* (Ibero-American Institute for Law and Finance Working Paper Series 5/2018, 2018), <https://ssrn.com/abstract=3256281>.

Legal Materials

15 U.S.C. § 77d(c).

15 U.S.C. § 77e(a).

15 U.S.C. § 77e(c).

15 U.S.C. § 78c(a)(4).

17 C.F.R. § 227.100 et seq.

Dian Zi Zhi Fu Ji Gou Guan Li Tiao Li (電子支付機構管理條例) [Act Governing Electronic Payment Institutions].

Dian Zi Piao Zheng Fa Xing Guan Li Tiao Li (電子票證發行管理條例) [Act Governing Issuance of Electronic Stored Value Cards].

Directive 2007/64/EC of the European Parliament and of the Council of 13 November 2007 on payment services in the internal market, Amending Directives 97/7/EC, 2002/65/EC, 2005/60/EC and 2006/48/EC and repealing Directive 97/5/EC, 2007 O.J. (L 319) 1.

Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU, 2014 O.J. (L 173) 349.

Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, amending Regulation (EU) No 648/2012 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC, 2015 O.J. (L141) 73.

Directive 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC, 2015 O.J. (L 337) 35.

Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, and amending

Directives 2009/138/EC and 2013/36/EU, 2018 O.J. (L156) 43.

Explanatory Memorandum to the Payment Services Regulations 2017 No. 752.

H.R. 7356, 115th Cong. (2018).

H.R. 2144 116th Cong. (2019).

H.R. 528 116th Cong. (2019).

H.R. 6154, 116th Cong. (2020).

Jin Rong Ke Ji Fa Zhan Yu Chuang Xin Shi Yan Tiao Li (金融科技發展與創新實驗條例) [Financial Technology Development and Innovative Experimentation Act].

Jin Rong Ke Ji Chuang Xin Shi Yan Guan Li Ban Fa (金融科技創新實驗管理辦法) [Regulations Governing Financial Technology Innovative Experimentation].

Jin Rong Ke Ji Chuang Xin Shi Yan Fang Zhi Xi Qian Ji Da Ji Zi Kong Ban Fa (金融科技創新實驗防制洗錢及打擊資恐辦法) [Regulations Governing Anti-Money Laundering and Countering Terrorism Financing of Financial Technology Innovative Experimentation].

SEC v. W.J. Howey Co., 328 U.S. 293 (1946).

The Payment Services Regulations 2017, SI 2017/752.

U.S. Securities and Exchange Commission, Litigation Release No. 23090, Securities and Exchange Commission v. Trendon T. Shavers and Bitcoin Savings and Trust, Civil Action No. Civil Action No. 4:13-CV-416, U.S. SECURITIES AND EXCHANGE COMMISSION (Sep. 22, 2014), <https://www.sec.gov/litigation/litreleases/2014/lr23090.htm>.

U.S. Securities and Exchange Commission, The Honorable Thomas R. Carper (Aug. 30, 2013), <https://online.wsj.com/public/resources/documents/VCurrenty111813.pdf>.

U.S. SECURITIES AND EXCHANGE COMMISSION, SECURITIES ACT OF 1933 RELEASE NO. 9592 ADMINISTRATIVE PROCEEDING FILE NO. 3-15902 (June 3, 2014), <https://www.sec.gov/litigation/admin/2014/33-9592.pdf>.

U.S. SECURITIES AND EXCHANGE COMMISSION, REPORT OF INVESTIGATION PURSUANT TO SECTION 21(A) OF THE SECURITIES EXCHANGE ACT OF 1934: THE DAO (25 July 2017), <https://www.sec.gov/litigation/investreport/34-81207.pdf>.

U.S. SECURITIES AND EXCHANGE COMMISSION, SECURITIES ACT OF 1933 RELEASE NO. 10445 ADMINISTRATIVE PROCEEDING FILE NO. 3-18304, at 9 (Dec. 11, 2017),

<https://www.sec.gov/litigation/admin/2017/33-10445.pdf>.

Wai Ji Yi Gong Guo Wai Xiao E Hui Dui Ye Wu Guan Li Ban Fa Cao An Zong Shuo Ming (外籍移工國外小額匯兌業務管理辦法草案總說明) [Explanations on the Regulations Governing the Business of Small-amount Cross-border Remittance for Migrant Workers].

Wai Ji Yi Gong Guo Wai Xiao E Hui Dui Ye Wu Guan Li Ban Fa Cao An (外籍移工國外小額匯兌業務管理辦法草案) [Draft of the Regulations Governing the Business of Small-amount Cross-border Remittance for Migrant Workers].

Wang Luo Jie Dai Xin Xi Zhong Jie Ji Gou Ye Wu Huo Dong Guan Li Zhan Xing Ban Fa (网络借贷信息中介机构业务活动管理暂行办法) [Interim Measures for the Administration of the Business Activities of Online Lending Information Intermediary Institutions].

Xin Tuo Ye Fa (信託業法) [Trust Enterprise Act].

Ying Hang Fa (銀行法) [The Banking Act of The Republic of China].

Zheng Quan Jiao Yi Fa (證券交易法) [Securities and Exchange Act].

Zheng Quan Shang She Zhi Biao Zhun (證券商設置標準) [Standards Governing the Establishment of Securities Firms].

Zheng Quan Shang She Zhi Biao Zhun Bu Fen Tiao Wen Xiu Zheng Zong Shuo Ming (證券商設置標準部分條文修正總說明) [Explanations on Amendments of Standards Governing the Establishment of Securities Firms] [hereinafter Amendments to the Securities Firms Establishment Regulation].

Zhong Hua Min Guo Yin Hang Gong Hui Hui Yuan Yin Hang Yu Di San Fang Fu Wu Ti Gong Zhe He Zuo Zhi Zi Lü Gui Fan (中華民國銀行公會會員銀行與第三方服務提供者合作之自律規範) [The Self-Regulation Governing the Cooperation Between Member Banks of the Bankers Association of the Republic of China and Third-Party Services Providers].

Zhong Yang Fa Gui Biao Zhun Fa (中央法規標準法) [Central Regulation Standard Act].

Zui Xin Fa Ling Han Shi (最新法令函釋) [Explanations on New Regulations], JIN RONG JIAN DU GUAN LI WEI YUAN HUI (金融監督管理委員會) [FINANCIAL SUPERVISORY COMMISSION] (May 6, 2021),

https://www.fsc.gov.tw/ch/home.jsp?id=3&parentpath=0&mcustomize=lawnew_vi

[ew.jsp&dataserno=2015060001&dtable=NewsLaw](http://www.federalreserve.gov/newspapers/2015060001/dtable=NewsLaw).

Government Guidelines / Policy

BUREAU OF CONSUMER FINANCIAL PROTECTION, POLICY ON THE COMPLIANCE ASSISTANCE
SANDBOX (Sep. 10, 2019),
https://files.consumerfinance.gov/f/documents/cfpb_final-policy-on-cas.pdf.

BUREAU OF CONSUMER FINANCIAL PROTECTION, POLICY TO ENCOURAGE TRIAL
DISCLOSURE PROGRAM (Sep. 10, 2019),
https://files.consumerfinance.gov/f/documents/cfpb_final-policy-to-encourage-tdp.pdf.

CF Disclosure Guidance: Topic No. 2, U.S. SECURITIES AND EXCHANGE COMMISSION (Oct.
13, 2011), [https://www.sec.gov/divisions/corpfin/guidance/cfguidance-
topic2.htm#_edn2](https://www.sec.gov/divisions/corpfin/guidance/cfguidance-topic2.htm#_edn2).

EBA, FINAL REPORT: GUIDELINES ON THE SECURITY MEASURES FOR OPERATIONAL AND
SECURITY RISKS OF PAYMENT SERVICES UNDER DIRECTIVE (EU) 2015/2366 (PSD2)
(2017),
[https://eba.europa.eu/sites/default/documents/files/documents/10180/2060117/d53
bf08f-990b-47ba-b36f-
15c985064d47/Final%20report%20on%20EBA%20Guidelines%20on%20the%20s
ecurity%20measures%20for%20operational%20and%20security%20risks%20unde
r%20PSD2%20\(EBA-GL-2017-17\).pdf](https://eba.europa.eu/sites/default/documents/files/documents/10180/2060117/d53bf08f-990b-47ba-b36f-15c985064d47/Final%20report%20on%20EBA%20Guidelines%20on%20the%20security%20measures%20for%20operational%20and%20security%20risks%20under%20PSD2%20(EBA-GL-2017-17).pdf).

EBA, FINAL REPORT ON THE EBA GUIDELINES UNDER DIRECTIVE (EU) 2015/2366 (PSD2)
ON THE INFORMATION TO BE PROVIDED FOR THE AUTHORISATION OF PAYMENT
INSTITUTIONS AND E-MONEY INSTITUTIONS AND FOR THE REGISTRATION OF ACCOUNT
INFORMATION SERVICE PROVIDERS (2017),
[https://eba.europa.eu/sites/default/documents/files/documents/10180/1904583/f0e9
4433-f59b-4c24-9ccc-
2d6a2277b62c/Final%20Guidelines%20on%20Authorisations%20of%20Payment
%20Institutions%20\(EBA-GL-2017-09\).pdf](https://eba.europa.eu/sites/default/documents/files/documents/10180/1904583/f0e94433-f59b-4c24-9ccc-2d6a2277b62c/Final%20Guidelines%20on%20Authorisations%20of%20Payment%20Institutions%20(EBA-GL-2017-09).pdf).

EBA, EBA OPINION ON ‘VIRTUAL CURRENCIES’ (July 4, 2014),

<https://eba.europa.eu/sites/default/documents/files/documents/10180/657547/81409b94-4222-45d7-ba3b-7deb5863ab57/EBA-Op-2014-08%20Opinion%20on%20Virtual%20Currencies.pdf?retry=1>.

EBA Publishes Final Draft Technical Standards on Home-host Cooperation under PSD2, EBA (July 31, 2018), <https://eba.europa.eu/-/eba-publishes-final-draft-technical-standards-on-home-host-cooperation-under-psd2>.

EBA Published an Opinion on the elements of strong customer authentication under PSD2, EBA (June 21, 2019), <https://eba.europa.eu/eba-publishes-an-opinion-on-the-elements-of-strong-customer-authentication-under-psd2>.

EUROPEAN COMMISSION, COMMUNICATION FROM THE COMMISSION: ON AN ACTION PLAN FOR A COMPREHENSIVE UNION POLICY ON PREVENTING MONEY LAUNDERING AND TERRORIST FINANCING (2020), <https://www.politico.eu/wp-content/uploads/2020/03/Draft-AML-communication-2.pdf>.

EXPLANATORY MEMORANDUM TO THE MONEY LAUNDERING AND TERRORIST FINANCING (AMENDMENT) REGULATIONS 2019 No. 1511 https://www.legislation.gov.uk/ukxi/2019/1511/pdfs/ukxiem_20191511_en.pdf.

FCA, Payment Services and Electronic Money – Our Approach: The FCA’s Role Under the Payment Services Regulations 2017 and the Electronic Money Regulations 2011, (June 2019), <https://www.fca.org.uk/publication/finalised-guidance/fca-approach-payment-services-electronic-money-2017.pdf>

Framework for “Investment Contract” Analysis of Digital Assets, U.S. SECURITIES AND EXCHANGE COMMISSION (last modified Apr. 3, 2019), <https://www.sec.gov/corpfin/framework-investment-contract-analysis-digital-assets>.

Guidelines on Authorization and Registration under PSD2, EBA, <https://eba.europa.eu/regulation-and-policy/payment-services-and-electronic-money/guidelines-on-authorisation-and-registration-under-psd2> (last visited Nov. 4, 2019).

New Regulated Payment Services: Account Information Services (AIS) and Payment Initiation Services (PIS), FCA (Feb. 14, 2018), <https://www.fca.org.uk/firms/new-regulated-payment-services-ais-pis> (last visited Dec. 28, 2020).

OPEN BANKING, OPEN BANKING: GUIDELINES FOR OPEN DATA PARTICIPANTS (July 2018),

<https://www.openbanking.org.uk/wp-content/uploads/Guidelines-for-Open-Data-Participants.pdf>.

Public Statement, U.S. Securities and Exchange Commission, Statement on “Framework for ‘Investment Contract’ Analysis of Digital Assets”, U.S. SECURITIES AND EXCHANGE COMMISSION (Apr. 3, 2019), <https://www.sec.gov/news/public-statement/statement-framework-investment-contract-analysis-digital-assets>.

THE U.S. FINANCIAL CRIMES ENFORCEMENT NETWORK, FINCEN GUIDANCE: APPLICATION OF FINCEN’S REGULATIONS TO CERTAIN BUSINESS MODELS INVOLVING CONVERTIBLE VIRTUAL CURRENCIES (May 9, 2019), <https://www.fincen.gov/sites/default/files/2019-05/FinCEN%20Guidance%20CVC%20FINAL%20508.pdf>.

U.S. SECURITIES AND EXCHANGE COMMISSION, REPORT OF INVESTIGATION PURSUANT TO SECTION 21(A) OF THE SECURITIES EXCHANGE ACT OF 1934: THE DAO (25 July 2017), <https://www.sec.gov/litigation/investreport/34-81207.pdf>.

「JIN RONG KE JI CHUANG XIN SHI YAN FA GUI」 WEN DA JI (「金融科技創新實驗法規」問答集) [THE FINTECH SANDBOX ACT Q&A], <https://www.fsc.gov.tw/uploaddowndoc?file=news/201804261659470.pdf&filedisplay=%E6%96%B0%E8%81%9E%E7%A8%BF1%E9%99%84%E4%BB%B6-%E9%87%91%E8%9E%8D%E7%A7%91%E6%8A%80%E5%89%B5%E6%96%B0%E5%AF%A6%E9%A9%97%E6%B3%95%E8%A6%8F%E5%95%8F%E7%AD%94%E9%9B%86.pdf&flag=d> (last visited June 8, 2021).

Online News

Browne, Ryan. *Apple and Tesla Shares on the Blockchain Could be the Next Big Thing in Crypto*, CNBC (Jan. 8, 2019, 2:00 AM EST), <https://www.cnbc.com/2019/01/07/bitcoin-security-token-and-sto-explained.html>.

Chambers, Teresa. *Unstable coins: cryptoassets, financial regulation and preventing financial crime in the emerging market for digital assets*, FCA (Mar. 6, 2020), <https://www.fca.org.uk/news/speeches/unstable-coins>.

Chen, Hwei-Ling (陳蕙綾). *Kai Ji Tiao Kuan Ke Wang Wei Shou Li Jian Li Sha He Ye Wu*

- Ruo Wei She Fa Ling Jin Jih Ci Ta Yin Hang Ye Ke Shih Ban* (凱基條款可望為首例 監理沙盒業務若未涉法令禁止 其他銀行也可試辦) [*The KGI Bank Rules May Be the First Case. Other Banks Could Conduct the Regulatory Sandbox Businesses Which Are Not Forbidden by Laws on a Trail Basis.*], Ju Heng (鉅亨) [anue] (June 18, 2019), <https://news.cnyes.com/news/id/4341136>.
- Chen, Guo-Rui (陳國瑞). “*Jin Rong Jian Li Sha He*” *Shang Lu Liang Nian Zhi He Zhun Qi An, Wen Ti Chu Zai Na Li?* (「金融監理沙盒」上路兩年只核准七案，問題出在哪裡?) [*Only 7 Experiments Were Approved Since the FinTech Sandbox Has Been in Effect for 2 Years. What Are the Problems?*], GUAN JIAN PING LUN (關鍵評論) [THE NEWS LENS] (Apr. 24, 2020), <https://www.thenewslens.com/article/134230>.
- Curran, Brian. *What is an STO? A Complete Guide to Security Token Offerings*, BLOCKONOMI (Mar. 1, 2019), <https://blockonomi.com/what-is-an-sto/>.
- Dai, Rui-Yao (戴瑞瑤). *Wai Ji Yi Gong Kua Jing Hui Kuan Sha He Shi Yan Ni Jie Gui Dian Zhi Tiao Li 7 Yue Luo Di* (外籍移工跨境匯款沙盒實驗 擬接軌電支條例 7 月落地) [*Sandbox Experiment of Cross-border Remittance for Migrant Workers May End by Following the Act Governing Electronic Payment Institutions.*], LIAN HE XIN WEN WANG (聯合新聞網) [UDN] (Mar. 6, 2021), <https://udn.com/news/story/7239/5298505>.
- De Meijer, Carlo R.W. *Blockchain versus GDPR and Who Should Adjust Most*, FINEXTRA (Oct. 9, 2018), <https://www.finextra.com/blogposting/16102/blockchain-versus-gdpr-and-who-should-adjust-most>.
- Eroglu, Hakan. *Comparing the Berlin Group and Open Banking UK API Standards for PSD2*, FINEXTRA (Dec. 13, 2017), <https://www.finextra.com/blogposting/14834/comparing-the-berlin-group-and-open-banking-uk-api-standards-for-psd2>.
- Gilson, David. *Mt. Gox bitcoin exchange review*, COINDESK (Oct. 13, 2013, 11:30 AM), <https://www.coindesk.com/mt-gox-bitcoin-exchange-review>.
- Haering, Martin. *Open Banking APIs Need Standards*, FINEXTRA (May 11, 2018), <https://www.finextra.com/blogposting/15350/open-banking-apis-need-standards>.
- Ji, Jia-Yun (紀佳妘). *Xin Yong Xiao Bai Yong Shou Ji Hao Ma Ban Dai Kuan! 8 Yue Di Suo You Yin Hang Ke Wang Kai Ban* (信用小白用手機號碼辦貸款! 8 月底所有銀行

- 可望開辦) [*People Without Credit Scores Could Apply For Loans Through Mobile Phone Numbers! It Is Expected to Come in All the Banks Before the End of August.*], ETODAY (Aug. 6, 2020), <https://finance.ettoday.net/news/1778932>.
- Jin Guan Hui Fa Bu 「*Jin Rong Ke Ji Fa Zhan Lu Jing Tu*」, *Yi 3 Nian Ti Sheng Shu Wei Jin Rong Fu Wu Xiao Lü* · *Ke Ji Xing* · *Shi Yong Xing Ji Pin Zhi* (金管會發布「金融科技發展路徑圖」, 以3年提升數位金融服務效率、可及性、使用性及品質) [*The FSC Issued “FinTech Development Roadmap”. Enhance the Efficiency, Accessibility and Quality of Digital Financial Services in 3 Years.*], JIN RONG JIAN DU GUAN LI WEI YUAN HUI (金融監督管理委員會) [Financial Supervisory Commission R.O.C. (Taiwan)] (27 Aug. 2020), https://www.fsc.gov.tw/ch/home.jsp?id=96&parentpath=0.2&mcustomize=news_view.jsp&dataserno=202008270008&dttable=News.
- Kay, John. *Complexity, not size, is the real danger in banking*, FIN. TIMES (Apr. 12, 2016), <https://www.ft.com/content/5c2a416e-000f-11e6-99cb-83242733f755>.
- Kuhn, Daniel. *The Cryptocurrency Act of 2020 Is ‘Dead on Arrival,’ Washington Tells Sponsors*, COINDESK (Mar. 11, 2020), <https://www.coindesk.com/the-cryptocurrency-act-of-2020-is-dead-on-arrival-washington-dc-tells-sponsors>.
- Li, Jing-Yi (李靜宜). *Tai Wan Kai Fang Yin Hang Da Jin Zhan! Shou Ban Open API Biao Zhun Chu Lu, 2 Da Zhun Ze 5 Xiang An Kong 13 Jia Yin Hang Xian Zhi Yuan* (臺灣開放銀行大進展! 首版 Open API 標準出爐, 2 大準則 5 項安控 13 家銀行先支援) [*A Big Improvement in Open Banking in Taiwan! The First Version of Open API Standards Is Released with 2 Main Principles, 5 Safety Controls and 13 Banks’ Support.*], ITHOME, (July 3, 2019), <https://www.ithome.com.tw/news/131648>.
- Lim, Xing Loong. *Security token offerings (STO)s: Re-centralizing the blockchain dream in Singapore*, MONDAQ (Sep. 10, 2019), <https://www.mondaq.com/fin-tech/843982/security-token-offerings-stos-re-centralizing-the-blockchain-dream-in-singapore>.
- Lin, Zi-Jie (林資傑). *《Jin Rong》Sha He Shi Yan 3 Nian 9 An Huo Zhun Jin Nian 2 An Jiang Luo Di* (《金融》沙盒實驗3年9案獲准 今年2案將落地) [*《Finance》9 Applications Were Approved in the Three Years that the Sandbox Has Been Implemented. 2 Cases Are Expected to Exiting the Sandbox this Year.*], ZHONG SHI

- XIN WEN WANG (中時新聞網) [CHINA TIMES] (May 10, 2021), <https://www.chinatimes.com/realtimenews/20210510001537-260410?chdtv>.
- Liu, Xiu-Zhen (劉秀珍). *Zao Fan You Li – Zhi Ji Sha He Wu Ge An Zhi Chuang Xin Yu Tiao Zhan* (造反有理 一直擊沙盒五個案之創新與挑戰) [*The Innovation and Challenges in Five Regulatory Sandbox Cases.*], JING JI RI BAO (經濟日報) [ECONOMIC DAILY NEWS] (Mar. 5, 2020), <https://money.udn.com/money/topic/2020030501>.
- Mitchell, Alastair. *US Regulators Need to Catch Up with Europe on Fintech Innovation*, TECHCRUNCH (Jan. 23, 2020), <https://techcrunch.com/2020/01/23/us-regulators-need-to-catch-up-with-europe-on-fintech-innovation/>.
- Open Banking Year One: Insights from the CMA9 and More*, FINEXTRA (Jan. 11, 2019), <https://www.finextra.com/newsarticle/33194/open-banking-year-one-insights-from-the-cma9-and-more>.
- Pauw, Chrisjan. *What Is an STO, Explained*, COINTELEGRAPH (Feb. 21, 2019), <https://cointelegraph.com/explained/what-is-an-sto-explained>.
- Peng, Zhen-Ling (彭禎伶). *Jin Guan Hui: Jin Nian Yan Yi “Kai Fang Yin Hang” Tui Dong Jia Gou* (金管會：今年研議「開放銀行」推動架構) [*The FSC Said That The Framework for Promoting Open Banking Will Be Developed This Year*], GONG SHANG SHI BAO (工商時報) [COMMERCIAL TIMES], (Mar. 13, 2018), <https://ctee.com.tw/news/finance/102117.html>.
- Peng, Zhen-Ling (彭禎伶); Chen, Xin-Wen (陳欣文); Wei, Qiao-Yi (魏喬怡). *Kai Ji Yin Sha He Shi Yan Jin Guan Hui An Zan* (凱基銀沙盒實驗 金管會按讚) [*The FSC Appraised KGI Bank’s Experiment in the Regulatory Sandbox.*], GONG SHANG SHI BAO (工商時報) [COMMERCIAL TIMES] (May 8, 2019), <https://ctee.com.tw/news/finance/85674.html>.
- Peng, Zhen-Ling (彭禎伶); Wei, Qiao-Yi (魏喬怡). *Sha He Shi Yan Cheng Gong Fa Gui Gen Bu Shang Kai Ji Yin Jin Rong Xiao Bai Xian Ting* (沙盒實驗成功法規跟不上 凱基銀金融小白先停) [*Regulation Could Not Keep Pace After the Success of the Sandbox Experimentation. The KGI Bank’s Project Stopped.*], GONG SHANG SHI BAO (工商時報) [COMMERCIAL TIMES] (Aug. 6, 2020), <https://m.ctee.com.tw/livenews/aj/a91617002020080620245843>.

- PYMNTS, *PSD2's Elephant In The Room*, PYMNTS.COM (Apr. 2, 2019), <https://www.pymnts.com/bank-regulation/2019/tokenio-limited-psd2-api-standardization-user-data/>.
- Schroeder, Pete; Shakil, Ismail. *U.S. Proposes Barring Big Tech Companies from Offering Financial Services, Digital Currencies*, REUTERS (July 15, 2019), <https://www.reuters.com/article/us-usa-cryptocurrency-bill/u-s-proposes-barring-big-tech-companies-from-offering-financial-services-digital-currencies-idUSKCN1U90NL>.
- Shifflett, Shane; Jones, Coulter. *Buyer Beware: Hundreds of Bitcoin Wannabes Show Hallmarks of Fraud*, WALL STREET JOURNAL (May 17, 2018, 12:05 PM), <https://www.wsj.com/Chapters/buyer-beware-hundreds-of-bitcoin-wannabes-show-hallmarks-of-fraud-1526573115>.
- Siegel, David. *Understanding The DAO Attack*, COINDESK (Jun. 25, 2016, 17:52 PM), <https://www.coindesk.com/understanding-dao-hack-journalists>.
- The Pros and Cons of Security Token Offerings*, TOKENY (Aug. 21, 2018), <https://tokeny.com/the-pros-and-cons-of-security-token-offerings/>.
- Trachsler, Tracy. *Securities Token Offerings: the Differences from Other Fundraising Methods*, CRYPTOHEROES (Feb. 15, 2019), <https://cryptoheroes.ch/security-token-offerings-the-differences-from-other-fundraising-methods/>.
- Tsai, Peng-Min (蔡芃敏). *Zhong Hua Dian Xi Shou Kai Ji Yin Jin Rong Jian Li Sha He An Qian Yue Yu Bai Jian (中華電攜手凱基銀金融監理沙盒案 簽約逾百件 [Chunghwa Telecom Cooperated with KGI Bank In the Regulatory Sandbox Experiment. More Than 100 Cases Were Done Therein.]*, CNA (中央通訊社) (June 6, 2019), <https://www.cna.com.tw/news/afe/201906060311.aspx>.
- Tsai, Yao-Lian (蔡曜蓮). *Liang Jia "Lao" Xin Chuang Yao Bang Yi Gong An Xin Hui Qian Hui Jia (兩家「老」新創 要幫移工安心匯錢回家) [Two "Old" Startups Are Helping Migrant Works Send Money Back Home.]*, JIN ZHOU KAN (今周刊) [BUSINESS TODAY] (June 12, 2019), <https://www.businesstoday.com.tw/article/category/80393/post/201906120021/%E5%85%A9%E5%AE%B6%E3%80%8C%E8%80%81%E3%80%8D%E6%96%B0%E5%89%B5%20%20%E8%A6%81%E5%B9%AB%E7%A7%BB%E5%B>

[7%A5%E5%AE%89%E5%BF%83%E5%8C%AF%E9%8C%A2%E5%9B%9E%E5%AE%B6.](https://www.chinatimes.com/realtimenews/20201109003074-260410?chdtv)

Wei, Qiao-Yi (魏喬怡); Peng, Zhen-Ling (彭禎伶). *Ying Tao Zhi Fu Ke Qi Si Hui Sheng Jin Sha He? Huang Tian Mu San Zi Hui Ying* (櫻桃支付可起死回生進沙盒？黃天牧三字回應) [*Will CherryPay Revive to Enter the Sandbox? Tian-Mu Huang Replied with Three Characters.*], ZHONG SHI XIN WEN WANG (中時新聞網) [CHINA TIMES] (Nov. 9, 2020), <https://www.chinatimes.com/realtimenews/20201109003074-260410?chdtv>.

Yu, Zhi-Hao (余至浩). *Guo Nei Jin Rong Jian Li Sha He Shou Chuang De Ji Jin Jiao Huan Ping Tai 12 Yue Ji Jiang Shang Xian, Wei Yun Tuan Dui Hao Hao Tou Zi Ji Lu Geng Duo Ji Shu Yun Zuo Xi Jie* (國內金融監理沙盒首創的基金交換平臺 12 月即將上線，維運團隊好好投資揭露更多技術運作細節) [*The First Funds Exchange Platform in Taiwan's Regulatory Sandbox Is Operating Soon in December: The Operation Team of How Investech Reveals More Operational Details.*], ITHOME (Oct. 9, 2019), <https://www.ithome.com.tw/news/133522>.

Zhou, Qi-Yuan (周岐原). *Mei Xin Yong Ji Lu, Yong Shou Ji Men Hao Yi Yang Neng Dai Kuan! Suo You Yin Hang Dou Ke Ban, Zui Kuai Ba Yue Di Shang Lu* (沒信用紀錄，用手機門號一樣能貸款！所有銀行都可辦，最快八月底上路) [*Loans Could Be Offered Without Credit History! It Will Be Available in All the Banks Soon Before the End of August.*], FENG CHUAN MEI (風傳媒) [THE STORM MEDIA] (Aug. 7, 2020), <https://www.storm.mg/article/2921667>.

Magazines

Arnold, Andrew. *4 Promising Use Cases of Blockchain in Cybersecurity*, FORBES (Jan. 30, 2019, 04:30 AM), <https://www.forbes.com/sites/andrewarnold/2019/01/30/4-promising-use-cases-of-blockchain-in-cybersecurity/#4becaf273ac3>.

Chester, Jonathan. *Will Security Token Offerings Be The Future of Raising Money?*, FORBES (Feb. 19, 2019, 09:14 AM), <https://www.forbes.com/sites/jonathanchester/2019/02/19/will-security-token->

[offerings-be-the-future-of-raising-money/#7b4ff4b71826](#).

Groenfeldt, Tom. *U.S. Needs Smarter FinTech Regulation To Compete Globally*, FORBES (Aug. 2, 2018), <https://www.forbes.com/sites/tomgroenfeldt/2018/08/02/u-s-needs-smarter-fintech-regulation-to-compete-globally/#61c351202df3>.

Kim, Robert. *ANALYSIS: A Crypto-Currency Act of 2020? You Cannot Be Serious!*, BLOOMBERG LAW (Jan. 13, 2020), <https://news.bloomberglaw.com/bloomberg-law-analysis/analysis-a-crypto-currency-act-of-2020-you-cannot-be-serious>.

Koloskov, Alexey. *Solving Crypto's Long-Standing Fragmentation Problem*, FORBES (Dec. 12, 2020), <https://www.forbes.com/sites/forbesfinancecouncil/2020/12/10/solving-cryptos-long-standing-fragmentation-problem/?sh=2bd882a545df>.

Lin, Kun-Zheng (林坤正). *Lin Kun Zheng: Yin Hang Men Hu Dong Kai, Shen Fang Qing Bing Ru Guan!* (林坤正：銀行門戶洞開，慎防「清兵入關」!) [Kun-Zheng Lin: *The Troy Gate to Army Conquering Banks to Be Opened: Be Wary of "Trojan Horse"*], CAI XUN (財訊) [WEALTH MAGAZINE] (Sep. 18, 2019), <https://www.wealth.com.tw/home/articles/22295>.

Pollock, Darryn. *The Fourth Industrial Revolution Built On Blockchain And Advanced With AI*, FORBES (Nov. 30, 2018), <https://www.forbes.com/sites/darrynpollock/2018/11/30/the-fourth-industrial-revolution-built-on-blockchain-and-advanced-with-ai/#5edd8dfe4242>.

Rossow, Andrew. *Former Goldman Sachs Banker Brings Cryptocurrency To The Financial Mainstream*, FORBES (Feb. 28, 2018, 09:02 PM), <https://www.forbes.com/sites/andrewrossow/2018/02/28/former-goldman-sachs-banker-brings-cryptocurrency-to-the-financial-mainstream/#637f0be55af2>.

The Fintech Revolution, THE ECONOMIST (May 9, 2015), <https://www.economist.com/leaders/2015/05/09/the-fintech-revolution>.

Blog Articles / Online Articles

Appaya, Sharmista; Haji, Mahjabeen. *Four years and counting: What we've learned from regulatory sandboxes*, WORLD BANK BLOGS (Nov. 18, 2020),

<https://blogs.worldbank.org/psd/four-years-and-counting-what-weve-learned-regulatory-sandboxes>.

Buterin, Vitalik. *Visions, Part 1: The Value of Blockchain Technology*, ETHEREUM BLOG (Apr. 12, 2015), <https://blog.ethereum.org/2015/04/13/visions-part-1-the-value-of-blockchain-technology/>.

Curie, Margaux. *FinTech Regulations in the US: Policy, Implementation, and Future Directions*, WHITE & CASE (July 24, 2018), <https://www.whitecase.com/publications/article/fintech-regulation-us-policy-implementation-and-future-directions>.

DeWaal, Gary; Muchin, Katten. Rosenman LLP. *CFTC Files Charges Alleging Bitcoin Ponzi Scheme Not Involving Derivatives*, LEXOLOGY (Sep. 24, 2017), <https://www.lexology.com/library/detail.aspx?g=46d6a1e5-e2b8-4695-9e4e-cb25c8a406c6>.

Dewey, Joe. Holland & Knight LLP. *Blockchain & Cryptocurrency Regulation 2021 | USA*, GLOBAL LEGAL INSIGHTS, <https://www.globallegalinsights.com/practice-areas/blockchain-laws-and-regulations/usa#chaptercontent3> (last visited Aug. 6, 2021).

Don, Alex. *Is GDPR A Competitive Advantage for FinTechs?*, DELOITTE, <https://www2.deloitte.com/uk/en/pages/financial-services/articles/is-gdpr-a-competitive-advantage-for-fintechs.html> (last visited Aug. 21, 2020).

Fox, Merritt B. *The Social Functions of the Stock Market: A Primer*, THE CLS BLUE SKY BLOG (Apr. 12, 2019), <http://clsbluesky.law.columbia.edu/2019/04/12/the-social-functions-of-the-stock-market-a-primer/>.

Frank, Jens-Uwe; Peitz, Martin. *Digital Platforms: Market Definition and Market Power*, OXFORD BUS. L. BLOG (May 29, 2019), <https://www.law.ox.ac.uk/business-law-blog/blog/2019/05/digital-platforms-market-definition-and-market-power>.

Frost, Lucy. *PRIMER: Markets in Crypto-Assets Regulation (MICA)*, IFLR (Feb. 11, 2022), <https://www.iflr.com/article/b1wq8hcyrmfywv/primer-markets-in-cryptoassets-regulation-mica>.

Jenik, Ivo; Duff, Schan; de Montfort, Sean. *Do Regulatory Sandboxes Impact Financial Inclusion? A Look at the Data*, CGAP (Apr. 30, 2019),

<https://www.cgap.org/blog/do-regulatory-sandboxes-impact-financial-inclusion-look-data>.

Herkströter, Caroline; Born, Michael. *Crypto Assets: Germany Introduces New Regulatory Regime*, NORTON ROSE FULBRIGHT (Feb. 17, 2020), <https://www.regulationtomorrow.com/de/crypto-assets-germany-introduces-new-regulatory-regime/>.

Hinman, Bill; Szczepanik, Valerie. *Public Statement, U.S. Securities and Exchange Commission, Statement on “Framework for ‘Investment Contract’ Analysis of Digital Assets”*, U.S. SECURITIES AND EXCHANGE COMMISSION (Apr. 3, 2019), <https://www.sec.gov/news/public-statement/statement-framework-investment-contract-analysis-digital-assets>.

Hunt, Brian; Jermyn, Ronan Daly. *Bringing Crypto-Assets into its Regulatory Web: Draft EU Markets in Crypto-Assets Regulation*, LEXOLOGY (July 5, 2021), <https://www.lexology.com/library/detail.aspx?g=26d5d8fb-95fe-4e0d-858d-b14d662c3a58>.

Jout, Gleb. *NEXT.exchange: Explaining the Difference between ICO’s, IEO’s, and STO’s.*, MEDIUM (Apr. 2, 2019), <https://medium.com/nextexchange/next-and-ico-ieo-and-sto-launches-f6751bf3d433>.

Keller, Philip. *Philippines Fintech Push Makes it a Compelling Market to Watch*, REGULATION ASIA (Mar. 19, 2019), <https://www.regulationasia.com/philippines-fintech-push-makes-it-a-compelling-market-to-watch/>.

Li, Allen S. *Utah Passes the Third State-Run “Sandbox” for Innovative Financial Products and Services*, NATIONAL LAW REVIEW (Aug. 1, 2019), <https://www.natlawreview.com/article/utah-passes-third-state-run-sandbox-innovative-financial-products-and-services>.

Fang-Wei Lin (林芳維), *Cong Cherrypay An Li Kan Kua Jing Hui Dui Zai Wo Guo Ji Wai Guo Li Fa Li Xiang Guan Fa Ling Fa Zhan* (從 CherryPay 案例看跨境匯兌在我國及外國立法例相關法令發展) [*Study on the Regulatory Development of International Remittance in Taiwan and Other Countries from the CherryPay Case*], LI CI (理慈) [LEE, TSAI & PARTNERS] (July 29, 2019), <https://www.leetsai.com/%E9%87%91%E8%9E%8D%E7%A7%91%E6%8A%80>

-

<https://www.nortonrosefulbright.com/en/knowledge/publications/8f84c163/the-eu-fifth-anti-money-laundering-directive-a-regulatory-compliance-perspective>.

Lovegrove, Simon; Lewis, Lisa Lee. *The EU's Fifth Anti-Money Laundering Directive: A Regulatory Compliance Perspective*, NORTON ROSE FULBRIGHT (Nov. 2019), <https://www.nortonrosefulbright.com/en/knowledge/publications/8f84c163/the-eu-fifth-anti-money-laundering-directive-a-regulatory-compliance-perspective>.

McDermott, Christian; Tyndall, Jagveen; Smyth, Amy. Latham & Watkins LLP. *PSD2 & Brexit: EU Card Issuers Must Apply SCA to UK Website Purchases Post-Brexit*, LEXOLOGY (Oct. 2, 2019), <https://www.lexology.com/library/detail.aspx?g=23461c0a-ca0c-46b3-8b61-ae27ccd6e76d>.

Moran, Eamonn K. *CFPB Revises Trial Disclosure Policy and Issues Compliance Assistance Sandbox Policy*, MORGAN LEWIS (Oct. 2, 2019), <https://www.morganlewis.com/blogs/finreg/2019/10/cfpb-revises-trial-disclosure-policy-and-issues-compliance-assistance-sandbox-policy>.

Noble, Elisabeth *Digital Platform: A New Source of Financial System Interconnectedness*, OXFORD BUSINESS LAW BLOG (Sep. 27, 2021), <https://www.law.ox.ac.uk/business-law-blog/blog/2021/09/digital-platforms-new-source-financial-system-interconnectedness-0>.

Novak, Nejc. *A Call for Legal, Ethical and Sustainable Token Offerings*, MEDIUM (Jun. 27, 2018), <https://medium.com/@nejcnovaklaw/a-call-for-legal-ethical-and-sustainable-token-offerings-4d7cd16c64ac>.

Peng, Jin-Lung (彭金隆); Tsang, Cheng-Yun (臧正運). *Wo Guo Jin Rong Ke Ji Chuang Xin Shi Yan Ji Zhi Zhi Jian Shi Yu Gou Jian* (我國金融科技創新實驗機制之檢視與構建) [*Examination and Establishment of Taiwan's FinTech Innovation Experimentation Mechanisms*], FTRC (國立政治大學商學院金融科技研究中心), <http://www.ftrc.nccu.edu.tw/wordpresseng/?p=3536> (last visited Aug. 16, 2021).

Poncibó, Cristina; Borgogno, Oscar. *Law and Autonomous Systems Series: The Day After*

- Tomorrow of Banking – On FinTech, Data Control and Consumer Empowerment*, OXFORD BUS. L. BLOG (Apr. 5, 2018), <https://www.law.ox.ac.uk/business-law-blog/blog/2018/04/law-and-autonomous-systems-series-day-after-tomorrow-banking-fintech>.
- RealtyReturns.io, *How Tokenization is Transforming Real Estate on the Blockchain*, MEDIUM (Oct. 16, 2018), <https://medium.com/@realtyreturnsio/how-tokenization-is-transforming-real-estate-on-the-blockchain-7b6dc165f98b>.
- Restoy, Fernando. BIS, *Regulating Fintech: What is Going On, and Where Are the Challenges?* (Oct. 16, 2019), <https://www.bis.org/speeches/sp191017a.pdf>.
- Reynolds, Barnabas; Donegan, Thomas; Orr, Mathew. Shearman & Sterling LLP. *UK Implements EU's Fifth Anti-Money Laundering Directive*, LEXOLOGY (Jan. 10, 2020), <https://www.lexology.com/library/detail.aspx?g=932b6b49-5f1d-429a-af21-3214cc8a519c>.
- Rosov, Sviatoslav. *Regulators Have a “Wait and See” Attitude About Regulating FinTech*, CFA INSTITUTE (Dec. 29, 2016), <https://blogs.cfainstitute.org/marketintegrity/2016/12/29/regulators-have-a-wait-and-see-attitude-about-regulating-fintech/>.
- Salem, Omar; Roche, Jerome. *Individual Accountability in Financial Services – the UK and US Compared*, OXFORD BUS. L. BLOG (Aug. 28, 2019), <https://www.law.ox.ac.uk/BUSINESS-LAW-BLOG/BLOG/2019/08/INDIVIDUAL-ACCOUNTABILITY-FINANCIAL-SERVICES-UK-AND-US-COMPARED>.
- Salmon, John; Lipworth, Claire. Hogan Lovells. *Crypto: UK Proposes Gold-plating Upcoming AML Rules*, LEXOLOGY (Apr. 26, 2019), <https://www.lexology.com/library/detail.aspx?g=61c09255-15d0-4d3a-a8b5-84fa4db9ab54>.
- Stamm, Hans; Dr. Kayser, Joachim; Blessing, Denise; Lercara, Angelo. Dechert LLP. *AMLD5 in Germany: Implementation provides far-reaching licensing requirements for crypto-asset service providers*, LEXOLOGY (Aug. 16, 2019), <https://www.lexology.com/library/detail.aspx?g=8ac13a85-a5b9-4a9d-ac0e-be851766bfa1>.

- The Fourth Industrial Revolution*, by Klaus Schwab, WORLD ECONOMIC FORUM, <https://www.weforum.org/about/the-fourth-industrial-revolution-by-klaus-schwab> (last visited Aug. 10, 2021).
- The FSC released FinTech Development Strategy White Paper*, FINANCIAL SUPERVISORY COMMISSION (June 23, 2016), https://www.fsc.gov.tw/en/home.jsp?id=74&parentpath=0.2&mcustomize=multimessage_view.jsp&dataserno=201608240002&aplistdn=ou=bulletin.ou=multisite.ou=english.ou=ap_root.o=fsc.c=tw&dtable=Bulletin.
- Tseng, Ken-Ying. *Major Changes Taiwan Financial Services – Sandbox Experiments, Token Offerings and Internet Banks*, THE IN-HOUSE LAWYER (Oct. 15, 2019), <http://www.inhouselawyer.co.uk/legal-briefing/major-changes-to-taiwan-financial-services-sandbox-experiments-token-offerings-and-internet-banks/>.
- Tual, Stephan. *DAO.Security, A Proposal to Guarantee the Integrity of The DAO*, MEDIUM (May 25, 2016), <https://blog.slock.it/dao-security-a-proposal-to-guarantee-the-integrity-of-the-dao-3473899ace9d>.
- van Gorp, Olaf. *PSD2 & Open Banking: The Role of API Management*, AKANA (Apr. 4, 2018), <https://www.akana.com/blog/psd2-open-banking-role-api-management>
- Voshmgir, Shermin. *Blockchain's Problem with Unknown Unknowns*, MEDIUM (Mar. 12, 2017), <https://medium.com/blockchain-hub/blockchains-problem-with-unknown-unknowns-6837e09ec495>.
- Winn, Jane K. *Reengineering European Payment Law* (June 30, 2019), <https://ssrn.com/abstract=3412457>.
- Wong, Andrew. *Security Tokens – What Can We Expect in Asia in 2019?*, MEDIUM (Dec. 20, 2018), <https://medium.com/altcoin-magazine/security-tokens-what-can-we-expect-in-asia-in-2019-cb51905386d6>.
- Wu, Xiao-Han (吳筱涵); Ko, Chen-Hao (柯晨皓). *Qu Kuai Lian Yu Xu Ni Huo Bi Fa Lü Zhuan Ti (Wu)* (區塊鏈與虛擬貨幣法律專題(五)) [*Special Topic 5: Blockchain and Visual Currency and the Laws*], ZHONG YIN LÜ SHI SHI WU SUO (中銀律師事務所) [ZHONG YIN LAW FIRM], (Apr. 10, 2018), <https://zhongyinlawyer.com.tw/%E5%8D%80%E5%A1%8A%E9%8F%88%E8%88%87%E8%99%9B%E6%93%AC%E8%B2%A8%E5%B9%A3%E6%B3%95%E5%>

[BE%8B%E5%B0%88%E9%A1%8C%E4%BA%94/](https://www.gvm.com.tw/article/74340).

Xu, Ya-Mian (許雅綿). *Gu Li Chuang Xin De Jian Li Sha He Fan Zu Duan Xin Chuang Huo Lu* (鼓勵創新的監理沙盒 反阻斷新創活路?) [*Does the Regulatory Sandbox Aiming to Encourage Innovation Hinder Innovation Instead?*], YUAN JIAN (遠見) (Aug. 27, 2020), <https://www.gvm.com.tw/article/74340>.

Zhang, Kai. Bryan Cave Leighton Paisner LLP. *Brexit: Changes Afoot for UK Payment Services?*, LEXOLOGY (Apr. 21, 2020), <https://www.lexology.com/library/detail.aspx?g=18709c6f-f0ed-46a6-8d83-c01b8f433abf>.

Webpages

About Us, OPEN BANKING, <https://www.openbanking.org.uk/about-us/> (last visited Jul. 2, 2019).

About Us, THE FINANCIAL INFORMATION SERVICE Co., LTD., <https://www.fisc.com.tw/EN/ab-history.html> (last visited Jun. 26, 2020).

Account Providers, OPEN BANKING, <https://www.openbanking.org.uk/providers/account-providers/> (last visited Dec. 6, 2019).

Applying to the regulatory sandbox, FCA, <https://www.fca.org.uk/firms/innovation/regulatory-sandbox-prepare-application> (last visited Sep. 22, 2021).

Banking Competition, THE WORLD BANK, <http://www.worldbank.org/en/publication/gfdr/gfdr-2016/background/banking-competition> (last visited June 7, 2019).

Bank of Greece Regulatory Sandbox launch event, EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT (June 2, 2021), <https://www.ebrd.com/news/events/bank-of-greece-regulatory-sandbox-launch-event.html>.

Crypto operators should prepare for DNB supervision, DNB (Sep. 3, 2019), <https://www.dnb.nl/en/news/news-and-archive/Persberichten2019/dnb385424.jsp#>.

Cryptoassets: AML/CFT regime, FCA, <https://www.fca.org.uk/firms/financial->

- [crime/cryptoassets-aml-ctf-regime](#) (last visited Aug. 2, 2021).
- cryptocurrency, Merriam-Webster, <https://www.merriam-webster.com/dictionary/cryptocurrency> (last visited Mar. 23, 2021).
- DEFAULT STANDARDS FOR SANDBOX TESTING PARAMETERS, FCA, <https://www.fca.org.uk/publication/policy/default-standards-for-sandbox-testing-parameters.pdf> (last visited June 22, 2021).
- EU Legal Framework on Anti-money Laundering and Counter Terrorist Financing*, EUROPEAN UNION, https://ec.europa.eu/info/business-economy-euro/banking-and-finance/financial-supervision-and-risk-management/anti-money-laundering-and-counter-terrorist-financing_en (last visited Apr. 24, 2020).
- Fa Gui Cao An Yu Gao* (法規草案預告) [*Preview of Law Draft*], JIN RONG JIAN DU GUAN LI WEI YUAN HUI (金融監督管理委員會) [FINANCIAL SUPERVISORY COMMISSION], (May 25, 2021), https://www.fsc.gov.tw/ch/home.jsp?id=133&parentpath=0,3&mcustomize=lawnotice_view.jsp&dataserno=202105250001&dtable=NoticeLaw.
- FATF Members and Observers*, FATF, <https://www.fatf-gafi.org/about/membersandobservers/> (last visited Dec. 10, 2021).
- Fight Against the Financing of Terrorism*, EUROPEAN COMMISSION, https://ec.europa.eu/home-affairs/what-we-do/policies/crisis-and-terrorism/financing_en (last visited Oct. 16, 2019).
- Financial Technology Regulatory Sandbox Framework*, BANK NEGARA MALAYSIA (Oct. 18, 2016), <https://www.bnm.gov.my/-/financial-technology-regulatory-sandbox-framework>.
- FinTech Regulatory Sandbox*, MFSA, <https://www.mfsa.mt/fintech/regulatory-sandbox/> (last visited June 2, 2021).
- Fintech Supervisory Sandbox (FSS)*, HONG KONG MONETARY AUTHORITY, <https://www.hkma.gov.hk/eng/key-functions/international-financial-centre/fintech/fintech-supervisory-sandbox-fss/> (last visited June 2, 2021).
- FMA Sandbox*, FMA, <https://www.fma.gv.at/en/fintech-point-of-contact-sandbox/fma-sandbox/> (last visited June 2, 2021).
- FT Lab*, DFSA, <https://www.dfsa.dk/Supervision/Fintech/FT-lab> (last visited June 2,

2021).

Global Financial Innovation Network (GFIN), FCA, <https://www.fca.org.uk/firms/innovation/global-financial-innovation-network> (last visited Nov. 25, 2021).

History and Functions of the Bankers Association of the Republic of China, THE BANKERS ASSOCIATION OF THE REPUBLIC OF CHINA, <https://www.ba.org.tw/EnglishVer/Introduction> (last visited Nov. 8, 2019).

History of the FATF, FATF, <https://www.fatf-gafi.org/about/historyofthefatf/> (last visited Dec. 10, 2021).

Innovation Sandbox, FINANŠU UN KAPITĀLA TIRGUS KOMISIJA, <https://www.fktk.lv/en/licensing/innovation-and-fintech/innovation-sandbox/> (last visited June 2, 2021).

Jin Guan Hui Cheng Wei Quan Qiu Jin Rong Chuang Xin Lian Meng (GFIN) Hui Yuan Xiang Guan Zi Xun Jie Lu (金管會成為全球金融創新聯盟(GFIN)會員相關資訊揭露) [*Revealing Information Regarding the FSC's Participation in the GFIN*], JIN RONG JIAN DU GUAN LI WEI YUAN HUI (金融監督管理委員會) [FINANCIAL SUPERVISORY COMMISSION] (June 25, 2019), https://www.fsc.gov.tw/ch/home.jsp?id=726&parentpath=0.7.478&mcustomize=onemessages_view.jsp&dataserno=201907220001&dtable=O20160223020901.

Jin Rong Ke Ji Fa Zhan Yu Chuang Xin Shi Yan Jie Lu Ge Shi (金融科技發展與創新實驗揭露格式) [*The Sandbox Experiment Information Disclosure Form*] 1, <https://www.fsc.gov.tw/uploaddowndoc?file=20160223020901/202001141412540.pdf&filedisplay=%E5%BC%B1%E4%B8%AD%E5%BF%83%E5%8C%96%E5%85%B1%E5%90%8C%E5%9F%BA%E9%87%91%E4%BA%A4%E6%98%93%E5%B9%B3%E5%8F%B0%E6%8F%AD%E9%9C%B2%E8%A1%A8%28New%29.pdf&flag=doc> (last visited June 30, 2021).

Jin Rong Ke Ji Chuang Xin Shi Yan Xiang Guan Zi Xun Jie Lu - He Zhun (金融科技創新實驗相關資訊揭露-核准) [*Sandbox Experiments Information Disclosure – Approval*], JIN RONG JIAN DU GUAN LI WEI YUAN HUI (金融監督管理委員會) [FINANCIAL SUPERVISORY COMMISSION], <https://www.fsc.gov.tw/ch/home.jsp?id=667&parentpath=0.7.478> (last visited June

23, 2021).

Money Laundering, EUROPEAN COMMISSION, https://ec.europa.eu/home-affairs/what-we-do/policies/organized-crime-and-human-trafficking/money-laundering_en (last visited Oct. 10, 2019).

New Regulatory Regime for Crypto Assets in Germany, NORTON ROSE FULBRIGHT (Mar. 2020), <https://www.nortonrosefulbright.com/de-de/wissen/publications/5ee1e37e/new-regulatory-regime-for-crypto-assets-in-germany>.

Open Banking March Highlights, OPEN BANKING, <https://www.openbanking.org.uk/about-us/news/obie-publishes-open-data-service-quality-indicators/> (last visited July 2, 2019).

Open Banking Limited, COMPANIES HOUSE, <https://beta.companieshouse.gov.uk/company/10440081> (last visited Oct. 3, 2019).

Open Banking Publishes Version 3.1.1. of the Open Banking Standard, OPEN BANKING (Mar. 15, 2019), <https://www.openbanking.org.uk/about-us/news-release-archive/open-banking-publishes-version-3-1-1-of-the-open-banking-standard/>.

Operational Risk, EUROPEAN BANKING AUTHORITY, <https://eba.europa.eu/regulation-and-policy/operational-risk> (last visited Apr. 15, 2020).

Overview, SANDBOX KOREA, <https://sandbox.fintech.or.kr/financial/overview.do?lang=en> (last visited Aug. 19, 2021).

Ponzi Schemes, U.S. SECURITIES AND EXCHANGE COMMISSION, <https://www.sec.gov/fast-answers/answersponzihtm.html#PonziWhatIs> (last visited Aug. 4, 2021).

Press Release, U.S. Securities and Exchange Commission, SEC Charges Bitcoin Entrepreneur With Offering Unregistered Securities, U.S. SECURITIES AND EXCHANGE COMMISSION (June 3, 2014), <https://www.sec.gov/news/press-release/2014-111>.

Press Release, U.S. Securities and Exchange Commission, SEC Sanctions Operator of Bitcoin-Related Stock Exchange for Registration Violations, U.S. SECURITIES AND EXCHANGE COMMISSION (Dec. 8, 2014), <https://www.sec.gov/news/press-release/2014-273>.

Press Release, U.S. Securities and Exchange Commission, Company Halts ICO After SEC Raises Registration Concerns, U.S. SECURITIES AND EXCHANGE COMMISSION (Dec. 11, 2017), <https://www.sec.gov/news/press-release/2017-227>.

Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937 (2020), <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020PC0593>.

Public Statement, U.S. SECURITIES AND EXCHANGE COMMISSION, Statement on Digital Asset Securities Issuance and Trading (Nov. 16, 2018), <https://www.sec.gov/news/public-statement/digital-asset-securities-issuance-and-trading>.

Public Statement on Virtual Assets and Related Providers, FATF (June 21, 2019), <https://www.fatf-gafi.org/publications/fatfrecommendations/documents/public-statement-virtual-assets.html>.

Quan Qiu Jin Rong Chuang Xin Lian Meng (GFIN) (全球金融創新聯盟(GFIN)) [Global Financial Innovation Network (GFIN)], WAI JIAO BU (外交部) [MINISTRY OF FOREIGN AFFAIRS, REPUBLIC OF CHINA (TAIWAN)], https://subsite.mofa.gov.tw/igo/News_Content.aspx?n=163B8937FBE0F186&sms=53182B822F41930C&s=E6FAB19CF6108374 (last visited Oct. 21, 2021).

Regulation of Virtual Assets, FATF (Oct. 19, 2018), <https://www.fatf-gafi.org/publications/fatfrecommendations/documents/regulation-virtual-assets.html>.

Regulation S-P, U.S. SECURITIES AND EXCHANGE COMMISSION, <https://www.sec.gov/spotlight/regulation-s-p.htm> (last visited May 7, 2019).

Regulatory Sandbox, MNB, <https://www.mnb.hu/en/innovation-hub/regulatory-sandbox> (last visited June 2, 2021).

Regulatory Sandbox, LIETUVOS BANKAS, <https://www.lb.lt/en/regulatory-sandbox> (last visited June 2, 2021).

Regulatory Sandbox, AFM, <https://www.afm.nl/en/professionals/onderwerpen/innovationhub-maatwerk> (last visited June 2, 2021).

Sandbox, MONETARY AUTHORITY OF SINGAPORE,

<https://www.mas.gov.sg/development/fintech/sandbox> (last visited June 2, 2021).

Third Party Providers, OPEN BANKING, <https://www.openbanking.org.uk/providers/third-party-providers/> (last visited June 15, 2022).

Transposition of the Fifth Money Laundering Directive, GOV.UK (Jan. 23, 2020), <https://www.gov.uk/government/consultations/transposition-of-the-fifth-money-laundering-directive>.

Summary

FinTech (financial technology, “FinTech”) is a double-edged sword as it brings both benefits and risks. The potential risks, specifically, may merit regulatory attention. This study found that information deficits might arise. This study appraised FinTech’s technological nature that brings changes in complexity in modern financial markets to identify the information deficits and its undesirable outcomes. Financial crimes such as fraud, cheating, and money laundering exemplify them. Besides, as FinTech is still developing, the information regarding, for instance, whether and how to apply regulation to these new products, services or players may be insufficient for both regulators and those regulated. More one-size-fits-all regulation might accordingly be adopted, thereby being unable to distinguish between the safer and riskier FinTech. Through the lens of both law and economics and law and technology, this study further found that the root cause of the aforementioned problems is the pacing issue. Regulation cannot keep pace with technology. To solve this issue, this study suggested AFR (adaptive financial regulation, “AFR”) of FinTech. AFR features its dynamic nature, enabling regulatory adjustments and learning through truly experimenting. Exploring and collecting information through experiments and learning from experiments are the core of AFR. FinTech regulatory sandboxes, which have been existing in countries, epitomize AFR. This study chose Taiwan as a case study. This study found that the barriers to adaptive and effective FinTech regulation such as sandboxes tend to happen with respect to the entry into, operation of, and formulation of sandboxes. Unduly emphasizing consumer protection and the innovation entry criterion by improperly imposing limits on the entry into sandboxes, ignoring post-sandbox mechanisms, and relying on detailed, specific and prescriptive rules to formulate sandboxes are examples. In addition, interest groups’ influence and regulators’ attitude were also found to be barriers to adaptive and effective FinTech regulation. To

solve these barriers except for the interest groups' influence and regulators' attitude, this study proposed several solutions by looking into the experiences in other jurisdictions and analyzing several experimental cases. First, striking a balance between encouraging innovation and ensuring financial stability and consumer protection is indispensable. Several consumer protection measures after entering the sandboxes were recommended instead of the ex-ante limitation on sandboxes' accessibility. Second, entry to sandboxes should be facilitated by improving the selection criteria. This study suggested that an innovation criterion may not be a necessity. Third, adhering to realizing regulatory adjustment and learning to adapt regulation to technology, this study argued that systematic post-sandbox mechanisms should be established. Regulatory adjustments are achievable through such mechanisms. Those regulated could also be incentivized to provide information on the expectation of the subsequent lighter regulations benefiting them. Fourth, this study recommended "more principles-based sandboxes". Principles rather than rules should be the base on which sandboxes or FinTech regulation are established. Having principles could provide more flexibility, being easier to adjust and adapt, and better at avoiding obsolescence. Interpreting principles that are with a lower degree of specificity may be more costly than interpreting rules. However, the higher interpretation costs should be considered together with the increase or decrease of other types of costs such as the decrease of revising costs in the case of obsolescence and hence the decrease of obsolescence costs.

Samenvatting

FinTech (financiële technologie, “FinTech”) is een tweesnijdend zwaard dat zowel voordelen als risico’s brengt. De potentiële risico’s, met name, verdienen regulerende aandacht. Deze studie ontdekte dat informatieachterstanden kunnen ontstaan. Deze studie evalueerde de technologische aard van FinTech, die leidt tot veranderingen in complexiteit in moderne financiële markten om de informatieachterstanden en de ongewenste resultaten daarvan vast te stellen. Geïllustreerd door financiële misdaden zoals fraude, bedrog en witwassen. Bovendien, nu FinTech zich nog steeds ontwikkelt, kan de informatie met betrekking tot, bijvoorbeeld, of en hoe regelgeving wordt toegepast op deze nieuwe producten, diensten en spelers onvoldoende zijn voor zowel regelgevers als gereguleerden. Meer in alle gevallen passende regelgeving kan dus worden aangenomen, waarbij het onmogelijk is om een onderscheid te maken tussen de veiligere en risicovollere FinTech. Door de lens van zowel recht en economie als wetgeving en technologie, ontdekte deze studie verder dat de tempokwestie de oorzaak van voornoemde problemen is. Regelgeving kan geen gelijke tred houden met technologie. Om deze kwestie op te lossen, deed deze studie een voorstel voor Adaptieve Financiële Regelgeving (“AFR”) van FinTech. AFR kenmerkt zich door zijn dynamische aard, die regulerende aanpassingen mogelijk maakt en kennis door daadwerkelijk experimenteren. Het onderzoeken en verzamelen van informatie door daadwerkelijk experimenteren is de kern van AFR en de experimenten in dat kader. Belichaamd door in landen bestaande regulerende FinTech sandboxes. Deze studie koos Taiwan als casestudy. Deze studie ontdekte dat de belemmeringen voor adaptieve en effectieve FinTech regelgeving zoals sandboxes zich lijken voor te doen met betrekking tot de toetreding tot, werking van en formulering van sandboxes. Voorbeelden zijn overmatig benadrukken van consumentenbescherming en innovatietoetredingsnormen

door onterecht opleggen van beperkingen op toetreding tot sandboxes, negeren van post-sandbox mechanismen en vertrouwen op gedetailleerde, specifieke en voorgeschreven regels voor het formuleren van sandboxes. Bovendien bleken de invloed van belangengroeperingen en de houding van regelgevers ook belemmeringen te zijn voor adaptieve en effectieve FinTech regelgeving. Om deze belemmeringen op te heffen, behalve de invloed van belangengroeperingen en de houding van regelgevers, werden in deze studie verschillende oplossingen voorgesteld door onderzoek te doen naar de ervaringen in andere rechtsgebieden en het analyseren van verschillende experimentele casussen. Ten eerste is het essentieel om een balans te vinden tussen het stimuleren van innovatie en het garanderen van financiële stabiliteit en consumentenbescherming. Na toetreding tot de sandboxes werden diverse consumentenbeschermingsmaatregelen aanbevolen in plaats van voorafgaande beperking van de toegankelijkheid van sandboxes. Ten tweede zou toetreding tot sandboxes gefaciliteerd worden door verbetering van de selectiecriteria. Deze studie stelde voor dat een innovatienorm geen noodzaak hoeft te zijn. Ten derde vasthoudend aan het realiseren van regulerende aanpassing en kennis om regelgeving aan te passen aan technologie, stelde deze studie dat systematische post-sandbox mechanismen zouden moeten worden ingesteld. Regulerende aanpassingen zijn haalbaar via dergelijke mechanismen. Gereguleerden kunnen ook gestimuleerd worden om informatie te verstrekken omtrent de verwachting van de hen tot voordeel strekkende latere lichtere regelgevingen. Ten vierde deed deze studie aanbevelingen voor “meer op principes gebaseerde sandboxes”. Principes en niet regels zouden de basis moeten zijn voor sandboxes of FinTech regelgeving. Dit zou meer flexibiliteit kunnen bieden, gemakkelijker aangepast en vastgesteld kunnen worden, beter veroudering voorkomen. Interpretatie van principes die minder gespecificeerd zijn kan duurder zijn dan interpretatie van regelgeving. Echter, de hogere interpretatiekosten moeten worden afgezet tegen de toename of afname van andere soorten kosten zoals de afname van herzieningskosten in het geval

van veroudering en dus de afname van verouderingskosten.

Curriculum Vitae

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Education	
LL.M. in Science and Technology at National Tsing Hua University	2011-2015
B.A. in Economics at National Tsing Hua University	2007-2011
Work experience	
Research Assistant at Blockchain Law & Policy Centre, National Tsing Hua University	2019-2020
Legal Specialist at Foxconn	2015-2016
Research Assistant at National Tsing Hua University	2013-2015
Audit Intern at PwC	2009
Prizes and awards	
Scholarship – Lian and Liu Intellectual Property Office	2012
Stray Animals Volunteer Award – Ministry of Education of Taiwan	2009

Publications	
(Book) Robert Chang-Hsien Tsai & Kuan-Jung Peng. 'Regulating Open Banking: A Comparison of the EU, the UK, and Taiwan'. Publisher: Routledge.	2022
(Journal Article) Robert Chang-Hsien Tsai & Kuan-Jung Peng. 'Analysis of the Open Banking Policies in the EU and UK'. The Taiwan Law Review. Vol. 313. Pp. 76-96.	2021
(Journal Article) Robert Chang-Hsien Tsai & Kuan-Jung Peng. 'The FinTech Revolution and Financial Regulation: The Case of Online Supply Chain Financing'. Asian Journal of Law & Society. Vol. 4. Pp. 109-132.	2017

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PhD Training

<i>Bologna Courses</i>	<i>year</i>
Introduction to Statistics	2016
Modeling Private Law	2016
Experimental Economics – Topics	2016
Introduction to European Competition Law	2016
Econometrics III	2016
Behavioral Law and Economics and Enforcement Mechanism	2017
Game Theory and the Law	2017
Experimental Economics – Methods	2017
<i>Hamburg Courses</i>	<i>year</i>
Introduction to Empirical Methods	2017
Modeling Contract Law	2017
Introduction to German Law	2017
Empirical Methods for the Law	2017
Political Construction of Judicial Independence	2017

<i>Rotterdam Courses</i>		<i>year</i>
Concepts and Methods of Law and Economics		2017
Public Law and Economics		2017
Advanced Empirical Methods: Research Design – Theoretical		2018
Advanced Empirical Methods: Research Design – Applied		2018
<i>Specific Courses</i>		<i>year</i>
Seminar ‘How to write a PhD’		2017
Academic Writing Skills for PhD students (Rotterdam)		2017
Seminar Series ‘Empirical Legal Studies’		2017
Publication Strategy		2017
<i>Seminars and Workshops</i>		<i>year</i>
Bologna November Seminar (attendance)		2016
Joint Seminar ‘The Future of Law and Economics’ (attendance)		2018
Rotterdam Fall seminar series (peer feedback)		2018
Rotterdam Winter seminar series (peer feedback)		2018
BACT seminar series (attendance)		2018-2019
EGSL lunch seminars (attendance)		2018-2019
Rotterdam Guest Lecture series		2018-2019
Joint Seminar ‘The Future of Law and Economics’ (attendance)		2019
<i>Presentations</i>		<i>year</i>
Bologna March seminar		2017
Hamburg June seminar		2017
Rotterdam Fall seminar series		2017

Rotterdam Winter seminar series	2017-2018
Bologna November seminar	2018
<i>Attendance (international) Conferences</i>	<i>year</i>
Italian Society of Law and Economics XII Annual Conference – Turin, Italy	2016
FinTech: Law and Regulation – Luxembourg	2017
PRIME Finance Annual Conference – The Hague, the Netherlands	2018
Dynamics of Inclusive Prosperity – Rotterdam, the Netherlands	2018
PRIME Finance Annual Conference – The Hague, the Netherlands	2019