THE EFFECTS OF AUTOCRACIES ON GOVERNANCE

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To my beloved ones.

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Part I

MAIN BODY

Introduction

1 MOTIVATION: WHY STUDY AUTOCRACIES?

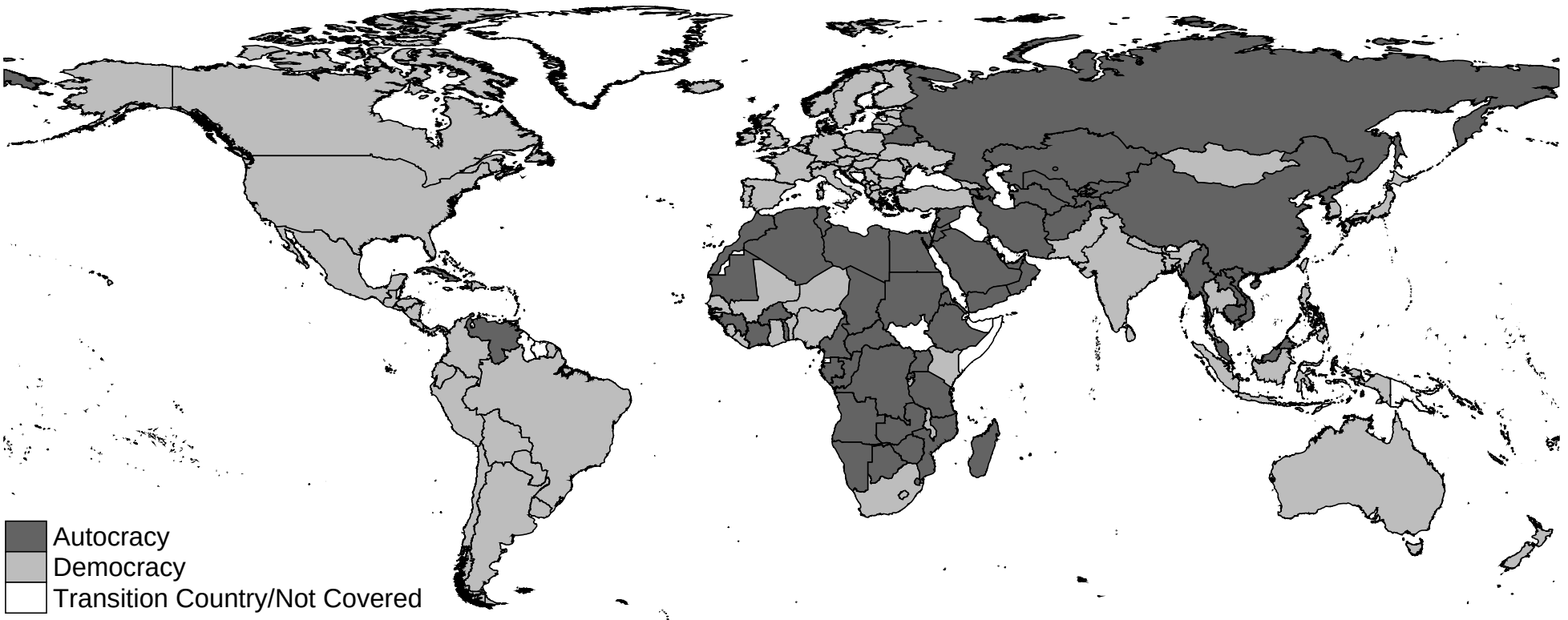
Autocracies constitute an under-researched group of states. Although the number of democracies has increased over the last decades, 40 percent of all countries (59 out of 147) still continued to be autocratically ruled in 2010 and two thirds of the entire world population are living in such countries (Geddes et al. 2014b; World Bank 2015).[1]While autocracies exist in all regions of the world, there is a concentration of them in Africa and Asia, as Figure 1 illustrates. Looking at the recent European past, many European countries also faced autocratic episodes: most of the Eastern European countries experienced the dictate of the Soviet Union; the Southern European countries Greece, Portugal and Spain faced military dictatorships until the mid-1970s and not to mention the Nazi dictatorship in Germany. As this type of political system has affected and still affects the lives of many people, autocracies have been subject to many academic and political debates.

In the literature autocracies, often also labeled as dictatorships, have been defined ex-negativo: as the political system that does not fulfill the key characteristics of democracies (Acemoglu and Robinson 2006; Cheibub et al. 2010; Gandhi 2008; Geddes 1999).[2] Put differently, this definition of autocracy thus refers to all countries in which contested elections are not the principal mechanism to select the political leaders in power.[3]

1 Although the actual number of countries across the globe is higher, coding is only available for 149 countries. The dataset of Geddes et al. (2014b) limits its coverage to countries with more than 1,000,000 inhabitants. Countries are excluded from coding while being in transition, under occupation or at civil war, which was the case for Iraq, Somalia in 2010.

2 In this thesis, I use the terms autocracy and dictatorship interchangeably to refer to a non-democratic country.

3 Geddes et al. (2014b, 6) even provide a definition for undemocratic "[...] as any means other than a direct, reasonably fair competitive election in which at least ten percent of the total population (equivalent to about 40 percent of the adult male population) was eligible to vote; or indirect election by a body at least 60 percent of which was elected in direct, reasonably fair competitive elections; or constitutional succession to a democratically elected executive."



Note: This graph is calculated for 2010 based on data from Geddes et al. (2014b). In white are all the countries with either less than one million inhabitants or which were facing a civil war, foreign occupation or were without functioning central government.

Figure 1: Distribution of Autocracies and Democracies Across the World in 2010.

Once established, most autocracies do not break down immediately (Magaloni 2008), in contrast to the often made assumption that they are transitory. The average duration of an autocracy is approximately 35 years based on all identified autocracies in the Geddes et al. (2014b) data.[4] Democracies tend to last for about 34 years. This empirical evidence suggests that a least some of the autocratic countries persist for many years and even decades. Some sort of governance must have been developed in autocracies for them to endure. The question of how governance works in autocracies and which policy outcomes it generates are currently not fully answered in the literature. Research on autocracies is generally not as advanced as the study of democracies as pointed out by e.g. Charron and Lapuente 2011; Voigt 2010; Wright 2008. Until now research on autocracies is, instead, more devoted to studying the breakdown and subsequent democratization of these countries, thereby neglecting that their varying internal structures impose different incentives and constraints on a dictator's behavior, which have consequences for policy decisions and outcomes.

This thesis advances our understanding of autocracies by analyzing how governance influences policy decisions and outcomes in autocracies. By differentiating between authoritarian regime types as well as different political leader types, I offer a nuanced analysis of these specific countries. Consequently, my thesis aims to reduce the research gap between public choice, political economy and authoritarian studies.

2 THEORETICAL FRAMEWORK

Although the studies on autocracies are often focused on examining breakdown and ruler exit, some research is placed on identifying the inner-workings of autocracies. Relying on this research, the three subsequent subsections build the theoretical basis for my analysis in this thesis. I outline in 2.1 the general structure of autocracies and discuss the dictator's main tools to remain in power, so that this subsection indicates the overall incentives and constraints a dictator faces when taking policy decisions. In 2.2 two ways to differentiate across autocracies are highlighted, which enables me to use different types of dictators or different authoritarian regimes as the explanatory variable in my thesis chapters. Building on 2.1 and 2.2, the

4 The calculations are based on the *gwf duration* variable, which counts the years of the democracy or autocracy existence as independent states from its emergence (even the years prior to the start of the datasets are included) until 2010. These averages need to be viewed with some caution, as over the course of the past decades new states have emerged, due to the independence and end of Soviet Union, which could have influenced the mean calculations.

concept of governance as the underlying theme of this thesis is introduced in 2.3.

2.1 *What Do We Know About the Functioning of Autocracies so Far?*

Turning now towards the literature, the autocratic ruler is described as the head of state holding the monopoly of violence in the basic models. The dictator shares power over the political and economic spheres with his small supporting group, the ruling elite, whereas the rest of the society, the mass, is excluded from the political and decision-making process (Besley and Kudamatsu 2008; Bueno De Mesquita et al. 2003; Olson 1993). Some theoretical contributions, for example by Svolik (2009) or Slater (2003) suggest that despite the power-sharing with his elite, the key decision power remains in the hands of the dictator, while other models, such as the seminal one by Acemoglu and Robinson (2006), do not make this distinction.

Wintrobe (1998) identifies the use of repression and buying loyalty as the main tools of the autocrat to secure his rule. Repression aims to limit the capacity of both groups to create any opposition against the dictator. Its use leads to an increase of the costs connected with opposing the dictator, lowers the incentives to (openly) oppose the dictator and increases the collective action problem for the masses. Taking the scope of repression as reference, repression can either be imposed on individuals by violations of physical integrity rights (e.g., torture, disappearances, political imprisonment) or it can also affect the population at large by the repression of civil liberty rights (e.g., limitations on freedom of speech, restrictions on freedom of assembly and association)(see among others e.g., Davenport 2007; Frantz and Kendall-Taylor 2014; Neumayer 2005). The masses and/or the ruling elite can be the target of the repressive means of the dictator.

With seeking to establish loyalty, in contrast, the dictator aims to generate support for his rule. By providing benefits, the dictator creates incentives to support his continuation in power and contrary to repression, loyalty works indirectly. The definition of what exactly loyalty constitutes varies in the literature. Some models such as the one from Acemoglu and Robinson (2006) only attribute the distribution of monetary benefits in the shape of lump-sum transfers or the provision of public/private goods to it. Other contributions by, for example Gandhi and Przeworski (2007) or Bueno De Mesquita et al. (2003) define loyalty more broadly and include, in addition to rents and distribution policy, concessions as well as the provision of positions of power. A way to attach individuals to the dictator is to establish polit-

ical structures, such as a legislature and political parties, which make the exchange of benefits for political support more credible. By adjusting the policies to the demands of opponents or offering them a forum to express their discontent, the opposition loses support against the ruler (see for instance Gandhi 2008; Gandhi and Przeworski 2007; Geddes 2003; Magaloni 2008). As for repression, the dictator can target the ruling elite or the masses with loyalty, specifically or even both groups simultaneously.

During his reign a dictator faces the inherent threat of being overthrown by both groups (Tullock 1987). They can challenge the dictator's reign via elite-based coup d'état or mass upheavals.[5] If the dictator is ousted, he may face exile, jail or even death, in addition to losing all his privileges (Debs and Goemans 2010; Goemans 2008), therefore he has a strong incentive to remain in power. To establish a long-term rule, the dictator has to take the calculus of both the ruling elite and the masses into account while governing and making credible commitments to them. While applying a mix of the above two depicted means, the ruler reduces the risk of being overthrown. No contribution so far has linked the two internal threats together and analyzed the dictator's reaction with respect to the use of his means; the research is devoted to either one of the two threats. Exogenous shocks such as economic/financial crisis or natural disasters may also pose a threat to the dictator, as an unthoughtful reaction to such shock also triggers overthrow attempts by both groups. While the existing literature examines the broader implications of such exogenous shocks like regime breakdown or ruler exit (see among others e.g., Aidt and Leon 2015; Brückner and Ciccone 2011; Miguel et al. 2004), literature remains scarce when it comes to the precise dictator's reaction regarding his two means. I address these two research gaps in my thesis chapters.

2.2 *How Are Autocracies Categorized?*

Despite often being treated in the literature as a homogenous group, autocracies are not alike. They constitute a wide range of countries with different ruler characteristics and are politically organized in different ways. Analyzing them as a unitary group could produce too simplistic results. For research on the differences among autocracies, scholars in economics and political science have established two important strands to categorize

5 A controversial debate in the literature is centered on the actual occurrence of revolutions. For instance Tullock (1971) suggests to focus purely on coup d'états, as successful revolutions are very rare. Acemoglu and Robinson (2006, chapt.3) among others discuss the chances of the masses to overcome the collective action problem for launching a revolution.

these countries since the early 1990s: first, the type of autocrat in power and second, the authoritarian regime. The first strand is a bit more prominent in the economics literature compared to its use in political science literature. However, both strands are present and commonly used in research in the two disciplines. I include both strands in my thesis by referring to either one of them in each chapter. For that reason, I outline below the most relevant categorizations of each strand for later analysis.

The theories of the first strand refer to the type of autocrat in power. Wintrobe (1998, 1990) distinguishes dictators along two dimensions: repression and loyalty. In line with this discrimination, dictators can be classified into four types, each of which holds different combinations of the two dimensions. The tinpot is the most prominent and most frequent dictator type, who employs the lowest level of both repression and loyalty necessary to remain in office. The totalitarian is the opposite to a tinpot by applying the highest feasible level of repression and loyalty to maximize his power. A tyrant is characterized by a low level of loyalty, but high level of repression. A timocrat holds a low level of repression and high level of loyalty. A different, less prominent leader characterization is introduced by Slater (2003) who distinguishes dictators along two sources of power: infrastructural and personal power. Infrastructural power can be defined as the institutional capacity of the dictator to penetrate its territories and logistically implement decisions. If the dictator has the capacity to effectively implement his policies, he possesses high infrastructural power. Personal power, defined as the extent a dictator relies on other individuals or groups for making decisions, builds the second power dimension. A dictator with high personal power does not fully involve his ruling elite in the decision-making process in most cases. Taking the time-horizon of the dictator in power as the point of reference, Olson (1993) establishes the notion of a rovery and a stationary bandit. Both bandits aim to maximize their wealth. The rovery bandit faces a short-term power perspective and therefore exploits his citizens, whereas due to his long-term perspective the stationary bandit provides public goods to his citizens so as to benefit from them in the long run (McGuire and Olson 1996).

The theories of the second strand shed light on the ruling elite and organization of political rule and are based on the terminology of authoritarian regimes. To a certain extent, there is a theoretical overlap between the different categorizations in this literature strand, though the categorizations differ in the precise criteria to classify a country as one regime type and the exact number of regime types also varies across them.[6] Based on the identity

6 Please see Wilson (2014) and Wahman et al. (2013) for a more extensive discussion.

of the ruling elite group in power from which the autocrat can be chosen, Geddes et al. (2014a, see for the original contribution Geddes 2003) identify four different authoritarian regime types: military, monarchy, single-party and personal regimes. This categorization allows detecting the ruling elite and the institutional structure at the same time, as for instance armed forces build the ruling elite in military regimes, while decisions are taken in juntas or military councils. Cheibub et al. (2010) focus on the different nature of the executive office, as it indicates how power is organized within the dictatorship. The authors distinguish between three different types, which could be either monarchial, military or civilian. In a monarchy, for example, the effective head of government comes into power and similarly holds his rule through his (royal) family and kinship. The current version of Wahmann et al.'s (2013) authoritarian regime classification shifts the focus on the type of political body, which the different elites use to control their access to and their persistence of power. In particular, the authors refer to the modes by which dictators retain power to differentiate between the authoritarian regimes: monarchies by hereditary succession, military regimes by the use or threat of force and electoral regimes by elections. In their typology, they further subdivide authoritarian regimes with elected legislatures into no-party, one-party and multiparty electoral regimes to place the focus also on the shape of the underlying legislature and to consider not only the nature of the chief executive.

The use of the theories of the two strands consequences for the theoretical and empirical analysis. The analysis of autocratic persistence serves as a good example to illustrate these implications. The analysis can either be placed on the survival of the autocratic leader in office if one looks at the different leader types (first strand) or it can be concentrated on the survival of the authoritarian regime if one looks at the underlying regime (second strand). There could be a change of multiple ruler types in power while the authoritarian regime is still in place. The way of assessing autocracies in conceptual terms consequently determines how theories are applied. In my thesis, I rely on the first strand for *chapter 2* and *4*, while the second strand is used in *chapter 3* and *5*. The choice is determined by the underlying research question of each chapter. This allows to place the analysis on the adequate level and to incorporate the two perspectives on leaders and authoritarian regimes in my analysis.

Having outlined the different political settings how autocracies can be internally organized, we now move one step further to conceptualize governance. The governance concept serves as the overarching analytical framework in this thesis, by which the different settings of autocracies can be linked to policy outcomes. Here, I rely on Williamson's (2000) concept on four different levels of social analysis to conceptualize governance. For this thesis, the function of level 1, the informal institutions, and of level 2, the formal institutions, on level 3, the governance structure, are relevant. In his concept, Williamson focuses on the impact of lower levels on higher ones assuming that all levels are interconnected. In general terms, institutions are predominantly seen as "the rules of the game". Specifically, institutions set incentives for and equally put constraints on human behavior (North 1990). Voigt (2013, 5) offers a precise definition by defining institutions as "[...] commonly known rules used to structure recurrent interaction situations that are endowed with a sanctioning mechanism." Informal institutions or rules in the sense of Williamson's concept are customs, norms, traditions, sanctions or code of conduct are in place at the level 1, which is characterized as the social embeddedness. Formal rules such as property rights, constitutions and laws can be found at level 2, the institutional environment. The structures found at this level build the result of politics. For instance, the polity, judiciary and the bureaucracy are located here (Williamson 1998). In that regard, the type of executive or the existence of a legislature for instance may create constraints. The governance structure as level 3 is the interplay of the formal and informal institutions and is also interpreted as the play of the game. At this level the actual enforcement of the formal and informal rules becomes important. As Voigt (2013, 3) points out, the level of the implementation of the rules impacts to which extent the rules constrain behavior. If the rules are not or only partly implemented, or if there is no sanction mechanism, there are strong incentives for the individual not to stick to the rules. To enforce the rules in autocracies, the dictator can use repression to sanction rule-breaking behavior as well as provide benefits to ensure the compliance.

To evaluate governance, there are two options: The first one focuses on the process and the second one on outputs and outcomes. For this thesis I am interested in examining the effects of governance on policy outcomes. Therefore in a first step, the general constraints a dictator faces, his enforcement tools and the different internal structures of autocracies need to be identified, which is undertaken in 2.1 and 2.2. Their interaction builds the

dictator's behavior and thereby policy decisions, which in a second step translate into differences in policy outcomes and outputs and will the point of interest in the subsequent chapters.

3 OBJECTIVE OF THIS THESIS

The main objective of this thesis is to shed light on the following overarching research question:

> **How are policy outcomes shaped by informal and formal institutions in autocracies?**

This overarching research question motivates the overall analysis. All chapters of this thesis share the common research focus on policy outcomes. To gain different insights, the focus of each chapter is placed on a different policy outcome — namely fiscal policy in *chapter 2*, the dictator's reactions in moments of either an economic crisis in chapter *3* or a mass uprising in *chapter 4* and the level of corruption in *chapter 5*.[7]

In addition to the joint focus on policy outcomes, individual research questions are raised in each chapter, which are related to the overarching research question. *Chapter 2* asks if and how the type of dictator influences the collection of different revenues. *Chapter 3* tackles the question how authoritarian regimes react to income shocks, whereas *chapter 4* poses the question what drives the dictator's behavior in moments of mass crisis. In *chapter 5* the question is addressed how can the public- and private-sector corruption be empirically assessed and what determines them.

By seeking to answer both the overarching and specific research questions, this thesis aims to contribute to a better understanding of the underlying conditions of governance in autocracies, both on a global scale and under the premise of a more nuanced analysis of the different autocracies. It examines underlying constellations within the different autocracies to explain the variations in policy outcomes. A better understanding of autocracies could also translate into more refine grained predictions about the behavior of different groups (dictator, ruling elite and masses). Furthermore, this thesis also aims to link theory and empirics more closely due to its inclusion of formal modeling in the analysis and its use of more refined data, thereby reducing the gap between them.

7 Please note that in *chapter 5* only a very limited part of the analysis is devoted to autocracies.

Taken together, these four chapters deliver a more comprehensive picture on policy outcomes in autocracies than so far provided by the literature.

4 METHODOLOGY

The methodology employed in the thesis builds on a quantitative approach. An econometric analysis is performed in all main chapters. This approach is enriched by formal-modelling in one chapter.

Two recent developments made the use of quantitative methods more favorable. With increasing coverage of panel data on non-democratic countries since the past two decades, econometric methods can be now used to test theory on a broader scale. We can examine whether theories generated by formal modeling and/or (rival) theories from case or country studies are supported by the empirical analysis. In addition, the recent introductions of datasets capturing the leader characteristics in greater detail or authoritarian regime typologies provide more specific data on these countries. This allows examining autocracies more closely to the theory than it would be possible with the traditional political regime measures such the Polity IV or the Freedom House Index. The developments have opened up a field for research, in which the effects of dictatorial types and institutions on specific outcomes and outputs can now be better identified. Consequently, this thesis can use these improvements to complement and extend previous results.

In addition, the use of a new unpublished dataset on government revenues as well as the development of two new indicators for measuring corruption further help to improve the empirical results. In *chapter 2* I rely on the Global State Revenues and Expenditures (GSRE) data set, which Thomas Richter and I developed over the last years. This data set has a special focus on autocracies leading to higher country coverage than provided in the conventional data sets and also offers a longer time span. This allows to reduce the missing data issue often prevalent for these countries and hence, increases the preciseness of the estimations. In *chapter 5* two new corruption indicators are developed, that measure public- and private-sector corruption separately. This also helps to advance empirical research by enabling a more focused analysis.

Quantitative methods are often placed at the national level and therefore well suited for the analysis of autocracies. This method also allows including a large number of cases, in this case countries, in the analysis and to

take a broad comparative perspective. To a certain extent, general conclusions can be drawn from its results. The estimation model and the empirical identification strategy are specific to the underlying research question in each chapter and hence, differs from one chapter to another. The estimation models are the following: in *chapter 2* pooled OLS and fixed-effect models, in *chapter 3* linear probability models, in *chapter 4* pooled cross-section logit models and in *chapter 5* a cross-section OLS, which as a follow-up refined by general-to-specific specification search methodology.
The quantitative approach has its limitations in providing causal inferences (Rubin 1974). Although the correlations in this thesis are directly derived from theoretical concepts, the correlations are only initially statistical relationships and it remains to the author to convince the reader that there is actually a causal effect.
Concerns about endogeneity are increasingly raised in empirical studies linking economic shocks to political instability. Beginning with the paper of Miguel et al. (2004) the variation and level of rainfall has become a valid instrument for economic shocks, which is complemented by the level commodity price introduced by Bazzi and Blattman (2014). While working on the paper in *chapter 3* we also thought along those lines, to use temperature variations and shocks in commodity prices as possible instruments. Due to time constraints, it was unfortunately not possible to conduct the instrumental estimations for this thesis, for the revised version we will be hopefully able to include these estimations.

The combination of formal modeling with quantitative empirical analysis serves to overcome some limitations, such as the prevalent data issues of the quantitative analysis and the use of formal-modeling can be used to compensate for potential problems of endogeneity (Lieberman 2005). Formal modeling offers more rigor in the analysis by focusing on individual behavior, e.g. in my thesis the dictator's decisions. I use game theory to generate empirically testable theoretical predictions. The model as part of *chapter 4* is based on an entry deterrence game as developed by Spence (1977) and Jung et al. (1994). Svolik's model (2009) on power-sharing between the dictator and the ruling elite is the other important building block.

Overall, this thesis consists of four working papers which are all independent from each other. Except for the paper, which follows as *chapter 2* directly after this introduction, the other three constitute co-authored papers.[8]

This first chapter is the introduction, in which I outline the theoretical approach, the objective, the methodology chosen and the structure of this thesis. This chapter also shows how one can establish a connection between chapters 2 to 5.

Chapter 2 examines whether the type of dictator in power can influence the relative revenue composition. It tests the idea of the fiscal contract literature empirically that political representation fosters the tax compliance behavior of the citizens. This theory applied to autocracies predicts that a taxpayer withholds fewer taxes if there is some sort of political exchange and I distinguish between two types of dictators in the analysis. The empirical analysis is based on pooled OLS and the fixed-effects model and several additional estimations are presented to check the robustness of the results.

Chapter 3 and *4* analyze both the dictator's behavior in moments of crisis.
Chapter 3 investigates the dictator's response regarding the use of repression to an exogenous shock, here an income shock. Wintrobe's (1998)theoretical claim on the behavior of a tinpot dictator type, which predicts an increase in repression in response to a negative income shock, is tested empirically. Using linear probability models for panel data and incorporating fixed effects, this chapter also aims to complement the previous study of Islam and Winer (2004). The results are further placed in context of recent empirical studies.
Chapter 4 examines the dictator's reaction in moments of mass uprising, both theoretically and empirically. Based on a two-step entry deterrence game, the chapter analyzes which potential consequences the dictator's reaction in this moment of crisis may entail, as a reaction may induce his ruling elite to launch a coup and overthrow him, whereas no reaction may lead to a challenger entry. The analysis further examines which type of dictator is trapped in the dilemma. To test the predictions empirically, I use pooled cross-logit estimations.

Chapter 5 is centered on the analysis of public- and private-sector corruption. In this chapter two indicators that measure corruption separately are introduced and their usefulness is demonstrated in two empirical applications.

8 Please see Supplementary Material Part D for an overview of the distribution of work in the co-authored papers.

It also studies the determinants of sector-specific corruption levels. Hereby, it compares the effect of the political systems, democracies, and autocracies, on the two corruption outcomes and additionally it analyzes the potential impact of different authoritarian regimes. In the second part of the chapter, an influential study by Fisman and Miguel (2007) is replicated to examine whether the two corruption types can be linked to the unlawful behavior of a country's diplomats abroad.

This thesis closes with a brief conclusion in *chapter 6* that synthesizes the research results and puts them into perspective. It also provides answers to the overarching research question on the effects of autocracies on governance and outlines directions for future research.

Holding on to Power*

Revenue Composition under Different Dictator

1 INTRODUCTION

Dictators need revenues to finance their rule, since revenues are the precondition to provide redistribution, public services and security to the citizens, and because dictators often use these for their personal enrichment. Ultimately, raising revenues contributes to their political survival.

The need to collect revenue is not only faced by autocratic rulers, but also presents a challenge for democratic leaders. Revenue data reveals that across countries there is considerable variation in the level and the composition of revenues. To explain these variations, research focuses on the impact of political representation as one main cause. In theoretical terms, taxation is linked to political exchange by the idea that a fiscal contract exists between the ruler and the taxpayer (see among others Bates and Lien 1985; Levi 1989; Mahdavi 2008; Moore 2008; Timmons 2005). Political influence is traded for the payment of taxes. These models imply that there are systematic differences in the level and composition of revenues between countries that depend on the degree of political exchange within the respective country. Several studies have examined these implications empirically. Until now empirical research has primarily focused on the differences between democracies and autocracies (e.g., Cheibub 1998; Kenny and Winer 2006; Profeta and Scabrosetti 2010; Profeta et al. 2013) or within democracies (e.g. Blume

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et al. 2009; Persson and Tabellini 2003). Autocracies, if studied, are commonly treated as a unitary form of government, and little effort has been made to distinguish one from another. Thus, the impact of the different autocracies and dictators in power on revenue collection remains underexplored.[1]

This paper aims to overcome the research gap by analyzing the effect of two different types of dictators on the composition of revenues. It compares despotic with nondespotic dictators to identify whether and how political exchange impacts the revenue collection in these specific countries. Based on the concept by Slater (2003), despotic dictators are understood as those dictators who hold all the decision-making power and do not include other groups — i.e. their own supporting base or citizens — in that process. I argue in this paper that the existence of political exchange in one country affects the tax compliance of the citizens, even if the citizens are excluded from it. I show that the citizens do withhold fewer taxes in autocracies with a nondespotic dictator in power compared to those with a despotic dictator in power. Specifically, the nondespotic dictator is predicted to collect more taxes on personal income and on goods and services than his despotic counterpart, as those tax sources require an information exchange between the ruler and the taxpayers. To test the predictions empirically, the paper draws on the new unpublished Global State Revenues and Expenditures (GSRE) dataset on 81 autocracies between 1965 and 2003. Relying on revenue structure estimation models first introduced by Kenny and Winer (2006) and further applied by Profeta et al. (2013), the regression estimations confirm the previously made argument about the effect of type of dictator on tax compliance. The empirical results further outline that the type of dictator also impacts the collection of nontax revenues, which are lower in autocracies with a nondespotic dictator. The results help to advance our understanding of how policy outcomes are generated in different dictatorships.

The remainder of this paper is organized as follows: Section 2 provides a theoretical motivation for how the type of dictator can be linked to the compliance of the citizens. A prediction of how the despotic dictator impacts the collection of individual revenue sources is also developed in this section. In section 3 the operationalization of the variables and the estimation sample properties are described. Section 4 presents the estimation results and includes several additional estimations to examine the robustness of the results. Section 5 concludes by highlighting the main findings of this paper and gives directions for future research.

1 The work by Escribà-Folch (2009) is the only contribution in this area.

Existing theoretical contributions are rare when it comes to analysis of the level of taxation, the revenue structure and the tax compliance across autocracies. The work by Escribà-Folch (2009) represents the notable exception in this area. To be able to derive theoretically based predictions about the effect of the type of dictator in office on the revenue collection, I discuss in the following the theories presented in the fiscal contract literature and show how scholars can use these theories to study the connections between type of dictator and revenue collection. To deepen my analysis, I will then distinguish among the individual revenue sources as components of revenue collection and connect them to the dictator's ability to collect revenues.

The fiscal contract literature refers to revenue bargaining between the ruler and the taxpayers. According to Lieberman (2002) the ruler faces a collective-action problem: while raising taxes, the citizens call for redistribution, security and provision of public goods, but want other citizens to carry the tax burden. The citizens can do so by withholding their taxes completely or partially. This behavior, also labeled "tax xompliance", constrains the ruler.[2] It leads to a situation in which rulers must establish a functioning state apparatus for monitoring and sanctioning the tax-withholding citizens. As a consequence, collecting taxes entails costs for the state. Because of that, Timmons (2005), among others, suggests that the ruler needs to negotiate with the citizens about the revenue collection.

In order to lower the compliance costs, the ruler has an incentive to make a credible commitment to the citizens. The two relevant options identified by the literature for the ruler are, first, to provide benefits to citizens in the form of services and, second, to grant citizens influence in politics (see among others Levi and Sacks 2009; Moore 2008). Levi (1989) speaks in this context about the necessity to establish quasi-voluntary compliance. Other authors, i.e. Wintrobe (1998), stress the use of force as another option to overcome the collective-action problem. As also discussed by Cheibub (1998), coercion may influence the compliance, as the ruler may threaten to use repressive means against individuals who are withholding their taxes. It might also reduce the need of the dictator to bargain over benefits or representation. Due to my research interest on the type of dictator in power, I now focus on influence in politics as the essential credible commitment for my analysis.[3]

2 For a general overview on tax compliance, see e.g. Andreoni et al. (1998); Slemrod and Yitzhaki (2002).

3 Some implications for the link between revenue collection and force as well as between revenues and benefits can be drawn from Wintrobe's (1998) model on the economic orga-

Bates and Lien's (1985) formal model about the introduction of political representation analyzes how revenue collection can be linked to such a credible commitment.[4] The authors demonstrate that political leaders face a trade-off between revenue collection and policy concessions, assuming that taxable assets can be mobile. Here the citizens negotiate with the ruler over policy concessions for revenue. The more mobile their assets are, the more the citizens benefit from those negotiations due to their increasing political influence. The model further implies that the ruler benefits from political representation. Political representation offers the ruler the opportunity to negotiate with the citizens as a collective group instead of individually. That reduces the bargaining costs and smooths the bargaining process. Citizens, in return, also have an interest in bargaining collectively with the ruler, as it ensures that all other similarly situated individuals will be at the same tax rate, thus solving the collective-action problem. This model, among others, is used to explain how taxation can be linked to democratization. It shows further that, notwithstanding the form of the political system, the political exchange between the ruler and the citizens strengthens the ruler's credibility and therefore increases his capability to collect taxes.

Applying this reasoning to autocracies, Escribà-Folch (2009) links the degree of political representation to the revenue collection. His argument is based on the claim made by Gandhi and Przeworski (2006), which states that dictators can increase citizens' compliance by policy concessions. According to them, policy concessions comprise the introduction of legislatures and/or the creation of parties. For instance, different from democracies, legislatures in autocracies take different forms: there could be no legislature, a nonelective legislature (with members chosen by heredity, ascription or selected by the executive) or even an elective legislature (with members selected via direct or indirect popular elections). Escribà-Folch demonstrates in this context that the credible commitment mechanism even works for autocracies. The citizens and the opposition could become more attached to the ruler if the latter grants them more representation, which could positively influence their compliance and thus allow more revenues to be collected by the ruler.[5]

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nization of dictatorships. It suggests that the higher the threat of repression gets or the more that distribution fosters the citizens' support for the dictator, the more tax revenues can be collected.

4 There is also a vast literature connecting the taxation to the emergence of the European nation-state. North and Weingast (1989), for instance, argue that such a process occurred in the United Kingdom in the 17th century after the Glorious Revolution, in which the monarch and the rich negotiated over the protection of property rights and influence in politics for the provision of revenues.

5 The question of whether democracies or autocracies are able to collect more revenues has been investigated by several empirical studies, showing mixed results. While Profeta and

Going one step further, I argue that the idea of political exchange to ensure tax revenues can be applied to the dictator and his ruling elite. The ruling elite constitutes a small group supporting the dictator, with which the dictator shares power. At this point, the citizens (the rest of the society) are excluded from the political process. However, even if the citizens are not part of the political exchange, I will argue in the following that the political exchange between the dictator and the ruling elite impacts the compliance of the citizens. To do so, I distinguish between two types of dictators, despotic and nondespotic. Based on Slater's (2003) concept, despotic dictators are those who concentrate the full decision-making power within themselves, so that they can make decisions without consulting their ruling elite, whereas nondespotic dictators *do* include their ruling elite. The concept implies that despotic dictators are those with no legislature and no or very little political exchange. It follows from this that political exchange exists only in autocracies ruled by nondespotic dictators. Therefore, solely nondespotic dictators can rely on this tool to ensure tax revenues, which leads to higher compliance on the part of citizens. I assume that political exchange — even if the citizens are not part of it — always positively impacts revenue collection. The decisions made by the nondespotic dictator along with his ruling elite are likely to be more accepted by the citizens than stand-alone decisions of the despotic dictator. The credibility of the nondespotic dictator might be higher if the citizens know that at least the ruling elite has political influence.

Having established the link between compliance and the type of dictator, I disaggregate the revenue collection. This disaggregation allows us to examine the effect of the type of dictator on the individual revenue source. Liebermann's (2002) study reveals that the specific revenue sources differ in their compliance requirement. While taxes on personal income and on goods and services require high levels of citizen compliance, taxes on international trade or nontax revenues rely less on such compliance. One might think of taxes on personal income and taxes on international trade as contrasting cases. Compared to taxes on personal income, its counterpart is more easily and less costly to collect, as the state mainly needs to control the entry and exit shipping point of products. Even though some evasion may occur, the supervision and administration efforts are less complex than they are for the taxes on personal income. To ensure the collection of taxes on personal income, supervision needs to be implemented throughout the

Scabrosetti (2010) and Kenny and Winer (2006) as well as Mulligan et al. (2004)) show that differences arise with the respect to specific revenue sources, Profeta et al. (2013) find less robust results and Cheibub (1998) finds no statistical significant effect with respect to the overall amount of tax revenue collected.

entire country, and in particular citizens need to provide the state with information about their finances, which requires a high level of compliance and provides room for withholding taxes. In that regard, the level of taxes on personal income collected in autocracies could reflect the degree of information exchange between citizens and the ruler. This point is based on Lieberman (2002, 100), who stresses that the level of this type of taxes can be related to the closeness between the society and the state. In the context of autocracies, providing personal information to the state and thereby to the dictator could be seen as the lowest form of political exchange. The same logic could also be applied to collection of taxes on goods and services, though the compliance requirement might be lower than in the case of taxes on personal income. Putting this into perspective, this means that dictators can influence the collection of taxes with high compliance requirements by introducing some sort of information exchange — in the case of my analysis, the inclusion of their ruling elite in the decision-making.

Therefore, for the analysis on the effect of type of dictator on the revenue sources, the first testable, albeit informally developed prediction reads as follows:

Propostion 1 *The nondespotic dictator can be associated with more revenue collected from taxes on personal income as well as on goods and services than his despotic counterpart.*

Because despotic dictators, compared to their nondespotic counterparts, collect lower relative shares of taxes from those revenue sources with high compliance requirements, scholars must view other revenue sources as more important for despotic dictators for the analysis of the relative revenue composition in an autocracy. In that regard, taxes on international trade and nontax revenue might be more relevant in autocracies ruled by a despotic dictator than in those ruled by nondespotic dictator. This reasoning leads to the second prediction:

Proposition 2 *The despotic dictator can be associated with more revenue collected from taxes on international trade and nontax revenue than his nondespotic counterpart.*

3 DATA DESCRIPTION

Before I test the predictions empirically, I describe in this section the sample restriction on autocracies, the operationalization of the main variables and the sample properties.

To ensure that my analysis covers only autocratic rulers, I first need to define and distinguish between the concepts of democracy and autocracy.The definition developed by Alvarez et al. (1996) classifies any given country as a dictatorship that does not meet their criteria to be considered a democracy. Their dichotomous classification implies that if the most important political offices are not filled by contested elections, the country is considered to be a dictatorship.[6] The coding of the Democracy and Dictatorship dataset by Cheibub et al. (2010) builds on that definition, and I use this dataset to identify autocracies for my empirical analysis. The Polity index is also often used to distinguish between the two political systems. However, the Polity index operates on a 21-point scale and a threshold is needed to distinguish one political system from another. Since choosing a threshold is somewhat arbitrary and because there are several threshold options used in the literature — e.g. taking the threshold suggestion provided by the authors of Polity itself (Marshall et al. 2010), or selecting all countries with positive scores (see, among others, Vreeland 2008) — I opted for the dichotomous distinction. Apart from that, I exclude those countries-periods from the estimation when a given country is experiencing a situation preventing the government from collecting revenues and in places with a special taxation tradition, as these observations would distort the results. Hence, the sample consists of those cases that fulfill the following two conditions during the period under study:

1. The country was coded by the Democracy and Dictatorship dataset as an autocracy.[7]
2. The country was not experiencing a civil war, foreign intervention or a transition period.

3.1 *Dependent Variables: Revenue Sources*

With respect to the different revenue variables,I make use of a new, still unpublished dataset. The Global State Revenues and Expenditures (GSRE) dataset by Richter and Lucas (2015) consists of over 20 variables of different types of central government revenues (e.g. income tax, corporate taxes) and

6 To be categorized as a democracy, the following four conditions must be fulfilled: the chief executive must be chosen by popular election or by a body that was itself popularly elected; the legislature must be popularly elected; there must be more than one party competing in the elections; and an alternation in power under electoral rules identical to the ones that brought the incumbent into office must have taken place.

7 I further exclude those countries belonging to the 15 former Soviet Union, since these countries' ex-socialist systems have different tax traditions, which could potentially distort the results. The results remain robust to the inclusion of these countries.

expenditures (e.g. social spending, spending on defense). The data is based on historical IMF staff reports on macroeconomic developments of the respective member countries, which had been published every one to two years. This new dataset offers several important advantages for the study of the revenue structure compared to the recent ICTD Government Revenue Dataset by Prichard et al. (2014) and the Government Finance Statistics (GFS) provided by the IMF, on which most of the existing empirical taxation literature relies.[8,9] First, data from the ICTD and GFS is available starting from 1972; second, there is no continuous panel data available for the GFS;[10] and third, there is a lack of data coverage for many years, in particular for autocracies. The GSRE dataset aims at least partly to fill these gaps, as it already covers the 1960s and 1970s, provides continuous data and has a clear focus on dictatorships. A comparison of the coverage for the two exemplary variables *% Total Revenues on GDP* and *% Taxes on Personal Income on GDP* regarding autocracies across the GSRE and the ICTD in Table 1 illustrates the advantage of the GSRE. The correlation is 0.89^* for the variable *% Total Revenues on GDP* (1,574 observations) and 0.92^* for the variable *% Taxes on Personal Income on GDP* (700 observations). These high correlations further indicate that there is strong conceptual overlap between the two datasets and provide external validity to the use of the GSRE.

Table 1: Comparision Between GSRE and ICTD Datasets

	Total Revenues		**Personal Income Taxes**	
	GSRE	ICTD	GSRE	ICTD
Years Covered	1951–2006	1972–2008	1956–2006	1972–2008
Number of Observations	2,587	2,111	1,827	1,116
Countries Covered	119	112	104	88

Note: This table is based on annual data from the GSRE and ICTD restricted to autocracies based on the coding of the Democracy and Dictatorship dataset by Cheibub et al. (2010).

8 The World Development Indicators (WDI) published by the World Bank also contains a number of different revenue sources. However, as (Timmons 2010, 195), among others, notes, their coverage is rather poor.

9 Keen and Mansour (2010) also use the country reports to compile a fiscal dataset. In contrast to the GSRE, they combine the data with the GFS, which may raise questions due to the possible inconsistencies between the two datasets. In addition, the dataset is limited to sub-Saharan Africa.

10 Cf. for an explanation of these changes by the International Monetary Fund (2001, 157-59). The IMF is now trying to overcome this shortcoming by compiling a longer-lasting dataset of state spending and revenues. The extended dataset is only available for general government data and not for central government data, and the longer-lasting dataset consists mainly of developed/OCED countries. Only the latter concept is primarily used in the empirical analysis on the revenue structure.

Due to its focus on dictatorships, the GSRE contains data only for dictatorships and newly established democracies, which effectively restricts its application. Though it covers more autocracies and years than the other two datasets, it is far from providing a complete panel dataset.

For my analysis, four variables are taken from the GSRE: *Personal Income Tax*, *Taxes on Goods and Services*, *Taxes on International Trade* and *Nontax Revenue*. To standardize the variables, all four are converted into the relative revenue source share with respect to GDP. GDP is most often used in empirical studies as the denominator of interest, since it seems suitable to indicate how many taxes and nontax revenues are collected relative to the size of the national economy (Lieberman 2002, 106). Total revenues or even total tax revenues as the alternative denominators tend be more influenced by the political variables than are the shares of GDP (Profeta et al. 2013, 690). I use GDP as a main denominator to standardize the revenue source variables in my analysis, but also present the estimation results for the other two standardization options.

The number of observations available for the different revenue source variables differs greatly. Due to its lower complexity and effort in collecting, data on indirect taxes and, to an even higher extent, on nontax revenues, is available for more years and countries than is data for taxes on personal income. In addition, some countries (e.g. Uganda) have no tax on personal income.

3.2 *Independent Variable of Interest: Type of Dictator*

Turning to the independent variable of interest, I differentiate between a despotic and nondespotic dictator by indicating whether the dictator has the power to decide. According to Slater, despotic power is the range of actions that an individual leader "is empowered to take without routine" (Slater 2003, 81). Due to the sample restriction on autocracies, the variable for the type of dictator can be directly coded. Despotic dictators are operationalized using the indicator *xconst* from the Polity IV dataset (Marshall, Gurr, and Jaggers 2010). Measuring the level of constraint that weighs on the chief executive's decision-making, this indicator runs from 1 to 7, with 1 indicating unlimited authority of the ruler and 7 executive parity. This means that for low indicator values the dictator concentrates all decision-making power within himself and that for higher values, the ruling elite is participating. To code the binary variable *Despotic Dictator*, I consider rulers

with an *xconst* value of 1 and 2 to be despotic following Slater's empirical approach; conversely, nondespotic dictators have values of 3 and above.[11]

T-tests further outline that systematic differences between the two types of dictators exist. Table 2 presents the means for the different revenue sources while distinguishing between the two types. Here despotic dictators tend on average to collect to more taxes on international trade and nontax revenues than their nondespotic counterparts, who rely on a higher share of taxes on personal income and on goods and services. The t-tests show a statistical, systematic difference between the two types in terms of taxes on personal income and nontax revenues, which are in line with the two predictions, further providing a motivation for the regression analysis. Yet, this multivariate analysis can be also seen as preliminary evidence that the type of dictator seems to influence only the two previously mentioned revenue sources.

Table 2: t Tests

	% Taxes on Personal Income	% Taxes on Goods and Services	% Taxes on Int. Trade	% of Nontax Revenues
Mean Despotic Dictator	1.77	4.18	4.72	10.77
Mean Non-despotic Dictator	2.69	4.85	4.68	7.16
Difference between the means	0.92	0.67	-0.35	-3.61
T-statistic	3.97*	1.88	-0.08	-2.74*

Note: Data is based on GSRE, restricted to autocracies based on coding by the Democracy and Dictatorship data set by Cheibub et al. (2010), * indicates the significance with p<0.05.

3.3 *Control Variables*

With regard to the other independent variables, the natural log of real GDP per capita, PPP-adjusted data is included as the variable *ln GDP p. c.* in the equation. The variable is taken from the Penn World Tables by Feenstra et al. (2015). GDP is outlined in the empirical literature as a very, if not the most, important determinant for the revenue collection, since economic development increases the potential tax base (Kenny and Winer 2006). In

11 Choosing a threshold is somewhat arbitrary, and I would have preferred to use a dichotomous variable. Still, the *xconst* indicator seems to capture the concept of a despotic dictator better than other available variables. When testing an alternative threshold value of 3, the results did not change significantly.

addition, economic advancement often fosters improvement in the administrative capacity and infrastructure of the country for collecting different revenues (Tanzi 1992).

As already pointed out by Timmons (2010), finding the right estimation specification in the context of taxation analysis turned out to be challenging for several reasons. First, a wide range of socioeconomic and political control variables are used in the literature, though there is no agreed-upon set of control variables and most of them did not contribute to a considerable increase in the R-square. By including country fixed effects in some estimation specifications, I control for unobserved time-invariant variation across autocracies, thereby trying to reduce some of the omitted variable bias. Second, most of the potential control variables were insignificant in the estimations and their inclusion also led to a high loss of observations due to my paper's focus on autocracies. Therefore, the baseline specifications solely contain a control for GDP, and in the subsequent specifications a set of control variables are introduced.

This set of additional control variables refers to the structure of the national economy. I control for resource-rich countries by the variable *% Natural Resources on GDP*, since rents from natural resources could generate nontax revenue and thereby reduce the pressure on the state to collect tax revenue. The variable *% Tradeopenness on GDP* provided by Feenstra et al. (2015) is also used. The other important socioeconomic characteristics of each autocracy are captured by the following variables: *% ODA on GDP*, *% Urban Population*, *% Age Old Population* and *% Agriculture on GDP*. The latter four variables are drawn from the World Development Indicators(2015).

3.4 *Sample Properties*

The sample refers to the time frame from 1965 to 2003, for which comparable data on revenues for several autocracies is available. In order to balance out annual economic or other fluctuations as well as to mitigate random measurement errors, I use five-year averages of all variables. The last average consists of only four years due to the sample ending in 2003. Overall, we have an unbalanced panel with 335 observations for 81 countries.[12] The list of countries covered is provided in Appendix I. In 188 of these cases (56 percent), a despotic dictator rules the country. Most countries enter the

12 The descriptive statistics are based on the *% Nontax Revenue on GDP* specification in column 4 of Table 4, which includes the highest numbers of countries and observations of all specifications.

sample only for a limited number of periods. On average, each country is part in four out of the eight possible time periods. There are two different reasons for that: First, a country might democratize and consequently no longer be part of the sample, which has occurred in some Latin American and sub-Saharan African countries. Second, though data coverage has improved, there are still gaps. Most autocracies are developing countries, for which missing data remains common. I present in Table 3 the descriptive statistics for all relevant variables.

Table 3: Descriptive Statistics

Variable	**Count**	**Mean**	**SD**	**Min**	**Max**
% Personal Income Tax on GDP	253	2.195	1.988	0.018	10.828
% Taxes on Goods and Services on GDP	306	4.430	3.154	0.050	22.611
% Taxes on International Trade on GDP	316	4.865	4.243	0.131	26.166
% Nontax Revenue on GDP	335	8.178	12.103	0.024	72.335
ln GDP p. c.	335	7.608	0.997	5.530	11.307
% Natural Resources on GDP	332	9.368	17.325	0	103.057
% Tradeopenness on GDP	335	0.508	0.536	0.009	3.912
% ODA on GDP	289	8.136	9.022	-0.022	57.730
% Urban Population	334	3.203	1.416	0.021	8.636
% Agriculture on GDP	276	26.431	16.666	0.140	81.517
% Age Old Population	334	3.379	1.251	1.243	12.990
Subsaharan Africa	335	0.603	0.490	0	1
Europe	335	0.018	0.133	0	1
Middle East	335	0.203	0.403	0	1
Asia	335	0.137	0.345	0	1

Note: Values based on the sample used in Tables 4 and 5.

4 EMPIRICAL ANALYSIS

Relying on the recent empirical research on the revenue structure, my estimations build on two different empirical models. The first model is a pooled OLS regression based on the following equation:

$$\begin{aligned} \textit{Revenue Source}_{it} =& \alpha + \beta \textit{Despotic Dictator}_{it-1} + \gamma X_{it-1} \\ &+ \delta \textit{World Regions}_{it} + \theta_t + \epsilon_{it}, \end{aligned}$$

in which *Revenue Source* is the specific revenue source share on GDP in country i in period t. *Despotic Dictator* refers to the underlying type of ruler and X serves as the vector of all remaining explanatory variables. The *World Regions* include dummy variables for four different regions: sub-Saharan

Africa, Middle East, Europe and Asia, whereby Latin America is the excluded world region category in the estimations.[13] θ indicates the time fixed effects and ϵ the error term. Different OLS estimation models without country fixed effects are primarily used in the literature as the preferred model (see, among others, Escribà-Folch 2009; Garcia and von Haldenwang 2015; Kenny and Winer 2006; Profeta and Scabrosetti 2010; Profeta et al. 2013). Using pooled OLS estimations allows us to focus on cross-country variations and also to compare my estimation results with the established literature.

As the second model, I use a country fixed effects model, which relies on the following estimation equation:

$$Revenue\ Source_{it} = \alpha + \beta Despotic\ Dictator_{it-1} + \gamma X_{it-1} + \varphi_i + \theta_t + \epsilon_{it},$$

where θ referring to the country fixed effect. All remaining parameters of this equation correspond to the ones explained for the pooled OLS estimation equation. With this model I focus on the variation within an autocracy, as some autocracies may have experienced both types of dictators in power during the years under consideration. The time span of 38 years captured in 8 five-year averages suggests that some within-country variation might exist. In the following section, I present the estimation results for both models to show that the findings are robust to the choice of estimation model.

Both models control for time effects, as it is indicated in the individual estimation equations. The time period dummy variables capture any time-related effects, such as trends in fiscal policies, special events and the Cold War. As indicated in the estimation equations, all independent variables are lagged by one time period to reduce reverse causality. Standard errors are clustered at the country level, as the error term might otherwise be serially correlated with the country, leading to imprecise coefficients (Bertrand et al. 2004). I further use Huber-White standard errors to account for the presence of potential heteroscedasticity.

4.1 *Main Results*

The estimation results are shown in Tables 4 – 7. Each table is organized in the following way: I first present the results for the pooled OLS estimations (columns 1 to 4), which are followed by country fixed effects estimations

13 The definition of each world region is based on that of the World Bank (2014), and I coded South Asia together with East Asia and the Pacific as one region, labeled "Asia." I include region dummy variables to account for region-specific developments for the type of dictator and the different revenue sources.

(columns 5 to 8). Table 4 serves as the baseline specification in my analysis. In Tables 4 and 5 the specific revenues sources as the dependent variables are defined with respect to GDP, whereas in Table 6 they are defined with respect to total revenues and in Table 7 with respect to total taxes. Table 5 is the enriched version of the baseline specification in Table 4 due to its inclusion of a set of control variables. In the interpretation of the estimations I discuss only the coefficient for *Despotic Dictator* in order to identify the potential effect of the type of dictator on the specific revenue source. Starting with Table 4, my baseline specification, the estimated coefficient for *Despotic Dictator* in column 1 is negatively statistically significant with the respect to the share of taxes on personal income. This implies that a despotic dictator collects a lower share of this tax source than nondespotic dictators, which is in line with prediction 1. This result is supported by the result in the fixed-effect specification, in which the coefficient in column 5 is also negatively significant. Concerning the share of taxes on goods and services, the coefficient in column 2 has the expected negative sign, though not the significance at the 10 percent level. In the fixed-effect specification in column 6, the coefficient is negatively statistically significant, providing tentative support for prediction 1. When it comes to the share of taxes on international trade, no statistically significant effect at the 10 percent level can be found for either the pooled OLS or the fixed-effects specifications in columns 3 and 7. The part of prediction 2 saying that despotic dictators rely more on taxes collected through international trade than do nondespotic dictators is, therefore, not confirmed by these findings. Despotic dictators can be associated with a higher share of nontax revenues, as the positively statistically significant coefficient in column 4 indicates. The (also significant) coefficient in the fixed-effect specification in column 8 provides additional evidence for that result; consequently, the part of prediction 2 relating to nontax revenues is empirically confirmed.

In Table 5, a set of six control variables is included in the estimations, and the results can be compared to the baseline specifications in Table 4. The lower data availability of the control variables leads to a loss in countries and time periods covered. Yet, the results provide some support for the results listed in Table 4. The expected signs of the coefficients are confirmed and the significant effects are nearly the same, except for the coefficient in column 1. In the case of the tax share of goods and services, the coefficient is statistically significant in the pooled OLS specification in column 2, but not in the fixed-effect specification in column 6, showing again that there seems to be an effect, but that it is not statistically significant in each specification.

Table 4: Baseline Specifications

	(1) % Personal Income Tax on GDP	(2) % Taxes on Goods and Services on GDP	(3) % Taxes on International Trade on GDP	(4) % Nontax Revenue on GDP	(5) % Personal Income Tax on GDP	(6) % Taxes on Goods and Services on GDP	(7) % Taxes on International Trade on GDP	(8) % Nontax Revenue on GDP
Despotic Dictator	-0.750*	-0.730	0.035	2.440*	-0.597**	-0.676*	-0.262	2.746**
	(0.379)	(0.520)	(0.712)	(1.414)	(0.252)	(0.401)	(0.328)	(1.266)
ln GDP p.c.	0.996**	0.305	-0.126	5.241***	0.392	0.608	-0.629	2.370**
	(0.407)	(0.384)	(0.442)	(1.239)	(0.241)	(0.427)	(0.445)	(1.060)
Subsaharan Africa	0.982	-1.707	3.450***	5.576***				
	(0.826)	(1.439)	(0.930)	(2.016)				
Europe	-0.037	7.767**	-0.165	0.187				
	(1.226)	(3.806)	(1.043)	(2.012)				
Middle East	-0.702	-0.854	0.750	15.117***				
	(0.876)	(2.128)	(0.844)	(4.160)				
Asia	-1.125	-2.272	-0.156	5.420**				
	(1.120)	(1.453)	(0.756)	(2.129)				
Constant	-5.312*	4.377	2.508	-36.835***	-0.442	-0.231	11.293***	-11.907
	(2.936)	(3.327)	(4.247)	(11.039)	(1.791)	(3.159)	(3.021)	(7.957)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Observations	253	306	316	335	253	306	316	335
Countries	68	73	75	81	68	73	75	81
R^2	0.250	0.206	0.191	0.481	0.098	0.060	0.077	0.307

Note: Standard errors are clustered at the country level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

Table 5: Baseline Specifications with the Set of Control Variables

	(1) % Personal Income Tax on GDP	(2) % Taxes on Goods and Services on GDP	(3) % Taxes on International Trade on GDP	(4) % Nontax Revenue on GDP	(5) % Personal Income Tax on GDP	(6) % Taxes on Goods and Services on GDP	(7) % Taxes on International Trade on GDP	(8) % Nontax Revenue on GDP
Despotic Dictator	-0.632	-0.957*	0.154	2.602**	-0.560*	-0.453	-0.077	2.572*
	(0.394)	(0.530)	(0.663)	(1.247)	(0.289)	(0.399)	(0.322)	(1.402)
ln GDP p.c.	0.564	-0.224	-1.346	5.151***	0.198	0.267	-0.447	0.084
	(0.549)	(0.599)	(1.286)	(1.568)	(0.675)	(0.656)	(0.649)	(1.549)
% Natural Resources on GDP	-0.001	-0.002	-0.065**	0.118	0.001	0.007	-0.025**	0.076
	(0.010)	(0.021)	(0.029)	(0.101)	(0.015)	(0.021)	(0.012)	(0.056)
% Tradeopenness on GDP	-0.521	-0.818**	1.043	3.513**	-0.105	-0.607	-0.886	2.227
	(0.509)	(0.403)	(1.466)	(1.329)	(0.631)	(0.494)	(0.771)	(2.022)
% ODA on GDP	0.006	0.026	0.015	0.085	0.010	-0.004	0.062**	-0.020
	(0.020)	(0.029)	(0.041)	(0.098)	(0.015)	(0.032)	(0.025)	(0.046)
Population Density	-0.074	0.355	0.098	-1.367**	-0.340	3.968	3.124	-21.173**
	(0.165)	(0.249)	(0.324)	(0.655)	(2.260)	(3.371)	(2.820)	(9.802)
% Agriculture on GDP	-0.042**	-0.044*	-0.110**	0.069	-0.019	0.006	-0.052	-0.030
	(0.020)	(0.024)	(0.050)	(0.072)	(0.025)	(0.038)	(0.033)	(0.063)
% Age Old Population	-0.558**	0.503*	0.232	-1.413	0.178	0.712	0.591*	-1.207
	(0.241)	(0.291)	(0.469)	(0.879)	(0.380)	(0.506)	(0.343)	(1.314)
Subsaharan Africa	1.812**	-3.529	4.405***	1.434				
	(0.736)	(2.359)	(1.241)	(2.504)				
Europe	0.000	0.000	0.000	0.000				
	(0)	(0)	(0)	(0)				
Middle East	-0.185	-3.927	2.133*	12.054***				
	(0.649)	(2.634)	(1.182)	(4.271)				
Asia	0.882	-4.315*	1.087	3.156				
	(0.899)	(2.362)	(1.176)	(2.767)				
Constant	0.473	8.672	15.690*	-34.476**	2.358	-13.758	-5.272	87.823**
	(4.388)	(5.879)	(9.304)	(14.532)	(12.317)	(14.259)	(13.148)	(40.175)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Observations	200	244	249	263	200	244	249	263
Countries	57	62	63	68	57	62	63.000	68
R^2	0.329	0.200	0.293	0.581	0.106	0.016	0.006	0.033

Note: Standard errors are clustered at the country level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

In Table 6, the dependent variables are standardized differently from those in the previous tables to examine the robustness of the results. The shares of the specific revenue sources are calculated with respect to total revenues rather than to GDP. Despite the potential influence on the political variables, using total revenues as the selected denominator enables us to analyze more closely the trade-offs in how the state is financed. These estimations again support the results of the baseline estimations in Table 4. The results show that at least two revenue source shares — the share of taxes on personal income and the share of nontax revenues — are influenced by the type of dictator in power in the predicted directions. In case of the share of taxes on goods and services, no statistically significant link is shown, though the coefficient has the expected sign. The significance of the results does not change when the set of control variables is further included in the estimations. In order to not overload the paper with estimation tables, these estimations are provided in Appendix II.

In the next step, the specific tax sources are calculated as shares with respect to total taxes. Therefore, in these estimations nontax revenues are not considered. For the interpretation of the results please note that the three tax sources together comprise the essential components of total taxes.[14] This means that if a variable leads to a relative higher relevance of one tax source, it must also lead to a decrease of that variable for another tax source. For that reason, the estimation results are more or less comparable to the baseline specifications in Table 4. With respect to the share of taxes on personal income, the coefficient is negatively statistically significant in Table 7 in both the pooled OLS and the fixed-effect specification. This again shows that a despotic dictator can be associated with less revenue from taxes on personal income, which is in line with the results of Table 4 and prediction 1. Concerning the share of taxes on goods and services, the coefficient has the expected negative sign, but does not turn significant at the 10 percent level in either of the two specifications. The statistically significant coefficient in column 3 indicates a positive association of a despotic dictator with the share of taxes on international trade, but it is insignificant in the fixed-effect specification in column 6, which is very weak evidence for prediction 2. When including the set of control variables in the estimations, the results provided in Appendix III are less robust. Solely the coefficient for the share of taxes on personal income remains negatively significant in the fixed-effect specification in column 4, even though the signs of all other coefficients go in the expected direction.

14 Only taxes on corporations and taxes on land and property are further mentioned in this context, but often play a minor role in tax collection.

Table 6: Specifications with Total Revenues as the Denominator

	(1) % Personal Income Tax on REV	(2) % Taxes on Goods and Services on REV	(3) % Taxes on International Trade on REV	(4) % Nontax Revenue on REV	(5) % Personal Income Tax on REV	(6) % Taxes on Goods and Services on REV	(7) % Taxes on International Trade on REV	(8) % Nontax Revenue on REV
Despotic Dictator	-2.647*	-1.843	2.153	6.400*	-3.289***	-1.923	-0.823	5.624**
	(1.527)	(2.520)	(2.407)	(3.574)	(1.075)	(1.742)	(1.664)	(2.489)
ln GDP p.c.	2.172	-3.828**	-5.258***	9.612***	-0.428	-1.778	-5.442***	2.274
	(1.523)	(1.589)	(1.185)	(2.561)	(1.019)	(1.349)	(1.417)	(1.982)
Subsaharan Africa	-1.294	-18.875***	8.115**	11.886***				
	(4.268)	(4.538)	(4.038)	(3.996)				
Europe	-12.229**	-6.612	-7.733*	-0.121				
	(4.852)	(5.850)	(4.318)	(4.768)				
Middle East	-9.250**	-17.096**	-3.090	34.250***				
	(4.289)	(6.718)	(3.823)	(7.842)				
Asia	-8.854*	-15.437***	-3.511	18.839***				
	(4.980)	(4.798)	(4.245)	(6.035)				
Constant	1.437	74.480***	51.486***	-63.041***	14.452*	33.677***	72.662***	11.877
	(11.611)	(14.375)	(10.743)	(20.815)	(7.550)	(9.773)	(10.388)	(15.425)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Observations	304	367	384	406	304	367	384	406
Countries	68	73	75	81	68	73	75	81
R^2	0.189	0.135	0.454	0.469	0.015	0.048	0.351	0.245

Note: Standard errors are clustered at the country level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

Table 7: Specifications with Total Taxes as the Denominator

	(1) % Personal Income Tax on Total Taxes	(2) % Taxes on Goods and Services on Total Taxes	(3) % Taxes on International Trade on Total Taxes	(4) % Personal Income Tax on Total Taxes	(5) % Taxes on Goods and Services on Total Taxes	(6) % Taxes on International Trade on Total Taxes
Despotic Dictator	-2.855*	-1.609	6.176*	-3.232**	-0.281	2.111
	(1.643)	(2.764)	(3.367)	(1.286)	(2.405)	(1.928)
ln GDP p.c.	2.596	-4.169**	0.177	0.157	-1.383	-7.091***
	(1.700)	(1.784)	(2.516)	(0.864)	(2.336)	(1.865)
Subsaharan Africa	0.150	-20.159***	16.375**			
	(5.705)	(5.644)	(6.278)			
Europe	-10.820	0.242	-8.544			
	(6.684)	(6.474)	(7.374)			
Middle East	-7.568	-16.019**	16.031*			
	(5.762)	(7.381)	(8.297)			
Asia	-8.795	-10.794*	1.218			
	(6.691)	(6.037)	(6.528)			
Constant	-1.687	85.357***	11.979	13.151**	35.801**	93.879***
	(14.025)	(16.138)	(20.839)	(6.563)	(16.729)	(13.675)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	No	No	Yes	Yes	Yes
Observations	276	333	345	276	333	345
Countries	68	73	75	68	73	75
R^2	0.179	0.176	0.193	0.024	0.063	0.045

Note: Standard errors are clustered at the country level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

Taken together, the results provide some evidence that despotic dictators tend to collect a smaller share of personal income taxes and a larger share of nontax revenues than their nondespotic counterparts. There is tentative evidence that despotic dictators can be also associated with collecting a smaller share of taxes on goods and services than nondespotic ones. Prediction 1 can be more or less confirmed, while only the part of prediction 2 relating to nontax revenues can be confirmed.

4.2 *Comparison with ICTD Dataset*

In order to further check the robustness of the results, the dependent variables are now based on data from the ICTD dataset. This allows us to demonstrate that the results are not driven by the choice of the revenue dataset. The number of observations for the different estimations is reduced due to the different time ranges and lower coverage of autocracies in this ICTD dataset. Table 8 presents the estimation results using the same estimation set-up so that the results can be compared to my baseline specifications in Table 4. The results confirm the baseline specification results fully. The type of dictator is again linked to the shares of taxes on personal income and nontax revenue. Apart from that, in the two specifications, columns 2 and 6, the coefficient is negatively statistically significant with respect to the share of taxes on goods and services. I rerun the estimations of Table 8 with including the set of control variables to further investigate their robustness. Appendix IV displays the estimations results, which are line in with the baseline results in Table 4.

4.3 *Using Polity to Identify Autocracies*

To identify a country-period as autocratic I rely on a dichotomous differentiation between democracies and autocracies as provided by the Democracy and Dictatorship dataset from Cheibub et al. (2010). To show that the results are not influenced by this measure for autocracies, I rerun the baseline estimations of Table 4 by using the continuous Polity index as the alternative measure for democracy. The Polity index operates on a scale from -10 to $+10$ and therefore primarily measures the degree of openness of political institutions. To distinguish between democratic and nondemocratic coun-

Table 8: Specifications with ICTD Data

	(1) % Personal Income Tax on GDP	(2) % Taxes on Goods and Services on GDP	(3) % Taxes on International Trade on GDP	(4) % Nontax Revenues on GDP	(5) % Personal Income Tax on GDP	(6) % Taxes on Goods and Services on GDP	(7) % Taxes on International Trade on GDP	(8) % Nontax Revenues on GDP
Despotic Dictator	-1.396**	-1.246*	-0.345	2.892**	-0.884*	-1.027*	-0.258	2.492***
	(0.617)	(0.700)	(0.518)	(1.259)	(0.446)	(0.602)	(0.485)	(0.854)
ln GDP p.c.	1.108**	-0.447	-0.363	3.946***	0.452	-0.190	-0.832	2.000**
	(0.497)	(0.397)	(0.438)	(0.921)	(0.563)	(0.544)	(0.545)	(0.772)
Subsaharan Africa	2.166**	-5.286**	2.928***	4.771***				
	(1.005)	(2.259)	(0.788)	(1.683)				
Europe	-1.632**	3.117	0.818	3.489*				
	(0.781)	(4.233)	(0.716)	(1.911)				
Middle East	0.470	-3.049	1.664***	11.316***				
	(0.797)	(2.511)	(0.546)	(2.188)				
Asia	0.000	-4.138*	0.237	2.853**				
	(0)	(2.128)	(0.740)	(1.412)				
Constant	-6.666	10.886**	6.250*	-30.711***	-0.418	7.072	9.576**	-9.073
	(4.013)	(4.241)	(3.553)	(7.810)	(4.437)	(4.270)	(4.175)	(5.944)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Observations	144	205	230	261	144	205	230	261
Countries	47	58	64	66	47	58	64	66
R^2	0.303	0.260	0.132	0.503	0.165	0.031	0.075	0.316

Note: Standard errors are clustered at the country level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

Table 9: Specifications with Polity for Regime Classification

	(1) % Personal Income Tax on GDP	(2) % Taxes on Goods and Services on GDP	(3) % Taxes on International Trade on GDP	(4) % Nontax Revenue on GDP	(5) % Personal Income Tax on GDP	(6) % Taxes on Goods and Services on GDP	(7) % Taxes on International Trade on GDP	(8) % Nontax Revenue on GDP
Despotic Dictator	-0.476	-0.996**	0.573	2.351**	-0.436**	-0.310	-0.332	2.688**
	(0.390)	(0.490)	(0.617)	(1.166)	(0.196)	(0.501)	(0.338)	(1.346)
ln GDP p.c.	0.839**	0.238	0.010	5.533***	0.451*	0.408	-0.412	2.509**
	(0.352)	(0.377)	(0.423)	(1.180)	(0.232)	(0.545)	(0.419)	(1.219)
Subsaharan Africa	0.905	0.137	1.574	5.837***				
	(0.797)	(0.693)	(1.333)	(1.632)				
Europe	0.553	7.915***	-1.222	-0.193				
	(1.483)	(1.391)	(1.418)	(1.610)				
Middle East	-0.505	0.760	-0.658	14.235***				
	(0.755)	(1.573)	(1.425)	(3.708)				
Asia	-1.296	-0.075	-1.363	5.448***				
	(0.832)	(0.711)	(1.301)	(1.642)				
Constant	-4.362	2.815	1.922	-39.725***	-1.148	1.097	9.248***	-13.664
	(2.628)	(3.057)	(3.751)	(10.021)	(1.713)	(4.055)	(2.873)	(9.177)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Observations	250	299	310	325	250	299	310	325
Countries	72	76	79	84	72	76	79	84
R^2	0.240	0.200	0.216	0.518	0.052	0.046	0.104	0.336

Note: Standard errors are clustered at the country level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

tries, countries with scores below 6 are considered to be nondemocratic by the authors of that index.[15] The estimation sample consists of all those country-periods, which are classified as nondemocratic according to their Polity scores. Table 9 presents the results, which support the results of Table 4: The signs have the expected direction and most of the coefficients also have the same level of significance. To go one step further, the set of control variables is included in the estimations; the table with the results is presented in Appendix V. Most of the significances remain and all the coefficients have the expected sign, again in line with baseline specifications. Still, in the specifications with the share of taxes on personal income as the dependent variable, the coefficient is no longer significant.

5 CONCLUSION

Prior studies of the effects of political exchange on the level and the composition of revenues have fostered a debate in the literature about how the existing variances in the revenue data can be explained. This paper contributes to the on-going debate by attempting to understand the differences in the revenue structure under different dictators.

This paper claims that even the citizens are generally excluded from political exchange, and that the degree of political decision-making between the dictator and the ruling elite impacts the compliance of the citizens. I argue that political exchange matters for revenue collection even in the context of autocracies, and I provide some empirical evidence for that. The findings show that nondespotic dictators, who include the ruling elite in their decision-making, tend to collect more taxes on personal income (and arguably taxes on goods and services). Despotic dictators, by contrast, who make their decisions more or less alone, are able to collect more nontax revenues than their nondespotic counterparts.

Placing the findings into a broader context, my empirical results provide support for Escribà-Folch's (2009) findings that in autocracies, the more taxes collected from revenue sources with high compliance requirements, the more political representation is granted. Whereas Escribà-Folch also finds a positive association of taxes on international trade with little or no political representation, my results do not confirm this. Furthermore, the findings of Profeta et al. (2013) and Kenny and Winer (2006) that the de-

15 More precisely, they consider those countries with Polity scores between $+5$ and -5 to be anocracies, and those with scores between -6 and -10 to be totalitarian.

gree of political openness impacts the level of taxes on personal income are supported by my results.

Appendix I: List of Countries

Table 10: List of Countries

Albania	Cyprus (Greek)	Liberia	Saudi Arabia
Angola	Djibouti	Madagascar	Senegal
Bahrain	Ecuador	Malawi	Sierra Leone
Benin	Egypt	Malaysia	Singapore
Bhutan	El Salvador	Mali	South Africa
Bolivia	Equatorial Guinea	Mauritania	South Korea
Botswana	Ethiopia	Mongolia	Spain
Brazil	Fiji	Morocco	Sudan
Bulgaria	Gabon	Mozambique	Swaziland
Burkina Faso	Gambia	Namibia	Syria
Burundi	Guinea	Nepal	Taiwan
Cambodia	Guinea-Bissau	Niger	Tanzania
Cameroon	Hungary	Nigeria	Togo
Cape Verde	Indonesia	Oman	Tunisia
Central African Republic	Iran	Pakistan	Uganda
Chad	Iraq	Panama	Vietnam
Chile	Jordan	Paraguay	Zambia
Comoros	Kenya	Peru	Zimbabwe
Congo (Brazzaville)	Kuwait	Philippines	
Congo (Kinshasa)	Laos	Qatar	
Cote d'Ivoire	Lesotho	Rwanda	

Note: Countries listed are included in the Estimations. Sample based estimations in columns 4 and 8 of Table 4.

Appendix II: Specifications with Total Revenues as the Denominator and the Set of Control Variables

Table 11: Specifications with Total Revenues as the Denominator and the Set of Control Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	% Taxes on Personal Income on Total Revenues	% Taxes on Goods and Services on Total Revenues	% Taxes on International Trade on Total Revenues	% Nontax Revenues on Total Revenues	% Taxes on Personal Income on Total Revenues	% Taxes on Goods and Services on Total Revenues	% Taxes on International Trade on Total Revenues	% Nontax Revenues on Total Revenues
Despotic Dictator	-0.051*	-0.042	0.020	0.110***	-0.023	-0.029	-0.009	0.080**
	(0.027)	(0.030)	(0.024)	(0.033)	(0.023)	(0.029)	(0.024)	(0.032)
ln GDP p.c.	0.004	-0.044	-0.039	0.113***	0.006	-0.018	-0.004	0.029
	(0.026)	(0.035)	(0.032)	(0.035)	(0.021)	(0.045)	(0.026)	(0.034)
% Natural Resources on GDP	0.001	-0.001	-0.002	0.002	0.001	0.001	-0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.001)
% Tradeopenness on GDP	-0.033*	-0.078***	0.007	0.102***	0.021	-0.033	0.015	0.023
	(0.017)	(0.020)	(0.026)	(0.029)	(0.017)	(0.032)	(0.027)	(0.040)
% ODA on GDP	-0.000	0.002	-0.000	0.001	0.000	0.001	0.003**	-0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Population Density	0.008	0.030***	0.008	-0.033**	0.051	0.091	0.310*	-0.160
	(0.011)	(0.011)	(0.010)	(0.013)	(0.101)	(0.193)	(0.171)	(0.191)
% Agriculture on GDP	-0.001	-0.001	0.001	0.005**	-0.000	0.001	0.001	0.001
	(0.001)	(0.002)	(0.002)	(0.003)	(0.001)	(0.003)	(0.002)	(0.002)
% Age Old Population	-0.017	0.003	0.017	-0.026	0.021	-0.000	0.064***	-0.029
	(0.012)	(0.020)	(0.012)	(0.022)	(0.021)	(0.049)	(0.021)	(0.043)
Subsaharan Africa	0.060	-0.278***	0.199***	-0.069				
	(0.057)	(0.046)	(0.045)	(0.071)				
Europe	0.000	0.000	0.000	0.000				
	(0)	(0)	(0)	(0)				
Middle East	-0.030	-0.316***	0.100**	0.250***				
	(0.042)	(0.069)	(0.039)	(0.086)				
Asia	0.000	-0.244***	0.061	0.001				
	(0)	(0.060)	(0.053)	(0.097)				
Constant	0.145	0.788***	0.358	-0.728**	-0.180	0.057	-1.246*	0.467
	(0.259)	(0.289)	(0.254)	(0.345)	(0.474)	(0.755)	(0.730)	(0.646)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Observations	123	172	183	209	123	172	183	209
Countries	43	53	56	58	43	53	56	58
R^2	0.326	0.266	0.527	0.598	0.000	0.071	0.001	0.011

Note: Standard errors are clustered at the country level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

Appendix III: Specifications with Total Taxes as the Denominator and the Set of Control Variables

Table 12: Specifications with Total Taxes as the Denominator and the Set of Control Variables

	(1) % Personal Income Tax on Total Taxes	(2) % Taxes on Goods and Services on Total Taxes	(3) % Taxes on International Trade on Total Taxes	(4) % Personal Income Tax on Total Taxes	(5) % Taxes on Goods and Services on Total Taxes	(6) % Taxes on International Trade on Total Taxes
Despotic Dictator	-2.406	-2.504	5.261	-3.936**	0.453	2.235
	(1.619)	(2.521)	(3.530)	(1.614)	(2.431)	(2.036)
ln GDP p.c.	2.575	-1.858	7.330	1.920	-2.620	-4.914
	(1.719)	(3.023)	(4.672)	(1.988)	(3.645)	(3.013)
% Natural Resources on GDP	-0.010	0.042	-0.111	-0.030	0.091	-0.067
	(0.041)	(0.095)	(0.091)	(0.071)	(0.100)	(0.065)
% Tradeopenness on GDP	-1.951	-5.758*	0.143	3.702	2.239	-3.293
	(2.247)	(2.934)	(4.459)	(3.338)	(3.708)	(3.324)
% ODA on GDP	0.020	0.217	0.308*	0.045	-0.088	0.194
	(0.090)	(0.140)	(0.175)	(0.065)	(0.190)	(0.170)
Population Density	-1.073	1.532	1.543	4.096	4.481	11.418
	(0.743)	(1.320)	(1.936)	(4.514)	(11.603)	(14.915)
% Agriculture on GDP	-0.060	0.007	0.239	0.078	0.111	0.035
	(0.067)	(0.124)	(0.161)	(0.069)	(0.173)	(0.155)
% Age Old Population	-3.229***	0.951	-3.041	-2.859	0.549	3.086
	(1.049)	(1.558)	(2.476)	(1.878)	(3.285)	(2.419)
Subsaharan Africa	0.882	-30.076***	21.432**			
	(4.559)	(6.972)	(8.901)			
Europe	0.000	0.000	0.000			
	(0)	(0)	(0)			
Middle East	-5.898	-31.173***	23.257**			
	(4.252)	(7.497)	(9.773)			
Asia	-1.904	-24.245***	1.938			
	(5.268)	(7.544)	(9.600)			
Constant	13.505	60.157**	-50.636	-5.439	33.782	7.612
	(14.716)	(26.128)	(35.945)	(18.340)	(55.590)	(66.533)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	No	No	Yes	Yes	Yes
Observations	217	266	273	217	266	273
Countries	57	62	63	57	62	63
R^2	0.311	0.255	0.283	0.013	0.057	0.013

Note: Standard errors are clustered at the country level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

Table 13: Specifications with ICTD Data and the Set of Control Variables

	(1) % Personal Income Tax on GDP	(2) % Taxes on Goods and Services on GDP	(3) % Taxes on International Trade on GDP	(4) % Nontax Revenues on GDP	(5) % Personal Income Tax on GDP	(6) % Taxes on Goods and Services on GDP	(7) % Taxes on International Trade on GDP	(8) % Nontax Revenues on GDP
Despotic Dictator	-1.691**	-1.031	0.106	2.143**	-0.605*	-0.629	0.010	2.881***
	(0.673)	(0.644)	(0.650)	(1.039)	(0.349)	(0.470)	(0.448)	(1.075)
ln GDP p.c.	0.099	-0.982	-2.024	3.916**	-0.333	-0.519	-0.337	1.305
	(0.677)	(0.622)	(1.871)	(1.594)	(0.584)	(0.806)	(0.800)	(1.311)
% Natural Resources on GDP	0.013	-0.024	-0.048	0.076	0.030**	0.024	-0.008	0.016
	(0.022)	(0.035)	(0.041)	(0.082)	(0.012)	(0.029)	(0.022)	(0.045)
% Tradeopenness on GDP	0.095	-0.596	1.182	2.978***	0.321	-0.944*	-0.043	-0.840
	(0.455)	(0.452)	(1.151)	(0.856)	(0.496)	(0.556)	(0.647)	(1.021)
% ODA on GDP	-0.031	0.008	-0.038	0.023	0.000	-0.017	0.066**	0.017
	(0.026)	(0.030)	(0.049)	(0.049)	(0.018)	(0.025)	(0.029)	(0.045)
Population Density	0.315	0.180	-0.178	-0.809**	-1.295	2.182	4.365	-5.628
	(0.248)	(0.244)	(0.282)	(0.349)	(2.574)	(3.895)	(5.225)	(5.388)
% Agriculture on GDP	-0.047	-0.070**	-0.098	0.109	-0.031	-0.005	-0.011	-0.042
	(0.035)	(0.030)	(0.085)	(0.081)	(0.034)	(0.040)	(0.043)	(0.062)
% Age Old Population	-0.171	0.253	0.816	-0.879	0.280	0.330	0.333	-1.094
	(0.351)	(0.402)	(0.613)	(0.763)	(0.388)	(0.885)	(0.616)	(1.308)
Subsaharan Africa	2.295*	-6.551***	5.583***	-1.093				
	(1.309)	(0.945)	(1.822)	(2.157)				
Europe	0.000	0.000	0.000	0.000				
	(0)	(0)	(0)	(0)				
Middle East	-0.060	-5.698***	4.499***	7.316***				
	(0.934)	(1.360)	(1.433)	(2.711)				
Asia	0.000	-5.677***	2.962*	-1.380				
	(0)	(0.985)	(1.537)	(2.677)				
Constant	1.561	18.120***	16.508	-23.720*	9.347	0.441	-11.956	17.577
	(6.072)	(5.035)	(13.326)	(12.998)	(13.749)	(15.397)	(25.235)	(17.189)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Observations	125	175	189	214	125	175	189	214
Countries	43	53	57	59	43	53	57	59
R^2	0.371	0.273	0.252	0.546	0.042	0.016	0.001	0.015

Note: Standard errors are clustered at the country level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

Appendix V: Specifications with Polity for Regime Classification and Set of Control Variables

Table 14: Specifications with Polity for Regime Classification and Set of Control Variables

	(1) % Personal Income Tax on GDP	(2) % Taxes on Goods and Services on GDP	(3) % Taxes on International Trade on GDP	(4) % Nontax Revenue on GDP	(5) % Personal Income Tax on GDP	(6) % Taxes on Goods and Services on GDP	(7) % Taxes on International Trade on GDP	(8) % Nontax Revenue on GDP
Despotic Dictator	-0.576	-1.049**	0.562	2.300**	-0.369	-0.196	-0.121	2.685*
	(0.490)	(0.523)	(0.575)	(1.078)	(0.221)	(0.387)	(0.335)	(1.449)
ln GDP p.c.	0.502	-0.245	-0.513	5.877***	0.678	-0.676	0.158	-0.790
	(0.421)	(0.628)	(0.691)	(1.670)	(0.608)	(0.727)	(0.818)	(2.272)
% Natural Resources on GDP	0.003	-0.007	-0.041*	0.101	-0.004	0.001	-0.020*	0.103
	(0.008)	(0.021)	(0.025)	(0.091)	(0.017)	(0.026)	(0.011)	(0.066)
% Tradeopenness on GDP	-0.440	-0.887**	0.368	3.004***	0.008	-1.128**	-1.127	1.094
	(0.404)	(0.366)	(0.998)	(1.112)	(0.613)	(0.558)	(0.799)	(1.541)
% ODA on GDP	0.005	0.018	0.018	0.041	0.025*	-0.011	0.065***	-0.027
	(0.016)	(0.030)	(0.025)	(0.054)	(0.013)	(0.023)	(0.024)	(0.057)
Population Density	-0.125	0.358	0.113	-1.306**	1.811	4.594	2.136	-16.670
	(0.110)	(0.215)	(0.205)	(0.592)	(1.540)	(2.805)	(2.741)	(10.469)
% Agriculture on GDP	-0.032**	-0.051**	-0.055**	0.087	-0.002	-0.022	-0.027	-0.063
	(0.014)	(0.024)	(0.025)	(0.064)	(0.019)	(0.033)	(0.030)	(0.057)
% Age Old Population	-0.376**	0.320	0.335	-1.696*	0.098	0.754	0.295	-0.318
	(0.178)	(0.280)	(0.331)	(0.875)	(0.341)	(0.540)	(0.391)	(1.264)
Subsaharan Africa	0.388	0.115	0.594	4.349**				
	(1.026)	(1.032)	(1.671)	(1.887)				
Europe	-1.107	2.625*	-0.814	3.702				
	(1.041)	(1.465)	(1.989)	(3.185)				
Middle East	-1.262	-0.475	-1.240	13.426***				
	(0.902)	(1.626)	(1.716)	(3.658)				
Asia	-0.882	-0.362	-2.465	6.266**				
	(0.899)	(1.099)	(1.742)	(2.413)				
Constant	1.182	5.857	6.711	-36.878**	-8.085	-8.297	-6.585	77.399*
	(3.289)	(5.361)	(4.958)	(14.150)	(7.643)	(11.292)	(13.746)	(41.560)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Observations	196	237	244	255	196	237	244	255
Countries	61	66	67	71	61	66	67	71
R^2	0.320	0.157	0.286	0.619	0.051	0.024	0.011	0.034

Note: Standard errors are clustered at the country level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

How do Authoritarian Regimes React to Income Shocks?*

Estimating the Wintrobe Model of Tinpot Behavior

1 INCOME SHOCKS AS DRIVERS OF CHANGE WITHIN REGIMES AND AS TRIGGERS OF REGIME CHANGE

Some countries that started out poor and authoritarian about 200 years ago have managed to end up being rich and democratic. What is the role of income shocks in the long-run relationship between per capita income levels and the degree of democracy? How do authoritarian regimes react to positive and negative income shocks? We argue that the Wintrobe model of a tinpot dictator (1990, 1998) provides an answer that appears to complement recent empirical studies on the correlation between per capita income and the degree of democracy (or the level of repression).

The main innovation of the new empirical literature is to apply instrumental variables estimation[1] in order to account for the possible reverse causality from changes in regime behavior to income growth, while less emphasis is given to the modeling of regime behavior. Changes in regime behavior may refer to political and economic measures of repression and liberalization. For instance, Pitlik (2008) uses GMM estimation and reports that negative growth shocks are not conducive to economic liberalization in autocracies. Dorsch et al. (2015) suggest that negative economic shocks are associated with a higher likelihood of mass protests that may be reduced by granting

* This paper is written together with Erich Gundlach from the Department of Economics, University of Hamburg and GIGA German Institute of Global and Area Studies. The authors thank the participants of the ECPS 2015 and the Jour Fixe in January 2015 for their helpful comments.

1 Miguel et al. (2004) is the seminal paper in the field. It introduced rainfall variation as an instrument for income shocks and found that negative shocks increase the likelihood of civil conflict.

more economic liberties. Burke and Leigh (2010) find that negative income shocks can foster the transition to democracy while positive shocks tend to stabilize nondemocratic regimes, a result which Brückner and Ciccone (2011) also confirm using different instrumental variables.

A *negative* correlation between income shocks and the degree of democracy (or the level of repression) seems to be at odds with modernization theory (Lipset 1959), which claims that democracy, like many other socioeconomic variables, is a function of the level of income. That is, the new empirical literature endorses the view that the observed positive cross-country correlation between the degree of democracy and the level of income is nothing but a spurious relation (Przeworski et al. 2000, Acemoglu et al. 2008). Applying extreme bound analysis to assess alternative determinants of democratization, Gassebner et al. (2013) accordingly conclude that the *growth rate* of per capita income tends to have a robust negative effect on transitions to democracy while the *level* of per capita income tends to have a robust positive relationship with the survival of democracy but no robust effect at all in terms of its emergence.

Our argument is that the recent empirical studies overlook the potential link between income shocks and changes in the level of repression *within* existing authoritarian regimes. The formal modeling of the behavior of such regimes in response to economic shocks has not received much attention in the economics literature, at least when compared to the modeling of regime change. The Wintrobe (1990,1998) model of a tinpot dictatorship can be considered the seminal contribution in the field. Olson (1993) is a related contribution and distinguishes between a "roving" and a "stationary" bandit, where the latter is considered to be a dictator who may use his monopoly over power to provide public goods with the aim of extending the time horizon of his tenure in office. More recent contributions to this literature include Bar-El (2009), Desai et al. (2009), Guttman and Reuveny (2012) and Li and Gilli (2014).

The Wintrobe model implies that strong, sustained economic performance may allow a tinpot dictator to stay in office with very little repression and, eventually, to hold and win a reasonably free and fair election. Thus, accumulated *positive* income shocks may drive a gradual change toward democracy within authoritarian regimes. Repression is the distinctive mode of authoritarian governance, but loyalty can also be used to build and maintain political power over the population. Hence, an enforced regime change that is triggered by a *negative* income shock, as emphasized by the recent empirical literature, may not be the only path to achieving a less autocratic

society in the long run. To receive a more complete picture, empirical studies will have to disentangle the short-run effects of negative income shocks from the long-run effect of accumulated positive income shocks.

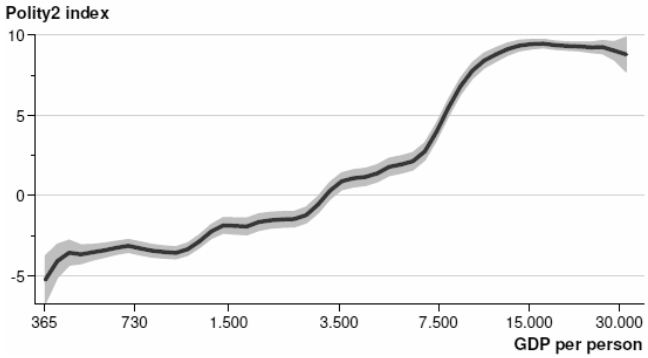
To the best of our knowledge, the Wintrobe model has only been brought to the data by Islam and Winer (2004), who used changes in the combined indices of political rights and civil liberties from Freedom House to identify changes in the behavior of tinpot regimes in response to economic shocks. They report empirical support for the predicted pattern in the case of negative income shocks, but not in the case of positive income shocks. With longer time series and richer data sets that also include measures of repression, improved estimates of the Wintrobe model may be considered as a complement to the present empirical literature, which focuses on the effect of negative income shocks on regime changes.

As a point of reference, the next section provides a brief summary of the correlation between income levels and the degree of democracy. Section 3 introduces the Wintrobe model. Section 4 describes our panel data set, which uses the coding by Geddes et al. (2014a) to identify autocratic regimes and regime changes so that our sample excludes both democracies and observations for years in which an individual regime was toppled. We use alternative specifications that have been employed in the recent literature to identify income shocks and changes in regime behavior, with our preferred specification taken from Dorsch et al. (2015). Section 5 presents our empirical results, which are based on changes in the level of repression exerted by authoritarian regimes in response to positive and negative income shocks. Changes in the level of repression are proxied by changes in the Political Terror Scale (PTS) index (Gibney et al. 2012). We find tentative empirical support for the effects of negative and positive income shocks on the behavior of authoritarian regimes as predicted by the Wintrobe model. As robustness tests, we use measures of civil and economic liberties and get results that are broadly in line with our PTS results for political repression. Section 6 tentatively concludes that within-regime changes in response to income shocks should be taken into account for an improved understanding of the long-run interaction between political and economic development.

2 INCOME AND DEMOCRACY REDUX

Figure 1 provides some stylized facts on the relationship between income and democracy. It summarizes the raw data on the relationship between the level of per capita income as measured by (log) GDP per person in

constant international dollars (Feenstra et al. (2015)and Maddison Project: van Zanden 2013) and the degree of democracy as measured by the Polity2 index (Polity IV: Marshall et al. (2014). It shows a kernel regression with a bandwidth of 0.10 and a confidence level of 95 percent, which is based on an unbalanced cross-country panel data set for 1950–2010. The sample includes 144 countries with a total of 6,886 observations, where former and present OPEC countries as well as countries with an average per capita income level of less than $ 1 per day are excluded.



Kernel Function with 95% Confidence Interval.
Note: Annual cross-country data in 1950–2010; 6886 observations, 144 countries. No former and present OPEC countries, no countries with less than $ 1 per day. Constant international $ (log scale). Epanechnikov kernel, bandwith 0.10, degree 0.
Source: Maddison Project: `http://www.ggdc.net/maddison/maddison-project/home.htm`
Politiy IV: `http://www.systemicpeace.org/politiyproject.html`

Figure 1: The Degree of Democracy and the Level of Income, 1950–2010

On average, there appears to be a fairly robust nonlinear relationship between income and democracy. Initially, the relation is flat, but beyond an income level of approximately $ 3,500 the degree of democracy starts to rise; it then gains momentum beyond an income level of $ 7,500. This suggests that negative income shocks as such are not sufficient to explain the pattern of the aggregate data: doing so with the pattern shown in Figure 1 would imply that negative income shocks have the strongest effect on the degree of democracy in the income interval between $ 7,500 and $ 15,000.

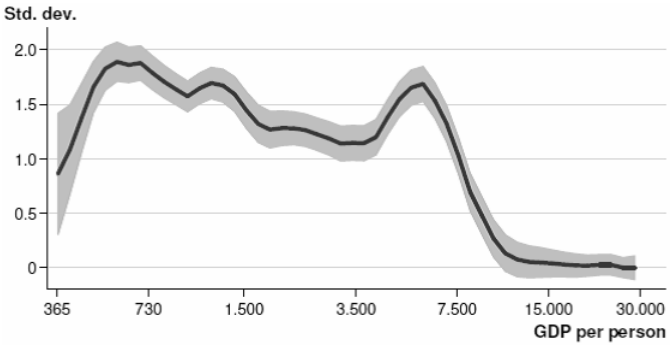
The problem with the "window of opportunity" hypothesis as advanced by Brückner and Ciccone (2011) is that we should see much higher levels of democracy in Africa just because there have always been transitory negative income shocks due to variations in rainfall that affect agricultural production. Hence, many windows of opportunity will have arisen over time. However, since there has not been so much accumulation of democracy in relatively poor countries, there must have been mean reversion in the form of authoritarian backlash.

This is not to deny that severe negative income shocks may in fact open up a democratic window of opportunity by forcing the incumbent regime to give up. But it appears that a regime change toward democracy in response to a negative income shock may not be enduring and may instead be followed by a return to authoritarian rule. A successful transition to persistent democracy may occur if and only if a certain (threshold) level of income has been reached. Negative income shocks that take place below such a critical income level apparently do not have sustainable effects on the occurrence of autocracy.

What may matter for *persistent* transitions toward democracy could be a substantial deviation of actual GDP from potential GDP, especially once a certain level of income has been reached (Paldam and Gundlach 2008). Such a GDP gap may be enlarged beyond a critical size by a recession (a negative shock), which in turn may generate a revolution and trigger a regime change toward democracy. But if there is no relevant gap between actual and potential GDP to begin with, as is the case if the incumbent authoritarian regime is able to build on the loyalty of its population, a transitory negative income shock will not generate a window of opportunity to begin with.

While the short-run relationship between income and democracy is indeed difficult to predict, some recent studies claim that there is a positive long-run effect of the level of income on the degree of democracy (e.g., Gundlach and Paldam 2009a, Benhabib et al. 2011, Barro 2012, Treisman 2014, and Murtin and Wacziarg 2014), in contrast to the hypothesis of a spurious correlation. The transition to a persistent democratic regime may in fact result when a negative income shock hits an autocratic regime that has a level of income high enough to guarantee the survival of democracy. But as long as such a critical income level has not been reached, a negative income shock may not trigger a persistent transition to democracy. Positive income shocks at low levels of per capita income seemingly stabilize autocratic regimes. However, they may actually generate the necessary preconditions for a persistent transition to democracy when such a transition is later triggered by a negative income shock at an income level beyond a critical threshold.

Figure 2 shows a kernel regression for the standard deviation of the degree of democracy that refers to the same data as in Figure 1. The standard deviation is calculated as a 10-year forward-moving average. As before, there appears to be robust evidence of a nonlinear relationship. The standard deviation of the degree of democracy substantially declines beyond an income level of $ 7,500 and falls to zero at an income level higher than $ 15,000.



Kernel Function with 95% Confidence Interval.
Note: Annual cross-country data in 1950–2010; 6886 observations, 144 countries. No former and present OPEC countries, no countries with less than $ 1 per day. Moving standard deviation (10-year forward window) vs. level of GDP per person. Constant international $ (log scale). Epanechnikov kernel, bandwith 0.10, degree 0.
Source: Maddison Project: `http://www.ggdc.net/maddison/maddison-project/home.htm`
Politiy IV: `http://www.systemicpeace.org/politiyproject.html`

Figure 2: Standard Deviation of the Degree of Democracy, 1950–2010

Overall, the aggregate evidence is compatible with the view that negative income shocks may trigger short-run regime changes over a broad income range. But negative shocks apparently do not trigger a persistent transition to democracy below income levels of approximately $ 7,500 when the standard deviation of the degree of democracy remains high. Above this income level, democratic regimes are unlikely to suffer from autocratic backlashes. The Wintrobe tinpot model may help to bridge the apparent gap between recent empirical results that emphasize either negative income shocks or long-run positive growth as determinants of declining levels of repression (or an increase in the degree of democracy).

3 THE WINTROBE MODEL OF TINPOT BEHAVIOR[2]

In Wintrobe (1990, 1998), the tinpot dictator uses only as much repression as is necessary to remain in office and otherwise uses his monopoly over power to maximize his personal wealth and consumption. According to the model, a tinpot dictator will respond to a negative income shock with *more* repression (that is, a lower degree of democracy) and to a positive income shock of the same absolute size with relatively less repression (that is, more democracy).[3]

2 For a more detailed discussion, see the original contributions by Wintrobe (1990, 1998) or Islam and Winer (2004).

3 Wintrobe (1998) distinguishes between totalitarian dictatorships, which unconditionally seek to maximize power, and tinpot dictatorships (nontotalitarian autocratic regimes), which seek to maintain just enough power to remain in office and otherwise use their monopoly position for personal enrichment. Examples of totalitarian regimes according

Changing the level of repression is the tinpot's default mode of governance in reaction to short-run economic shocks. In addition, the tinpot may generate loyalty to his regime by distributing political rents, but such a strategy only works over a longer time span. In any case, there is a trade-off between the two instruments that the tinpot uses to remain in power: both "repression" and "loyalty" use up resources that the tinpot may wish to use for himself, and since the level of repression exerted by a tinpot regime will affect the supply of loyalty from the citizenry, finding the optimal combination of the two inputs for remaining in power is more complex than a standard microeconomic framework suggests.

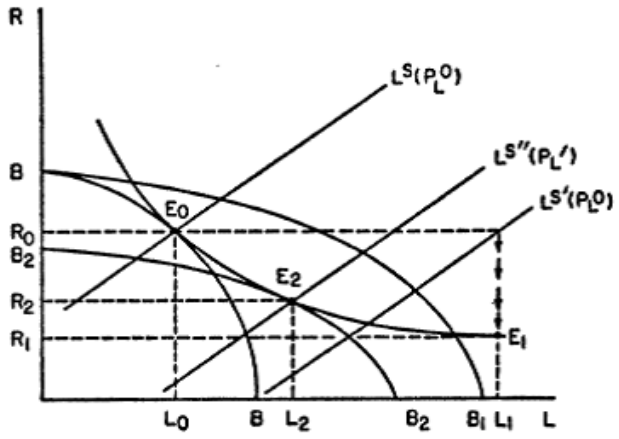
When comparing the effects of negative and positive income shocks on tinpot behavior, Wintrobe identifies an asymmetric effect. This means that an income shock of a given size generates a relatively larger change in repression if the shock is negative rather than positive. Put differently, a positive income shock is predicted to reduce the level of repression by less than a negative income shock of the same size increases repression.

The reason for the asymmetry is the diminishing rate of substitution between loyalty and repression. The problem is that even in the long run, the policy alternatives *repression* and *loyalty* cannot be considered complete substitutes. This is because the supply of loyalty depends on the level of repression and vice versa. A negative economic shock forces the tinpot to increase the level of repression to stay in office and it simultaneously reduces the supply of loyalty, whereas a positive income shock increases the supply of loyalty such that the tinpot can keep his level of power and remain in office with a relatively smaller decline in repression.

Wintrobe (1990, 1998) derives this reasoning from a simple diagram, which demonstrates the tinpot's optimization problem with an isoquant and a nonlinear budget constraint (Figure 3). The isoquant reflects the minimum level of power that is needed for the tinpot to stay in office. The budget constraint represents the tinpot's resource costs for staying in office — that is, his expenditures on *repression* and *loyalty* — where the nonlinearity results from the dependence of *loyalty* on the level of *repression*.

An initial equilibrium is given by point E_0, where the isoquant π_{min} is tangential to the nonlinear budget constraint BB and both curves intersect with the supply of loyalty from the citizenry L^S. If the tinpot regime is credited with a positive economic shock, the supply of loyalty increases —

to Wintrobe's concept include Nazi Germany and Communist dictatorships; at present, North Korea appears to be the only comparable totalitarian dictatorship.



Source: Wintrobe (1990, p. 859); Wintrobe (1998, p. 54).

Figure 3: A Positive Income Shock Triggers a Within-Regime Fall in Repression

that is, L^S shifts to the right to become $L^{S'}$ — which generates an excess of loyalty of $L_1 - L_0$.

Since the tinpot aims to minimize the costs of staying in office, his short-run reaction to a positive economic shock (to an excess of loyalty) is to reduce repression from R_0 to R_1; hence, the new short-run equilibrium is at E_1. However, this equilibrium is not stable because the excess loyalty gives the tinpot an incentive to pay less attention to the generation of loyalty than before, which implies that the relative price of loyalty P_L/P_R tends to fall. This has two consequences: $L^{S'}$ partially shifts back to $L^{S''}$ and the slope of the budget constraint changes to BB_1.

Due to the fall in the relative price of loyalty, the new long-run equilibrium must lie to the right of E_0. It can be found by making a parallel inward shift of the new budget constraint BB_1 until a tangential point with the unchanged isoquant π_{min} is reached. As Figure 3 is drawn, this is point E_2 on B_2B_2. Hence, a positive economic shock unambiguously induces a tinpot dictator to reduce the level of political repression: in the short run from R_0 to R_1 and in the long run to R_2. This result suggests that with persistent economic success that the citizens credit to the regime, a tinpot dictator may eventually reduce political repression to levels that allow for political competition and open elections.

The effect of a negative income shock on the behavior of a tinpot dictator can be discussed along the same lines. The difference from the previous case is that the tinpot has to match the corresponding *fall* in the supply of loyalty with a relatively stronger increase in repression in order to stay in office, especially in the short run. As can be seen from Figure 3, the reason for such an outcome is that the new short-run equilibrium will be

somewhere to the left of E_0 — that is, it will be unambiguously located somewhere on the steeper part of π_{min} — whereas a positive income shock results in a new equilibrium on the flatter part of π_{min} to the right of E_0. Taken together, the Wintrobe model of a tinpot dictatorship predicts the following:

H1 *A positive economic shock will decrease the level of repression.*

H2 *A negative economic shock will increase the level of repression.*

H3 *The responses to an economic shock will be asymmetric: repression will increase by more in response to a negative shock than it will fall in response to a positive shock of the same absolute size.*

4 SPECIFICATIONS OF THE EMPIRICAL MODEL AND DATA

We estimate the presumed effects of economic shocks on changes in the level of repression exerted by a tinpot dictatorship with a country-fixed effects specification

$$\text{Change in Repression} = \alpha\, \text{Economic Shock}_{it-1} + \beta_i + \epsilon_{it},$$

where *Change in Repression* refers to an increase or a decrease of repression in country i in period t and *Economic Shock* refers to a one-period lagged change in per capita income; β represents the country-fixed effect and ϵ represents the white-noise error term. Except for the dependent variable, this specification follows the basic specification used by Burke and Leigh (2010).

Our measure of the change in the level of repression is based on the Political Terror Scale (PTS) index by Gibney et al. (2012). Ranging from 1 (no terror) to 5 (terror affecting the entire population), this index identifies violations by the state of what is called the "physical integrity of individuals" along the three dimensions scope, intensity and range. Such violations may consist of extrajudicial killings, torture, disappearances and political imprisonment. The coding of the PTS index is based on annual country reports on human rights by Amnesty International (AI).[4]

Also in line with the main specification of Burke and Leigh (2010), we split our dependent variable into two binary variables and allow for a time lag

4 There is a second PTS index available from Gibney et al. (2012), which is based on reports on human rights practices from the US State Department. Neumayer (2005) suggests that the AI-based PTS index is preferable.

between the occurrence of the economic shock and the within-regime reaction. An *Increase in Repression* is defined as a one-point or higher rise in the PTS index over three years; hence, a *Decrease in Repression* is defined as a one-point or higher fall in the PTS index over three years. The one-point change threshold is somewhat arbitrary, but since the PTS index is restricted to a four-point scale without decimals, a lower threshold is not possible and as part of our robustness checks we find that a two-point cutoff point does not change our results.

Our explanatory variable, economic shocks, is based on a PPP-adjusted measure of GDP per capita (*rgdpe*) from the Penn World Table 8.0 (Feenstra et al. 2013). We consider two alternative specifications of an economic shock, both of which have been used in the previous literature. One is the annual growth rate of GDP per capita, which serves as a good indicator of significant and broad changes in the national economy. Substantial changes in the annual growth matter for both economic and political reasons, if only because there will be an impact on government revenues.

Following (Dorsch et al. 2015, 14), our main measure of an economic show is a binary truncated growth variable, which is meant to isolate positive from negative income shocks. For instance, the variable *Neg Trunc Shock* captures a negative economic shock as

$$\mathrm{NegTruncShock}_{it} = \begin{cases} -1 * \mathrm{Growth}_{it} & \text{if } \mathrm{Growth}_{it} \leqslant 0 \\ 0 & \text{if } \mathrm{Growth}_{it} > 0; \end{cases}$$

hence, a positive economic shock as captured by the variable *Pos Trunc Shock* follows as

$$\mathrm{PosTruncShock}_{it} = \begin{cases} \mathrm{Growth}_{it} & \text{if } \mathrm{Growth}_{it} \geqslant 0 \\ 0 & \text{if } \mathrm{Growth}_{it} < 0. \end{cases}$$

Our sample is restricted to autocracies, according to the definition by Geddes et al. (2014a). Included are all political regimes where the government rules by undemocratic means, steps into power by undemocratic means, or changes the rules of governance such that political competition, as in upcoming elections, is significantly restricted. Since we are only interested in within-regime changes in behavior, we exclude from our sample all country-

year observations in time t and $t-1$ in which a regime breakdown occurs. Based on the coding of Geddes et al. (2014a), regime breakdowns may result in transitions to democracy or to another autocratic regime or to foreign interventions or civil wars.

One question that arises in the context of the Wintrobe model is whether our sample countries include totalitarian dictatorships rather than tinpot dictatorships. Using the Polity IV index of autocracy, we find that Swaziland and Saudi Arabia are rated the most autocratic countries in our sample. These countries may not be considered as totalitarian dictatorships comparable to Nazi Germany or Communist dictatorships, so we maintain the hypothesis that our sample includes tinpot dictatorships.

The unbalanced panel data set for our main specifications with the PTS index as the measure of repression includes 90 countries and covers the years 1979–2010, with 1541 observations for the baseline regressions in Table 2. Appendix I lists the countries included in our baseline regressions. An increase in repression (as defined) is observed for 338 cases (21.93 percent of all observations); a decrease in repression is observed in 286 cases (23.95 percent). Only two sample countries, Turkey and Venezuela, did not experience any changes in their repression level. More descriptive statistics of our sample data are provided in Table 1.

Table 1: Descriptive Statistics

Variable	**Mean**	**SD**	**Min**	**Max**	**Count**
Main Specification					
Decrease in Repression (PTS)	0.239	0.427	0	1	1541
Increase in Repression (PTS)	0.219	0.414	0	1	1541
Negative Truncated Shock (PWT)	0.017	0.051	0	0.665	1541
Positive Truncated Shock (PWT)	0.061	0.090	0	1.641	1541
Ann. growth rate of GDP per capita (PWT)	0.044	0.113	-0.665	1.641	1541
Robustness checks					
Decrease in Repression (PTS, 2p cut-off)	0.026	0.159	0	1	1541
Increase in Repression (PTS, 2p cut-off)	0.038	0.190	0	1	1541
Decrease in Repression (CIRI)	0.140	0.347	0	1	1257
Increase in Repression (CIRI)	0.174	0.379	0	1	1257
Decrease in Civil Liberties (FH)	0.154	0.361	0	1	1541
Increase in Civil Liberties (FH)	0.206	0.405	0	1	1541
Decrease in Economic Liberties (EFW)	0.026	0.158	0	1	196
Increase in Economic Liberties (EFW)	0.117	0.323	0	1	196

Note: Main specification refers to the sample used in Table 2.

Due to our binary dependent variables, a linear probability specification with country-fixed effects is used as the main workhorse for our regression analysis. This empirical model has been the standard approach in the recent literature, including Burke and Leigh (2010). The linear probability specification allows for the inclusion of fixed effects, which is not possible with a probit model. The alternative logit specification allows for fixed effects, but the estimation drops countries or regimes without changes in the level of repression over time. The advantage of logit and probit models is that they model the probability of an event as a nonlinear cumulative distribution function, which is more realistic than the linear functional form implied by a linear probability model. We nevertheless focus on the linear probability model because it allows for the inclusion of country-fixed effects and a simpler interpretation of the estimated coefficients.

Our estimates, reported in the next section, control for standard errors that are clustered at the country level in order to avoid downwardly biased standard errors. We do not explicitly address the problem of reverse causality, which should be mitigated because our explanatory variable, the economic shock, is lagged by one time period relative to the observed change in the measure of repression.

5 EMPIRICAL RESULTS

Table 2 presents the estimation results for the linear probability model. In four of the six specifications of Table 2, the estimated coefficients are statistically significantly different from zero at the 10 percent level, and all estimated coefficients come with the expected sign. For instance, columns 1 and 2 refer to a specification with a negative truncated shock (*Neg Trunc Shock*). The negative coefficient in column 1 implies that a negative economic shock reduces the probability of a decrease in repression. The positive coefficient in column 2 implies that a negative economic shock increases the probability of an increase in repression. These results are in line with the prediction of the Wintrobe model of a tinpot dictatorship.

Columns 3 and 4 refer to a specification with a positive truncated shock. The positive coefficient in column 3 implies that a positive economic shock increases the probability of a decrease in repression. The negative coefficient in column 4 implies that a positive economic shock reduces the probability of an increase in repression. Columns 5 and 6 refer to the specification where the economic shock is proxied by the lagged growth rate of GDP per capita. In line with the results of the other specifications, we find that

Table 2: Baseline Linear Probabilty Specification with Country-Fixed Effects (PTS)

	Decrease Repression	**Increase Repression**	**Decrease Repression**	**Increase Repression**	**Decrease Repression**	**Increase Repression**
Neg Trunc Shock	-0.375*	0.498*				
	(0.215)	(0.295)				
Pos Trunc Shock			0.270**	-0.169		
			(0.123)	(0.171)		
GDP Growth Rate					0.236**	-0.199
					(0.010)	(0.143)
Constant	0.246***	0.211***	0.223***	0.230***	0.229***	0.228***
	(0.004)	(0.005)	(0.008)	(0.010)	(0.004)	(0.006)
Adj.-R^2	0.001	0.003	0.002	0.001	0.003	0.002
Countries	90	90	90	90	90	90
Observations	1541	1541	1541	1541	1541	1541

Note: Linear Probability Estimations with country-fixed effects, standard errors are clustered at the country-level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

a positive shock increases the probability of a decrease in repression and decreases the probability of an increase in repression.

In Table 3, we report results for logit specifications instead of linear probability specifications. Often, logit specifications are the preferred functional form for samples with a binary dependent variable. One drawback is that depending on the specification of country- and year-fixed effects and depending on the variation in the split dependent variable, one loses observations with zero variation through the logit transformation. This also explains the differences in the number of observations in tables 2 and 3. Otherwise the results reported in Table 3 support the results reported in Table 2: the expected signs of the estimated coefficients are confirmed and the level of statistical significance is about the same.

Table 3: Fixed-Effects Logit Specification with Country-Fixed Effects (PTS)

	Decrease Repression	**Increase Repression**	**Decrease Repression**	**Increase Repression**	**Decrease Repression**	**Increase Repression**
Neg Trunc Shock	-2.537*	2.571**				
	(1.511)	(1.161)				
Pos Trunc Shock			1.299**	-1.135		
			(0.656)	(0.851)		
GDP Growth Rate					1.236**	-1.261**
					(0.540)	(0.616)
Pseudo R^2	0.002	0.004	0.003	0.002	0.004	0.003
Countries	84	78	84	78	84	78
Observations	1500	1457	1500	1457	1500	1457

Note: Logit Estimations with country-fixed effects without regressions constant, standard errors are clustered at the country-level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

As mentioned above, using a one-point change in the PTS index (over three years) as a threshold for changes in repression may seem somewhat arbitrary. Therefore, we rerun the regressions reported in Table 2 with a two-

point or higher change in the PTS index as the cutoff point (again with country-fixed effects). Table 4 shows that the general pattern of the results is not affected by the higher cutoff point, but since the variation in the dependent variables decreases substantially (see Table 1), it is no surprise that most coefficients are estimated with large standard errors. Moreover, one could argue that a two-point change in repression is not necessarily linked to an unforeseen short-run economic shock but rather to events that signal a regime change, which will not be appropriately captured by our approach.

Table 4: Linear Probabilty Specification with Alternative Threshold (PTS)

	Decrease Repression	**Increase Repression**	**Decrease Repression**	**Increase Repression**	**Decrease Repression**	**Increase Repression**
Neg Trunc Shock	-0.060	0.135				
	(0.085)	(0.101)				
Pos Trunc Shock			0.125	-0.094*		
			(0.111)	(0.056)		
GDP Growth Rate					0.088	-0.083*
					(0.077)	(0.045)
Constant	0.027***	0.035***	0.018***	0.043***	0.022***	0.041***
	(0.001)	(0.002)	(0.007)	(0.003)	(0.003)	(0.002)
Adj.-R^2	-0.000	0.001	0.004	0.001	0.003	0.002
Countries	90	90	90	90	90	90
Observations	1541	1541	1541	1541	1541	1541

Note: Linear Probability Estimations with country-fixed effects, standard errors are clustered at the country-level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

We also consider whether our measure of repression influences the estimation results. The Physical Integrity Rights index (CIRI) by Cingranelli and Richards (2010) is an obvious alternative to the PTS index. The CIRI index runs from 0 (no government respect) to 8 (full government respect), indicating the degree of political repression in reverse order compared to the PTS index. The CIRI index starts five years later (in 1984) than the PTS index and it covers a slightly different country sample. But since both indices rely on a related conceptual framework and are, therefore, strongly correlated (correlation coefficient: -0.68 for 1257 observations), one should expect estimation results like the ones in Table 2 if the CIRI index is rescaled like the PTS index.

Since the CIRI index has a range that is approximately twice the range of the PTS index, we use a two-point or higher change as the cutoff point when defining the binary variables *Decrease in Repression* and *Increase in Repression* for the CIRI index. Table 5 shows the estimation results for the linear probability specifications with country-fixed effects, which can be compared to the results in Table 2. Somewhat surprisingly in light of the relatively strong correlation between the PTS and the CIRI index, all estimated coefficients turn out to be statistically insignificant and in the specifications with a pos-

itive shock the coefficients have the "wrong" sign. It remains to be seen which individual observations are driving the different results in tables 2 and 5.

Table 5: Linear Probability Specifications with CIRI Index

	Decrease Repression	**Increase Repression**	**Decrease Repression**	**Increase Repression**	**Decrease Repression**	**Increase Repression**
Neg Trunc Shock	-0.104	0.104				
	(0.141)	(0.209)				
Pos Trunc Shock			-0.049	-0.0418		
			(0.101)	(0.134)		
GDP Growth Rate					-0.007	-0.046
					(0.080)	(0.105)
Constant	0.142***	0.172***	0.143***	0.177***	0.140***	0.176***
	(0.002)	(0.004)	(0.006)	(0.008)	(0.004)	(0.005)
Adj.-R^2	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Countries	87	87	87	87	87	87
Observations	1257	1257	1257	1257	1257	1257

Note: Linear Probability Estimations with country-fixed effects, standard errors are clustered at the country-level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

Repression might take other forms than the actions captured by the PTS and the CIRI indices. An alternative category of repression refers to civil liberty rights (e.g., Davenport 2004). These forms of repression typically target the entire population and usually include restrictions on the freedom of expression and belief and on the freedom of association and assembly. In line with recent empirical studies of repression, we use the Civil Liberties index from Freedom House (2014) to examine whether and how tinpot dictatorships use this form of repression in response to economic shocks.[5] The Civil Liberties index has a scale from 1 (highest degree of freedom) to 7 (lowest degree of freedom). A one-point or higher change in the index is used to construct the two variables *Decrease Civil Lib* and *Increase Civil Lib*.

Table 6 presents the estimation results, which can be compared to the linear probability specifications with country-fixed effects reported in Table 2. In column 1, the coefficient for the specification with a negative truncated growth shock is positive, which implies that a negative income shock increases the probability of a decrease in civil liberties, which is in line with the estimate in column 1 of Table 2. Apart from the coefficient in column 6, all other coefficients are not statistically significant at the 10 percent level, but all coefficients have the expected signs matching those in Table 2. A positive interpretation of this finding would be that alternative measures of

5 For example, Frantz and Kendall-Taylor (2014), Escribà-Folch (2013), and Neumayer (2005). Islam and Winer (2004) also base their empirical study on Freedom House data to capture the degree of freedom (which they see as a complement to the degree of repression), but they use an average of the Civil Liberties index and the Political Rights index (the so-called Gastil index).

political repression tend to confirm the predictions of the Wintrobe model, notwithstanding the relatively large standard errors of the estimated coefficients.

Table 6: Linear Probability Specifications with FH Measures of Civil Liberties

	Decrease Civil Lib	**Increase Civil Lib**	**Decrease Civil Lib**	**Increase Civil Lib**	**Decrease Civil Lib**	**Increase Civil Lib**
Neg Trunc Shock	0.505*	-0.162				
	(0.255)	(0.179)				
Pos Trunc Shock			-0.130	0.133		
			(0.083)	(0.142)		
GDP Growth Rate					-0.176**	0.112
					(0.082)	(0.106)
Constant	0.145***	0.209***	0.162***	0.198***	0.162***	0.201***
	(0.004)	(0.003)	(0.005)	(0.009)	(0.004)	(0.005)
Adj.-R^2	0.004	-0.000	0.000	0.000	0.003	0.000
Countries	90	90	90	90	90	90
Observations	1541	1541	1541	1541	1541	1541

Note: Linear Probability Estimations with country-fixed effects, standard errors are clustered at the country-level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

In addition to our measures of political repression, we also look at a measure of economic restrictions that has been used in the recent literature — namely, the Economic Freedom of the World (EFW) index by the Fraser Institute (Gwartney et al. 2014). The EFW index runs from 0 (not free) to 10 (totally free) and represents an average measure of five main policy areas: size of government; security of property rights; sound money and price stability; freedom to exchange with foreigners; and regulation of credit, labor and business. Due to its high level of aggregation, observed changes in the EFW index occur on a rather small scale. Therefore, a 0.5-point or higher change in the index is used to construct the two variables *Decrease Economic Lib* and *Increase Economic Lib*. A major drawback of the EFW index is its limited time dimension: continuous annual data are only available for those years after 2000.

Table 7 reports the estimation results with the EFW index as a measure of (denied) economic liberties, which can again be compared to Table 2's linear probability specifications with country-fixed effects. The coefficients in columns 1 and 2 with the specification of a negative economic shock have the expected signs. A negative shock increases the probability of a decrease in economic liberties and decreases the probability of an increase in economic liberties. The specifications with a positive economic shock produce the expected sign for the coefficient only for the probability of an increase in economic liberties (column 4); the coefficient in column 3 has the wrong sign.

Table 7: Linear Probability Specifications with EFW Measures of Economic Lib

	Decrease Economic Lib	Increase Economic Lib	Decrease Economic Lib	Increase Economic Lib	Decrease Economic Lib	Increase Economic Lib
Neg Trunc Shock	0.0866	-0.490*				
	(0.150)	(0.243)				
Pos Trunc Shock			0.170	0.926*		
			(0.438)	(0.502)		
GDP Growth Rate					0.0966	0.645*
					(0.300)	(0.341)
Constant	0.0245***	0.123***	0.0130	0.0493	0.0195	0.0772***
	(0.00168)	(0.00273)	(0.0321)	(0.0368)	(0.0186)	(0.0212)
Adj.-R^2	-0.005	-0.002	0.003	0.060	-0.001	0.045
Countries	27	27	27	27	27	27
Observations	196	196	196	196	196	196

Note: Linear Probability Estimations with country-fixed effects, standard errors are clustered at the country-level and are in parentheses, *** p<0.01,** p<0.05 and * p<0.1.

This pattern repeats itself in columns 5 and 6, where the lagged annual growth rate serves to identify the short-run economic shocks. The coefficient in column 5 does not have the expected sign. The coefficient in column 6 implies that a positive economic shock will increase the probability of an increase in economic liberties and, correspondingly, that a negative shock will decrease the probability of an increase in economic liberties. The latter result is in line with results reported by Pitlik (2008) for nondemocracies, which are also based on the EFW index and annual growth rates of per capita income. Overall, our results for the EFW are less robust than the PTS results in Table 2, but they are also broadly in line with the predictions of the Wintrobe model.

6 CONCLUSION

Negative income shocks appear to be correlated with the probability of regime change toward democracy, as a number of recent empirical studies document. This result is intuitively plausible, but it generates a puzzle: if negative income shocks trigger a transition to democracy, how can one explain the fairly robust long-run relationship between the level of per capita income and the degree of democracy, which has also been documented by a number of recent empirical studies?

Our hypothesis is that short-run economic shocks may trigger not only regime changes but also within-regime changes in political behavior. Such within-regime changes are considered by the Wintrobe (1990, 1998) model of tinpot dictatorship. The model predicts that a tinpot dictator will respond with more repression to a negative income shock and with less repression to a positive income shock. Empirical support for the Wintrobe model would

allow for the possibility that what may contribute to the stabilization of an autocratic regime in the short run — namely, a positive income shock — may turn out to be the precondition for a transition toward democracy, which may be triggered by a later negative income shock once a certain level of income has been reached.

Our empirical results provide tentative support for the Wintrobe model in the sense that various specifications of alternative empirical models produce regression coefficients that have the predicted sign. This result appears to hold across alternative functional forms and across alternative measures of political repression. However, the statistical significance of the estimated regression coefficients is usually not better than 10 percent and is sometimes missing, which appears to reflect the rather limited variation in the available measures of political repression.

Further research is certainly needed to confirm the robustness of our tentative results. For instance, it would be interesting to see if the size of the estimated coefficients predicts a plausible range of changes in political repression in response to economic shocks. In addition, it remains to be seen whether the estimated coefficients confirm the Wintrobe model's prediction that positive and negative income shocks of the same size will have asymmetric effects on changes in repression and liberties.

Appendix I: List of Countries

Table 8: List of Countries

Albania[1]	Ethiopia[1]	Malaysia[2]	South Africa[1]
Angola[1]	Gabon[1]	Mali[1]	Sri Lanka[1]
Argentina	Gambia[1]	Mauritania[1]	Sudan[1]
Armenia[1]	Georgia[1]	Mexico[1]	Swaziland[1]
Azerbaijan[1]	Ghana[1]	Morocco[2]	Syria[2]
Bangladesh[1]	Guatemala[1]	Mozambique[1]	Taiwan[1]
Belarus[1]	Guinea[1]	Namibia[2]	Tajikistan[1]
Benin[1]	Guinea-Bissau[1]	Nepal[2]	Tanzania[2]
Brazil[1]	Hungary[1]	Niger[1]	Thailand[1]
Bulgaria[1]	Indonesia[1]	Nigeria[1]	Togo[2]
Burkina Faso[1]	Iran[2]	Pakistan[2]	Tunisia[2]
Burundi[1]	Iraq[1]	Paraguay[1]	Turkey
Cambodia[1]	Jordan[2]	Peru[1]	Turkmenistan[1]
Cameroon[2]	Kazakhstan[1]	Philippines[1]	Uganda[2]
Central African Republic[2]	Kenya[1]	Poland[1]	Uruguay
Chad[2]	Korea South[1]	Romania[1]	Uzbekistan[1]
Chile[1]	Kuwait[2]	Russia[2]	Venezuela[2]
China[2]	Kyrgyz Republic[1]	Rwanda[2]	Vietnam[1]
Congo Brazzaville[2]	Laos[1]	Saudi Arabia[1]	Yemen[1]
Congo Kinshasa[2]	Lesotho[1]	Senegal[1]	Zambia[2]
Cote d'Ivoire[2]	Liberia[1]	Serbia[1]	Zimbabwe[2]
Egypt[2]	Madagascar[1]	Sierra Leone[1]	
El Salvador[1]	Malawi[1]	Singapore[2]	

Note: All countries listed are included the estimations in Tables 2, 3, 4 and 6. Countries with [1] are further part of the estimations in Table 5 and countries with [2] can be found in all Tables and estimations.

Dictators Under Stress*

The Dilemma of Authoritarian Responses to Mass Crises

1 INTRODUCTION

Dictators are exposed to an inherent threat of losing power (e.g., Tullock 1987; Wintrobe 1998). If they are ousted, they face exile, jail, or even death, in addition to losing their privileges. There are two different domestic threats to a dictator's rule. The first emanates from the dictator's direct support base, the ruling elite (Bueno De Mesquita et al. 2003; Haber 2006; Magaloni 2008; Svolik 2009). The second arises from grievances voiced by ordinary citizens, the masses (Acemoglu and Robinson 2006; Boix 2003; Smith 2008). Both groups of authoritarian subjects have various means to express their discontent. If they do so vociferously, moments of political crises arise. Elite or mass crises thus constitute critical situations for dictators as they indicate vanishing political support and are likely to solicit a political reaction.

While the existing literature tends to analyze elite and mass crises separately (e.g., Guttman and Reuveny 2012; Powell 2012; Svolik 2012; Ulfelder 2005), we argue that mass and elite crises are intimately linked. Incorporating both types of threat in one sequential game, we show that when a dictator responds to mass crises with deterrence, his ruling elite may react by staging a coup d'état. This is because elite members fear that a dicta-

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tor might become too powerful once the crisis is over. A dictator's reaction to mass crises can thus propel the very outcome he is trying to prevent — however, not due to a mass revolution, but instead an elite-based overthrow. These sequential reactions by a dictator and the ruling elite present a crucial dilemma in terms of how authoritarian leaders respond to mass crises. Our paper addresses this dilemma and identifies the conditions under which dictators are trapped in it.

Our argument is two pronged. First, considering that protesting masses can in most instances be contained by repression (Wintrobe 1998) or bought off by the distribution of public goods (Smith 2008), unrest among the masses hardly imperils the dictator's rule. As a matter of fact, mass demonstrations that result in the overthrow of a dictator are extremely rare (Goemans et al. 2009). The real danger during mass crises stems from the ruling elite, as some members might exploit the tense situation to challenge the dictator's rule. Specifically, popular unrest gives members of the ruling elite an incentive to defect and place themselves at the head of the mass movement in order to topple the dictator (Tullock 2005, 293). Akin to a deterrence game (e.g., Dixit 1980; Epstein and Zemsky 1995; Spence 1977), discouraging a challenger entry requires bold and costly political dictatorial action, showing force and signaling strength to any potential defector. This reaction signals that the dictator is here to stay despite ongoing mass contention. However, this reaction comes at a high cost, and thus not every dictator possesses the power to undertake it. This is why initial reactions will differ depending on the type of dictator.

The second part of our argument concerns the ruling elite. A dictator's reaction affects not only potential challengers but also the ruling elite as a whole, since there is the risk that the dictator may use deterrence as an opportunity to launch a "power grab" (Svolik 2009, 478). A power grab curtails the influence of the ruling elite by taking power away from them. For instance, the restriction of civil liberties (e.g., the freedom of expression, the associational rights, the rule of law) during a mass crisis leads elite members to fear that once the uprising is over, these measures could be turned against them and render the ruler too powerful. Crucially, the ruling elite's interpretation of the dictator's reaction depends on their incorporation in the decision-making process. Close linkages between the dictator and core elite figures significantly reduce information asymmetries. If, however, the ruling elite lacks information about the dictator's actions and plans, there is a real risk that the elite will come to believe that the dictator wants to initiate a power grab. If this risk is large enough and the dictator is weak, elite members may decide to launch a coup. Conversely, if the ruling elite

is involved in the decision-making process and privy to the dictator's deterrence strategy, it is unlikely that the elite members are concerned about a potential power grab.

We employ a two-step model to analyze the interaction between the dictator and the ruling elite in the wake of a mass crisis. Our sequential game makes apparent the diametrically opposed concerns of both players: the ruling elite fears a power grab, while the dictator worries about challenger entry. Differentiating rulers along the two dimensions of infrastructural and personal power, we identify four different types of dictator and the reactions of their respective political elites.

The formal model implies that dictators who either possess extensive infrastructural power (strong dictators) or exclude elite members from the decision-making process (despotic dictators) respond to mass crisis with deterrence. While the likelihood of coups is low for strong dictators, despotic dictators who do not hold enough infrastructural power to enforce decisions (despotic and weak dictators) face a crucial dilemma: they risk being ousted by their own ruling elite should they use deterrence to prevent a challenger entry. To test the predictions of our model, we estimate a number of logit regressions with a sample of 412 observations between 1973 and 2004. By showing that strong and collective (whose who involves their elites in decision making) dictators expose themselves to a heightened coup risk by reacting to mass uprisings, the results corroborate our claim regarding the intimate linkage of mass and elite crises.

The remainder of the paper proceeds as follows: Section 2 presents our formal model in several steps, outlining the setup, notation, and equilibria of the game. In Section 3 we test the predictions of our theoretical model by using two different pooled, cross-sectional logit estimations. Section 4 concludes and highlights the wider implications of this paper for the debate on dictators' survival strategies.

2 FORMAL MODEL

Our model consists of two players, the dictator and the ruling elite. The game is sequential and models a situation in which a mass crisis occurs in $t = 0$, the dictator moves in $t = 1$, and the ruling elite reacts in $t = 2$. In the following we first outline the general set of our formal model, before showing the specific patterns of behavior with respect to different types of dictators.

The dictator holds the monopoly of political power (Wintrobe 1998, 4) but depends on the support and compliance of the ruling elite to survive.[1] In our model, we differentiate between infrastructural and personal power (Slater 2003). We normalize both types of power to 1. Here, p denotes the dictator's share of infrastructural power, while 1–p represents the ruling elite's share. Michael Mann (2014, 59) defines infrastructural power as "the institutional capacity of a central state, despotic or not, to penetrate its territories and logistically implement decisions." If the dictator has the capacity to effectively implement his policies, he possesses high infrastructural power. To simplify, we refer to theses dictatorships as *strong* dictators. A strong dictator's infrastructural power is greater than or at least equal to $p = 0.5$, while a *weak* dictator's infrastructural power is less than 0.5.

In addition to infrastructural power, personal power — defined as the extent a dictator relies on other individuals or groups to make decisions — represents the second power dimension. Operationalizing personal power with the parameter z, we can divide the dictators into two camps: collective dictators ($z < 0.5$) and despotic dictators ($z \geqslant 0.5$). Due to their low personal power, collective dictators consult the ruling elites and share information with them when it comes to decision making. Such dictators cannot decide alone. By contrast, despotic dictators exclude their ruling elites in most cases of decision making.

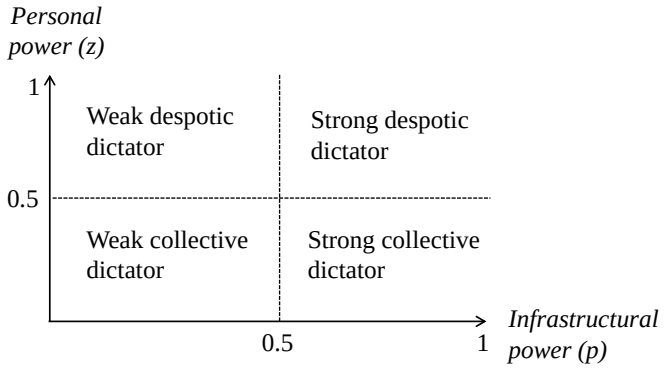

Figure 1: Matrix of Dictators

1 The ruling elite constitutes a small group that shares control over the key political and economic institutions with the dictator; however, the key decision power remains in the hands of the dictator. To keep the ruling elite loyal, the dictator provides private benefits to its members and partly includes them in his decision-making processes (Svolik 2009, 480). This concept has some links to the idea of the winning coalition as part of the selectorate theory by Bueno De Mesquita et al. (2003).

By combining the two power dimensions of infrastructural power (*weak* vs. *strong*) and personal power (*collective* vs. *despotic*), four types of dictators can be established as shown in Figure 1.

THE OCCURRENCE OF A MASS CRISIS IN T=0 A mass crisis occurs in $t = 0$ when there is widespread discontent among ordinary citizens with the dictator's policies, expressed through demonstrations, riots, or strikes. For our analysis, mass crises are conceptualized as exogenous shocks that affect the dictator and the ruling elite. This external event in $t = 0$ increases the risk that a challenger from within the ruling elite will emerge in $t = 1$ and together with the masses openly defy the dictator. The masses might be able to overthrow the dictator in a revolution under certain conditions;[2] however, the real danger in moments of mass crisis emanates from the ruling elite, as individuals from this group might exploit the situation. If a challenger from the ruling elite enters the game, the dictator is exposed to the risk of losing power. Note that challenger entry is conceptually different from a coup. Whilst the latter represents collective action on the part of the ruling elite with the objective of deposing the dictator, challenger entry is the defection from the ruling elite of an individual who has decided to support the revolting masses and, potentially, become their leader.[3]

THE DICTATOR'S DECISION IN T=1 Facing a potential challenger entry, the dictator can choose between two actions in $t = 1$: deter or not deter. Depending on the type of dictator, deterrence entails some costs. For instance, deterrence in the form of restricting civil liberties is costly as it generally meets strong resistance in the context of a tense political environment. As a result, the dictator faces the cost of deterrence given by $c = \frac{1}{(1+p)^2}\epsilon(0.25, 1)$. This assumption ensures that a dictator with a high level of infrastructural power faces lower deterrence costs, with costs ranging from 0.25 for a strong dictator (with $p = 1$) to 1 for a weak dictator (with $p = 0$). Consequently, weak and strong dictators have different incentive structures with regard to deciding whether to deter or not.

2 In the public choice literature, there is an ongoing debate about the so-called paradox of revolution (Tullock 1971) — that is, how and when the masses in a dictatorship are capable of carrying out a successful revolution. Kuran (1991), Bueno De Mesquita and Smith (2010), and Shadmehr and Bernhardt (2011) assume that the masses are not capable of toppling a dictator, whereas Acemoglu and Robinson (2006), Svolik (2012), and Boix and Svolik (2013) define specific conditions for a successful revolution.

3 Our idea of challenger entry is similar to Reuter and Gandhi's (2010) concept of elite defection.

The challenger only considers entering in the case of nondeterrence, which is interpreted as a signal of dictator weakness. Observing nondeterrence, the challenger thus enters with probability $\alpha \in (0, 1)$, which is exogenous and nonobservable for the dictator. In the case of a challenger entry, the dictator incurs a loss of $e \in (0, 1)$. As the dictator can only lose his existing share of power, the loss from challenger entry (e) is therefore smaller than or equal to p. With probability $1 - \alpha$, the challenger does not enter, and thus the dictator suffers no loss of power. The key point here is that the dictator is uncertain about the likelihood of a challenger's entry. In deciding on a possible reaction, the dictator weighs the cost of deterrence against the risk of a challenger entry. Both aspects entail the risk of losing power and can be viewed as trade-offs.

THE RULING ELITE'S REACTION IN T=2 Following the dictator's decision, the ruling elite can choose whether to stage a coup against the dictator or remain loyal in $t = 2$. If a coup is launched and succeeds, the elite will obtain all power and the dictator's power will be reduced to $p = 0$. Conversely, if the coup fails, the elite will be stripped of all privileges and power. By remaining loyal, the elite will maintain their power share (1–p). Following Svolik (2012, 64), the chances of a coup being successful depend on the balance of infrastructural power between the dictator and his ruling elite: the more power the ruling elite holds relative to the dictator, the greater the likelihood that the coup will be successful. This is because in that context the ruling elite has a higher capacity to enforce their policies. Coups thus succeed with probability $1 - p$, but fail with probability p. Opportunity costs of organizing the coup instead of generating income reduce the payoff for the ruling elite. These costs are influenced by the degree of infrastructural power the respective ruling elite holds. Parameter $l = \frac{1}{(2-p)^2} \in (0.25, 1)$ represents the costs. This equation implies that the costs of the coup decrease the larger the infrastructural power of the ruling elite is. This relationship also guarantees that launching a coup will always entail costs.

The timing of events can be summarized as follows:

1. Nature determines the degree of personal power of the dictator.
2. A mass crisis occurs in $t = 0$.
3. After considering his infrastructural power and the risk of a challenger entry, the dictator decides whether to deter or not in $t = 1$. In the case of nondeterrence, a challenger entry may occur and this could result in

the dictator being toppled by the challenger together with the masses, thus putting an end to the game.[4]

4. The ruling elite may react to the dictator's deterrence strategy by launching a coup if they fear deterrence measures are being used to disguise a power grab in $t = 2$. The less infrastructural power a dictator has, the greater the chances for the ruling elite to successfully overthrow the dictator.

2.2 *Collective Dictators*

If the dictator's degree of personal power (z) is less than 0.5, which is the case with a collective dictator, the ruling elite is involved in the dictator's decision making. This means that almost all information is equally shared between the dictator and his ruling elite. Figure 2 illustrates how the game unfolds, presenting the four possible outcomes and the respective payoffs for the collective dictator and the ruling elite.

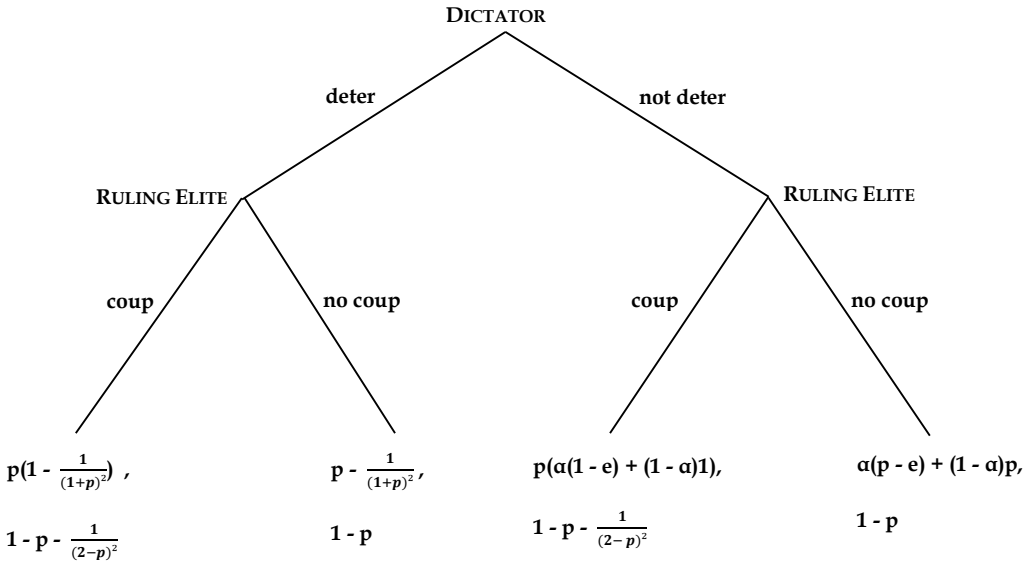

Figure 2: Collective Dictator

The dictator's payoff functions are determined by the costs of deterrence, the loss from challenger entry, and the loss from a coup with respect to the dictator's power (p). All these parameters affect the dictator's power and therefore influence his preferred outcomes. For a collective dictator, the payoff for deciding to deter is $p(1-\frac{1}{(1+p)^2})$ if the ruling elite stages a coup

4 In our analysis we do not further analyze the dynamics when a challenger entry takes place. We assume that the dictator wants to avoid such a situation and incorporate the risk of such a challenger in the dictator's payoff function.

and $p - \frac{1}{(1+p)^2}$ if the ruling elite remains loyal.[5] The payoff for the dictator in the event that the ruling elite launches a coup is lower than the payoff in the event that the ruling elite remains loyal. This is because the dictator's preferences take into account the fact that the coup might be successful and thereby reduce his payoff to zero. As a challenger entry can only occur if the dictator does not deter, the probability and the ensuing loss need to be included in the payoff functions for nondeterrence. Consequently, the payoff function is $p(\alpha(1-e) + (1-\alpha))$ if the ruling elite stages a coup and $\alpha(p-e) + (1-\alpha)p$ if no coup ensues. The payoff functions for the ruling elite are derived in a manner similar to those for the dictator: $1-p-\frac{1}{(2-p)^2}$ if the ruling elite launches a coup (as the costs for the coup needs to be included in the payoff function) and $1-p$ if the elite does not launch a coup (as no costs for a coup need to be considered).

Considering that this is an extensive form game with complete information, we use backward induction to eliminate noncredible threats and to identify equilibrium strategies. Starting with the final player (i.e., the ruling elite), one can easily see by comparing the two payoff functions that

$$1-p-\frac{1}{(2-p)^2} < 1-p, \tag{1}$$

which is why the ruling elite strictly prefers not to launch a coup, irrespective of the dictator's action.[6] Given that the ruling elite is privy to the decision making of a collective dictator, deterrence does not entail the risk of a power grab.

Moving up one level, we compare the dictator's payoff after deterrence and nondeterrence given the ruling elite's unwillingness to stage a coup. Simplifying the resulting equation leads to equation (2):

$$\begin{aligned} p-\frac{1}{(1+p)^2} &= \alpha(p-e) + (1-\alpha)p \\ \frac{1}{(1+p)^2} &= \alpha e. \end{aligned} \tag{2}$$

Equation (2) shows that a collective dictator compares the cost of deterrence with the risk-weighted loss from challenger entry. If the cost of deterrence

5 The payoff of the dictator facing a coup after deterrence can also be denoted as $(1-p)0 + p(1-)$ on the very left side of Figure 2, where $1-p$ relates to the possibility of a successful coup leading to the dictator's removal.

6 Even if coups could be carried out at zero cost, a risk-averse ruling elite can be assumed to prefer the status quo — that is, to not launch a coup.

exceeds the anticipated loss ($\frac{1}{(1+p)^2} > \alpha e$), the dictator chooses not to deter. Conversely, if $\frac{1}{(1+p)^2} < \alpha e$ holds, the dictator deters.

Having identified the general equilibrium for a collective dictator and his ruling elite, we now analyze whether equilibria are different for a weak collective dictator versus a strong collective dictator. All weak dictators are characterized by a share of power (p) below 0.5. Inserting possible values for p in $\frac{1}{(1+p)^2}$, the cost of deterrence ranges from 1 to 0.45 for the respective power values of 0 and 0.49. We also know that the loss from a challenger entry (e) has to be smaller or equal to p. The loss from a challenger entry would be $\alpha e = 0$ if $e = p = 0$, and $\alpha e = 0.49$ for $e = p = 0.49$ if $\alpha = 1$. Since uncertainty about the entry of challengers is in most cases a plausible assumption, values for α below 1 seem to be more realistic. If α is smaller than 0.9, the loss from challenger entry would be lower than the cost of deterrence — for example, if $\alpha = 0.9$ and $e = 0.49$, $0.44 < 0.45$ for $p = 0.49$. Plotting this relationship with $\alpha = 0.8$ and $p = e$ in Figure 3, we can see that for a weak collective dictator with p below 0.5, the cost of deterrence exceeds the probability-calculated loss from a challenger entry.

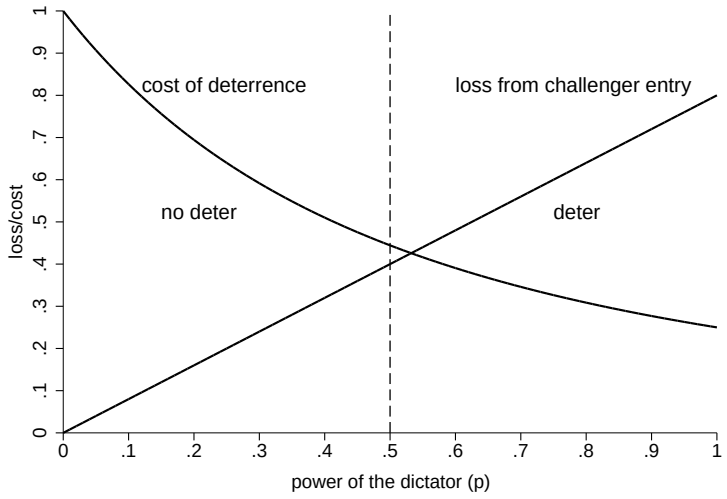

Figure 3: Comparative Statics: Collective Dictator

As a consequence, a weak collective dictator will very likely choose not to deter. This yields proposition 1:

Propostion 1 *A weak collective dictator is likely not to deter and the ruling elite remains loyal.*

Does a strong collective dictator also prefer not to deter? The power of a strong collective dictator is equal to or greater than 0.5. The cost of deterrence from equation (1) decreases as a dictator's power increases, reaching from 0.44 for $p = 0.5$ to 0.25 for $p = 1$. The loss from challenger entry is larger for the strong collective dictator than for the weak collective dicta-

tor as e runs from 0.5 to 1, assuming that $e = p$. By comparing the cost of deterrence with the loss from challenger entry, $0.44 < 0.5$ if $p = 0.5$ and $\alpha = 1$, the strong collective dictator deters. As Figure 3 shows, for a value of $\alpha = 0.8$ and all p-values above 0.53, a strong collective dictator will opt for deterrence. For $0.5 < p < 0.54$, the dictator will choose not to deter as the loss from challenger entry is smaller than the cost of deterrence. The turning point for the dictator's decision on whether or not to deter is shaped by the likelihood of challenger entry. In the case of $\alpha = 1$, the turning point is at $p = 0.47$; for $\alpha = 0.8$, at $p = 0.54$; and for $\alpha = 0.6$, at $p = 0.62$. However, as power increases, the cost of deterrence begins to outweigh the loss irrespective of the values of α. The strong collective dictator is therefore most likely to choose to deter. This leads to proposition 2:

Proposition 2 *The strong collective dictator is likely to deter and the ruling elite remains loyal.*

2.3 *Despotic Dictators*

Unlike the collective dictator, the despotic dictator excludes the ruling elite out of decision making as his personal power (z) exceeds 0.5. Therefore, the ruling elite lacks important information about the dictator's strategies and motives. In the event that a despotic dictator implements deterrence measures following a mass crisis, the ruling elite may thus fear that deterrence is being used as an opportunity to aggrandize the dictator's power. For instance, by restricting civil liberties to signal strength, a dictator may come under suspicion by his own elite. A despotic dictator may well promise that increasing his power is not the ultimate goal, but since the elite does not participate in the decision-making process, and, by consequence, the flow of information between them is therefore limited, the ruling elite cannot be sure that the dictator does not intend to carry out a power grab. Thus, the dictator cannot provide a credible commitment to his ruling elite.

For our model, this means that the ruling elite's payoff is further reduced by a power grab, $g \in (0, 1)$, if the despotic dictator decides to deter, which occurs with probability $\mu \in (0, 1)$.[7] Conversely, a power grab increases the dictator's payoff by the same amount; however, this increase is limited by the actual share of infrastructural power held by the ruling elite. Consequently, g has to be smaller or equal to $1–p$. Since deterrence is the prerequisite for the dictator to conduct a power grab, it follows that the lower the cost of

7 With probability $1–\mu$, the despotic dictator complies and does not seize power from the ruling elite.

deterrence or the higher the ruling elite's share of power, the higher the dictator's incentive for a power grab. If the despotic dictator deters, the risk of a power grab is real for the ruling elite due to asymmetric information. The dictator's degree of personal power and the likelihood for a power grab are positively interlinked. This crucially distinguishes the despotic dictator from a collective dictator, for whom the probability to conduct a power grab is close to 0. Figure 4 shows the game tree with the payoffs of the despotic dictator and his ruling elite.

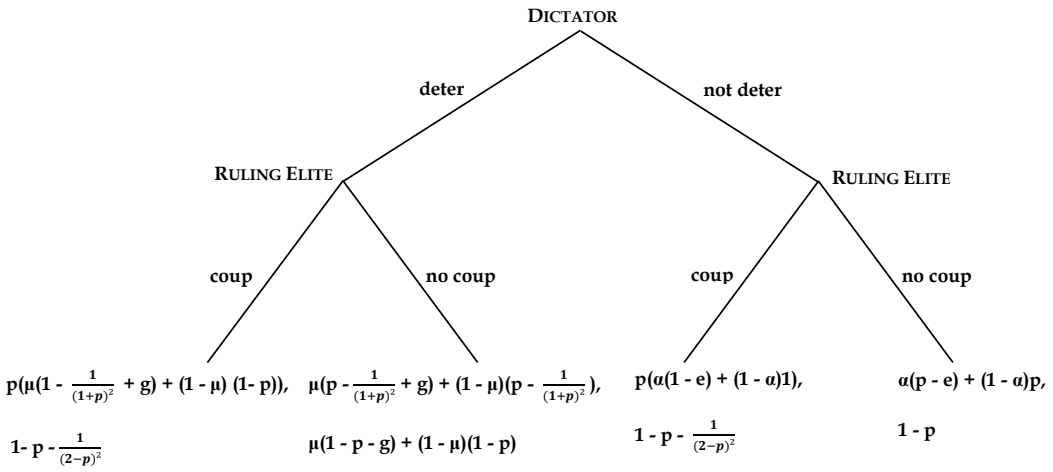

Figure 4: Despotic Dictator

As a power grab may change the preferences over outcomes for both actors, its consequences need to be included in the relevant payoff functions. In the event of deterrence, a despotic dictator obtains a payoff of $p(\mu(1-\frac{1}{(1+p)^2}+g)+(1-\mu)(1-\frac{1}{(1+p)^2}))$ if followed by an elite-based coup and $\mu(p-\frac{1}{(1+p)^2}+g)+(1-\mu)(p-\frac{1}{(1+p)^2})$ if no coup ensues. If the dictator decides not to deter, he has a payoff function of $p(\alpha(1-e)+(1-\alpha))$ if the ruling elite stages a coup and $\alpha(p-e)+(1-\alpha)p$ if the ruling elite remains loyal. Regarding the ruling elite's payoff, the elite obtains $1-p-\frac{1}{(2-p)^2}$ whenever they choose to launch a coup, regardless of the dictator's previous action. However, if the ruling elite decides to remain loyal, the payoff functions are $1-p$ following nondeterrence and $\mu(1-p-g)+(1-\mu)(1-p)$ following deterrence, which accounts for the risk of a power grab associated with deterrence.

To find equilibria, we again employ backward induction. Starting with the ruling elite, we analyze first how the ruling elite reacts if the despotic dictator chooses to deter. The resulting equation can be simplified to equation (3):

$$1\text{–}p\text{–}\frac{1}{(2-p)^2} = \mu(1\text{–}p\text{–}g) + (1\text{–}\mu)(1\text{–}p)$$
$$\frac{1}{(2-p)^2} = \mu g. \tag{3}$$

From equation (3), we can see that the ruling elite compares the cost for a coup with the probability-weighted loss caused by a power grab. The ruling elite stages a coup if the related costs are lower than the risk-weighted loss of a power grab ($\frac{1}{(2-p)^2} < \mu g$). In contrast, if the coup results in higher costs than the loss incurred from the power grab ($\frac{1}{(2-p)^2} > \mu g$), then the ruling elite will not launch a coup. However, if the dictator decides not to deter as the second option, the ruling elite strictly prefers not to stage a coup. This follows from $1\text{–}p\text{–}\frac{1}{(2-p)^2} < 1\text{–}p$ [8] since launching a coup entails additional cost that reduces the payoff for the ruling elite.

Moving up one level in the game tree, the dictator weighs the payoff of deterrence against that of nondeterrence. While the ruling elite will always respond to nondeterrence with loyalty, the ruling elite's reaction after deterrence established by equation (3) depends on the relationship between $\frac{1}{(2-p)^2}$ and μg. For that reason, two scenarios seem possible. If, as the first scenario implies, the costs of a coup are lower than the potential loss from a power grab ($\frac{1}{(2-p)^2} < \mu g$), then the ruling elite will stage a coup after deterrence. Comparing the corresponding payoff functions yields the simplified equation (4) for the despotic dictator:

$$p(\mu(1\text{–}\frac{1}{(1+p)^2} + g) + (1\text{–}\mu)(1\text{–}\frac{1}{(1+p)^2})) = \alpha(p\text{–}e) + (1\text{–}\alpha)p$$
$$\frac{1}{(1+p)^2} - \mu g = \frac{\alpha e}{p}. \tag{4}$$

Equation (4) makes the dictator's cost calculation between the cost of deterrence and the loss from a challenger entry explicit. If $\frac{1}{(1+p)^2}\text{–}\mu g < \frac{\alpha e}{p}$, the cost of deterrence including the risk-weighted benefits of a power grab is lower than the potential loss from a challenger entry. Thus, the despotic dictator will choose to deter even though the ruling elite will stage a coup. The dictator will not deter if the cost of deterrence together with the gain from the power grab exceed the loss from a challenger entry ($\frac{1}{(1+p)^2}\text{–}\mu g > \frac{\alpha e}{p}$).

8 For more explanations, please see the discussion about equation (1), as the ruling elite of a collective dictator compares the same payoff functions. However, in contrast to the ruling elite facing a despotic dictator, equation (1) holds for deterrence and nondeterrence.

In a second scenario regarding the ruling elite's reaction, the costs of a coup exceed the risk-weighted loss from a power grab ($\frac{1}{2-p)^2} > \mu g$). Consequently, the ruling elite refrains from launching a coup in response to deterrence measures. Put differently, given that the ruling elite will respond to both deterrence and nondeterrence with loyalty in this scenario, the despotic dictator weighs the payoff of deterrence against the payoff of nondeterrence for the event that no coup will follow:

$$\mu(p-\frac{1}{(1+p)^2}+g)+(1-\mu)(p-\frac{1}{(1+p)^2}))=\alpha(p-e)+(1-\alpha)p$$
$$\frac{1}{(1+p)^2}-\mu g=\alpha e \tag{5}$$

Equation (5) is a simplified form of the payoff functions and relates to the cost of each of the dictator's decisions. If the deterrence cost minus the gain from a power grab are lower than the loss from a challenger entry ($\frac{1}{(1+p)^2}-\mu g < \alpha e$), the dictator will choose to deter. If the potential loss from a challenger entry is smaller than the costs of deterrence plus the gain from the power grab ($\frac{1}{(1+p)^2}-\mu g > \alpha e$), the dictator will choose not to deter.

In the following, we outline the comparative statistics for weak and strong despotic dictators similar to our discussion of the comparative statistics for weak and strong collective dictators. Starting with ruling elite reactions toward weak despotic dictators, we know that in the case of nondeterrence the ruling elite responds with loyalty. However, regarding the ruling elite's reaction toward deterrence, the underlying relationship in equation (3) is crucial: $\frac{1}{(2-p)^2} = \mu g$. As the power of a weak dictator is restricted to $p < 0.5$, we can calculate the cost of a coup with 0.25 for $p = 0$ and 0.44 for $p = 0.49$. The loss incurred by the ruling elite from a power grab is connected to the dictator's power $g = 1 - p$, which in the case of a weak dictator ranges from 1 if $p = 0$ to 0.51 if $p = 0.49$. Calculating the probability-weighted loss in the case of complete certainty about the occurrence of the power grab ($\mu = 1$), ug is 1 if $p = 0$ and 0.51 if $p = 0.49$. In the case of a lower probability, the values for ug are smaller — for example, if $u = 0.8$, then ug is $0.8 * 0.51 = 0.41$ for $p = 0.49$ or if $u = 0.4$, ug is 0.20 for $p = 0.49$. Comparing the values of the cost of coup with the loss from a power grab, it is obvious that the cost of a coup is lower than the loss in most cases. Only when the probability of a power grab is low, which we assume not to be the case for despotic dictators, will the ruling elite not start a coup. These calculations reveal that when facing a weak despotic dictator, the ruling elite will most likely react to the high risk of a power grab by launching a coup. A further

illustration of this is presented in Figure 5, in which the potential loss from a power grab is plotted against the cost of a coup. A coup becomes likely when a dictator's power is below 0.5 and μ is assumed to be 0.8. For a strong despotic dictator with p equal or larger than 0.5, a coup is less likely.

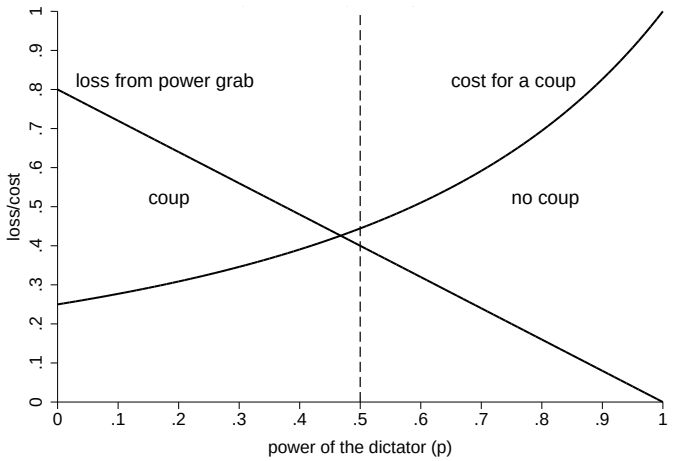

Figure 5: Comparative Statics: Ruling Elite Facing a Despotic Dictator

Using this insight, we now analyze the actions of weak despotic dictators. Equation (4), $\frac{1}{(1+p)^2} - \mu g = \frac{\alpha e}{p}$, refers to the corresponding cost calculus of a dictator. The right side of the equation denotes the costs minus the gain from a power grab. For a weak dictator with $p < 0.5$, the cost of deterrence decreases from 1 to 0.45 when his infrastructural power (p) increases from 0 to 0.49, while the potential gain from a power grab diminishes with increasing values of p, as g is defined by $1 - p$. If $p = 0.49$, the calculated overall costs are -0.06, 0.04, and 0.14 for μ depending the respective values of 1, 0.8, and 0.6. The overall costs are even lower if $p = 0$ and $\mu = 1$, 0.8, and 0.6 with 0, 0.2, and 0.4, as the dictator can grab a large amount of power and thereby reduce the costs of the deterrence reaction. In Figure 6 this cost-gain relationship is plotted for three different values of the likelihood of a power grab (μ). The curves show that the cost of deterrence subtracted from the gain from a power grab becomes smaller as the dictator's power (p) increases. The figure also shows that the lower the likelihood of a power grab, the higher its connected deterrence cost. If $\mu = 1$, weak despotic dictators even enjoy a net benefit by choosing deterrence, as the gain from the power grab outweighs the costs; these outcomes are shown as negative cost values in Figure 6.

The left side of equation (4) indicates the probability-weighted loss from a challenger entry divided by the power of the dictator. As the loss from a challenger entry (e) can only be equal to or smaller than the dictator's power (p), this equation is reduced here to the probability of a challenger entry (α). A high probability of a challenger entry would result in a high loss for

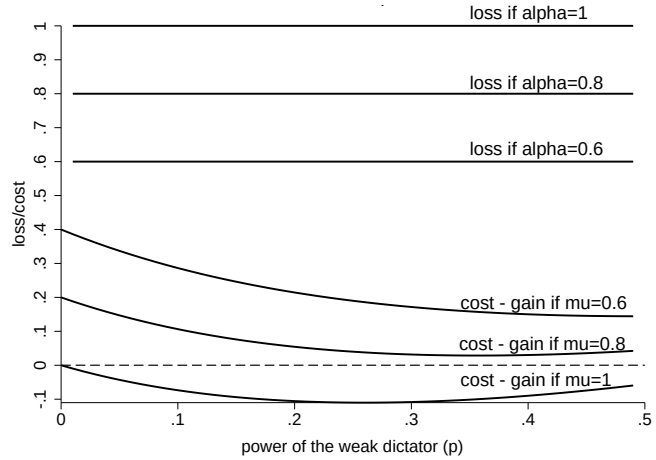

Figure 6: Comparative Statics: Weak Despotic Dictator

a dictator. This relationship is also shown in Figure 6, in which different levels of losses are plotted for different values of α. Comparing the overall costs of deterrence with the loss from challenger entry, it is obvious that the loss virtually always exceeds the overall cost. This means that the weak despotic dictator will deter, given that the likelihood of both a challenger entry and a power grab are sufficiently high. Here, the dictator's dilemma becomes apparent: By choosing to deter, the dictator will be overthrown by the ruling elite via a coup. By not choosing to deter, the dictator has to fear a challenger entry. Thus, proposition 3 reads as follows:

Proposition 3 *A weak despotic dictator is likely to deter and the ruling elite responds by launching a coup.*

Does this dilemma also apply to a strong despotic dictator? Again, we first analyze the reaction of the ruling elite. In the case of nondeterrence the ruling elite remains loyal. The reaction of the ruling elite if the dictator deters is given by equation (3), $\frac{1}{(2-p)^2} = \mu g$. A strong despotic dictator is endowed with infrastructural power (p) that reaches from 0.5 to 1. The ruling elite faces a coup cost of 0.44 if $p = 0.5$ and 1 if $p = 1$. The loss from a power grab is 0.5 if $p = 0.5$ and 0 if $p = 1$ for the ruling elite. When μ (the probability of a power grab) is introduced, the probability-weighted loss is 0.5 for $p = 0.5$ if $\mu = 1$, 0.4 if $\mu = 0.8$, and 0.2 if $\mu = 0.4$. If the dictator's power is $p = 0.8$, μg is 0.2 for $\mu = 1$, 0.16 if $\mu = 0.8$, and 0.08 if $\mu = 0.4$. Comparing the cost of a coup with the potential loss from a power grab at different levels of the dictator's power (p), we can see that the loss from a power grab is lower than the cost of a coup. This relationship is shown in Figure 5, if one considers all values of p equal to or above 0.5. Figure 5 demonstrates that when facing a strong despotic dictator, it is less costly for the ruling elite to remain loyal to the dictator by accepting the loss from a

power grab than to stage a coup. Consequently, the ruling elite will remain loyal to the strong despotic dictator.

Taking the ruling elite's response into account, equation (5), $\frac{1}{(1+p)^2} - \mu g = \alpha e$, reveals the process behind a strong despotic dictator's decision to deter or not. Similar to the weak despotic dictator's calculations, the right side denotes the cost of deterrence minus the gain from a power grab. Two forces are here at work. First, the cost of deterrence decreases with the value of p, the infrastructural power a dictator holds. Second, increasing the dictator's power reduces the possible gain from a power grab as there is less power available for the dictator to grab. Calculating some numerical examples, one can see that cost of deterrence added up by the gain from a power grab is particularly low for values of p at around 0.5. In this case, the calculated overall costs are -0.05, 0.4, and 0.14 for $\mu = 1$, 0.8, and 0 given that $p = 0.5$, whereas the overall costs are 0.25 regardless of the value of μ for $p = 1$.

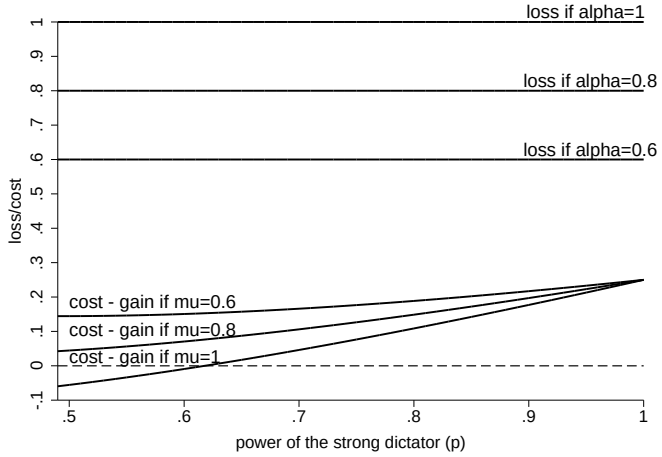

Figure 7: Comparative Statics: Strong Despotic Dictator

Figure 7 plots the linkage between the cost of deterrence and the gain from a power grab for the dictator at three different values of μ. These cost functions highlight that the lower the probabilities of a power grab (μ) the higher the cost of deterrence, even when the gain from the power grab is included. The right side of equation (5) relates to the risk-weighted loss from challenger entry. Here, the loss for the dictator in the case of a challenger entry increases the more power the dictator holds. For instance, given $p = 0.5$, the loss from a challenger entry is 0.5 for $\alpha = 1$ or 0.4 for $\alpha = 0.8$. If $p = 1$, the loss would be 1 or 0.8 for $\alpha = 1$. The dictator's loss function is also shown in Figure 7 for three different probabilities of a challenger entry (α). Comparing the cost of deterrence with the loss from a challenger entry, it is obvious that the latter exceed the cost of the former, assuming there is a sufficiently high likelihood of a power grab (μ) and a challenger entry (α).

This cost calculation shows that the strong despotic dictator will opt for deterrence.

Proposition 4 *The strong despotic dictator is likely to deter, but the ruling elite will remain loyal.*

3 EMPIRICAL EVIDENCE

In order to empirically test the theoretical predictions of the model, we run two sets of logit regressions, using a setup that corresponds to the order of play in our deterrence game.

3.1 *First Step: Which Dictator Chooses Deterrence?*

Based on our formal model, only dictators that have low infrastructural power and include the ruling elite in decision-making processes (weak collective dictator) are predicted to be unlikely to carry out deterrence measures, whereas for all other types of dictator, the likelihood of being able to deter is hypothesized to be higher. To test these predictions, we run logit regressions for a sample of dictators facing a mass crisis. The regressions estimate the likelihood of deterrence as the dependent variable and have the following form:

$$\Pr(\text{Restrict Civil Liberties} = 1) = \beta \text{Type of Dictator}_{it} + \theta X_{it} + \epsilon_{it},$$

where *Type of Dictator* refers to the underlying type of dictator in country i in year t, X stands for a vector of control variables, and ϵ is the error term.

Regarding the dependent variable, in order to discourage a challenger entry, the dictator chooses a reaction that, being costly, highlights his capacity to withstand defiance. One important and wide-ranging way of signaling this relates to the general restriction of civil liberties, which we operationalize with the dichotomous variable *Restrict Civil Liberties*. The variable takes the value 1 if there is an increase in the rating of civil liberties based on a scale of 1 (most liberties) to 7 (least liberties). The rating of civil liberties produced by the Freedom House (2014) is based on scores for 15 indicators in the following four areas: freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and personal rights.

As regards the independent variables, to code the four types of dictators, we follow Lai and Slater (2006) by employing two different variables, each of which captures one of the two power dimensions. The first dimension, infrastructural power, enables dictators to execute their decisions in the face of potential opposition in civil society and within the multiple layers of the state apparatus itself (Lai and Slater 2006; Slater 2003, 2010). As Fjelde (2010, 200) has argued, regime parties bestow upon dictators an "infrastructural advantage" that sets them apart from other civilian dictatorships and that primarily relies on clientelistic and kinship networks (see also Brownlee 2007; Smith 2007). In the same vein, infrastructural power based on a functioning military apparatus also provides dictators with considerable advantages when it comes to the implementation of decisions, especially when compared to monarchical or personal regimes. We therefore group party and military regimes together and code them by using a dataset of authoritarian regimes developed by Geddes et al. (2014a). Thus group party and military regimes are coded as strong dictators with considerable infrastructural power, while monarchical and personal regimes are coded as weak. The second dimension captures the level of personal power a dictator can hold. According to Dan Slater, despotic power is the range of actions that an individual leader "is empowered to take without routine" (Slater 2003, 81). Despotic dictators are operationalized with the *xconst* indicator from the Polity IV dataset (Marshall et al. 2010). Measuring the number of constraints that restrict the chief executive's decision making, this scale indicator ranges from 1 (unlimited authority of the ruler) to 7 (executive parity). We consider rulers with an *xconst* value of 1 and 2 to be despotic dictators; those with values of 3 and above, collective dictators.[9] Combining the dichotomous codings of each of the two power dimensions, we generate four types of dictators: *Weak Collective*, *Strong Collective*, *Weak Despotic* and *Strong Despotic*.

Since the overall socioeconomic situation of a country might impact the likelihood of deterrence, we control for a number of standard variables. The variables natural log of *GDP per capita* and *GDP Growth* capture the level of economic development and the effect of economic business cycles. Both variables are adjusted for purchasing power parity and taken from the Penn World Tables (Heston et al. 2012). The variable *Logrent* measures the amount of free resources available to the dictator as the natural log of the sum of fuel and metals income per capita based on the dataset by Haber and Menaldo (2011). We also control for the amount of foreign aid given to a country as

9 We recognize that every threshold is somewhat arbitrary. However, when testing alternative threshold values of 3 and 4, our results remain robust.

an additional form of income by including the variable *Logaid* as the natural log of foreign aid per capita expressed in constant 2008 USD. In addition, the share of the urban population (*Urban Population*) is included in the regression. These last two variables are drawn from the World Development Indicators (2013). The degree of ethnic fractionalization (*Ethnic Fractionalization*), as it is coded in the Ethnic Power Relations (EPR) dataset by Wimmer et al. (2009), is also used as a control variable.

Because political history and the handling of past mass crises are likely to result in learning effects and thus help dictators to refine their reactions, we also include the variable *Past Mass Crises* to account for the number of mass upheavals since 1946, using Banks (2011). As the length of tenure may also shape a dictator's decisions, we add the variable *Years in Office*, which counts the number of years a dictator has spent in power up until that respective year. The variable is calculated according to data from the Archigos dataset by Goemans et al. (2009).

To identify all those cases of dictators facing a mass crisis, we use a binary variable. In line with previous works on the effects of contentious collective action in authoritarian regimes (Menaldo 2012; Ulfelder 2005), we use data on general strikes, riots, and antigovernment protests from the Cross-National Time-Series Data Archive (Banks 2011).[10] This dataset defines (a) as a general strike any strike of at least 1,000 workers, involving more than one employer (it aims at national government organizations); (b) as a riot any violent clash or demonstration of more than 100 citizens; and (c) as an antigovernment demonstration any peaceful public gathering of at least 100 people displaying or voicing their opposition to government policies. The dummy variable *Mass Crisis* is coded 1 if at least one of these three forms of contentious antigovernment behavior occurred in a given country-year.

Our sample is limited to country-years in which a dictator faces a mass crisis, resulting in 412 observations between 1973 and 2004.[11] Out of these observations, 45 refer to weak collective, 184 to strong collective, 69 to weak despotic, and 114 to strong despotic dictators. In 88 countries mass crisis has forced the dictator to make a decision about whether or not to deter

10 As this coding is primarily based on articles in the New York Times and other newspapers, which might underreport political events in small and/or less accessible countries, the use of this data is not uncontroversial. We opted to use it due to its global scope and the lack of good alternatives; we are, however, aware of its limits. (GDELT would be an alternative but has legal and overreporting issues.)

11 We base this selection on the coding of authoritarian regimes by Geddes et al. (2014b). (2011). Country-years were excluded whenever a country was in a transition process, under foreign occupation, or involved in a civil conflict. As data on dictator's rule in the Archigos dataset is solely available until 2004, the analysis ends in that year.

on at least one occasion. Appendix I provides a list of countries included in the regression. In 74 of the 412 cases (18 percent) the dictator has actually opted for deterrence by restricting the civil liberties. Before we move to the logit regressions, we test whether there are any relevant systematic differences between the different types of dictators when it comes to deterrence and nondeterrence. Table 1 presents the divergence in means of each dictator type and the results of the four t-tests. The t-tests only show a statistically significant difference between a weak collective dictator and the other three dictator types. This is in line with our theoretical predictions, as weak collective dictators are expected to behave differently from the others.

Table 1: t Tests

	Weak Collective Dictator vs. all other Dictators	Strong Collective Dictator vs. all other Dictators	Weak Despotic Dictator vs. all other Dictators	Strong Despotic Dictator vs. all other Dictators
Restrict Civil Liberties	0.127	-0.068	0.042	-0.006
	t=2.956*	t=1.769	t=0.875	t=-0.1489

Note: In each cell the first value is the differences between the means and the second the t-statistic, which also indicates with * if the difference is statistically significant with * p<0.05.

The logit regressions are based on a pooled cross-section due to the restriction of dictator's facing a mass crisis and are clustered at the country-level. The descriptive statistics for these following regressions are presented in Table 2.

Table 3 shows the estimation results using *Restrict Civil Liberties* as the deterrence strategy on the dependent variable. The coefficient for *Weak Collective Dictator* is negative and statistically significant in column (1), whereas the coefficients for all other types (column 2 to 4) are insignificant. These results confirm our hypothesis that especially weak collective dictators deter less frequently after mass crises.

To check the robustness of our results, we run two additional estimations of the model in column (1) belonging to Table 3 with weak collective dictators as the main independent variable of interest. As shown in Table 4, we included a number of additional controls, such as the simultaneous occurrence of a coup with a mass crisis in column (1) and dummy variables for four world regions (Asia, Latin America, Middle East and North Africa and Sub-Saharan Africa) in column (2).[12] Both estimations in Table 4 yield

12 The variable *Past Coups*, taken from the Powell and Thyne dataset (2011), is coded 1 if one or more unsuccessful coup attempts for any given country-year occurred and 0 otherwise. The definition of each world region is based on those from the World Bank.

Table 2: Descriptive Statistics

Variable	**Mean**	**SD**	**Min**	**Max**
Restrict Civil Liberties	0.180	0.384	0	1
Weak Collective Dictator	0.109	0.312	0	1
Strong Collective Dictator	0.447	0.498	0	1
Weak Despotic Dictator	0.167	0.374	0	1
Strong Despotic Dictator	0.277	0.448	0	1
GDP Growth	1.268	8.148	-64.561	66.023
GDP per capita	7.867	0.913	5.556	9.790
Urban Population	43.481	19.105	2.880	86.840
Ethnic Fractionalization	0.443	0.285	0.000	1.000
Logrent	3.722	2.420	0.000	8.774
Logaid	18.528	5.170	0.000	22.946
Years in Office	9.379	8.551	1	44
Past Mass Crises	13.517	9.548	0	41
MENA	0.141	0.348	0	1
Sub-Saharan Africa	0.257	0.438	0	1
Asia	0.231	0.422	0	1
Latin America	0.286	0.453	0	1

Note: N = 412, values based on the sample used in Table 3 and 4.

Table 3: First Step

	(1)	(2)	(3)	(4)
Weak Collective Dictator	-1.413*			
	(0.725)			
Strong Collective Dictator		0.460		
		(0.325)		
Weak Despotic Dictator			-0.206	
			(0.374)	
Strong Despotic Dictator				0.036
				(0.302)
GDP Growth	0.002	0.002	0.001	0.002
	(0.024)	(0.027)	(0.026)	(0.025)
GDP per capita	0.057	0.131	0.211	0.209
	(0.269)	(0.284)	(0.266)	(0.264)
Urban Population	0.004	-0.002	-0.006	-0.005
	(0.013)	(0.013)	(0.012)	(0.012)
Ethnic Fractionalization	0.307	0.121	0.082	0.091
	(0.523)	(0.559)	(0.541)	(0.538)
Logrent	-0.052	-0.028	-0.030	-0.031
	(0.067)	(0.070)	(0.067)	(0.067)
Logaid	-0.043**	-0.026	-0.025	-0.025
	(0.022)	(0.027)	(0.029)	(0.029)
Years in Office	0.005	0.013	0.009	0.007
	(0.014)	(0.015)	(0.014)	(0.014)
Past Mass Crises	0.014	0.014	0.014	0.015
	(0.017)	(0.017)	(0.018)	(0.017)
Constant	-1.415	-2.479	-2.647	-2.692
	(1.935)	(2.039)	(1.981)	(1.973)
Log Likelihood	-188.590	-190.404	-191.681	-191.813
Dictators	122	122	122	122
Countries	88	88	88	88
Observations	412	412	412	412

Note: Logit regression with Restrict Civil Liberties as dependent variable; clustered standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

at the same result, and the direction and the significance of the coefficients for weak collective dictator remain largely unchanged.

3.2 *Second Step: Does a Weak Despotic Dictator Face a Coup After Deterrence?*

In view of our formal model, we expect ruling elites to be more likely to stage a coup if a weak despotic dictator implements deterrence measures than if any other dictator type does. In our logit regressions, the occurrence of a successful coup serves as the dependent variable. The estimation is therefore based on the following equation:

$$\Pr(\text{Successful Coup} = 1) = \gamma \textit{Weak Despotic Dictator}_{it} + \delta X_{it} + \epsilon_{it},$$

in which *Weak Despotic Dictator* indicates whether the dictator in power in country i in year t can be characterized as weak despotic. X refers to the control variables and ϵ is the error term.

To operationalize our dependent variable, we use coup event data compiled by Powell and Thyne (2011). The variable *Successful Coup* is coded 1 if a coup successfully ousted the dictator. The value 0 indicates that no coup was attempted or succeeded in the given country year.

To control for confounders, we rely on the same set of control variables used to estimate the first step. As countries may be caught in a coup trap (Collier and Hoeffler 2005), we include the variable *Past Coups* in the regression in order to account for the number of past years in which one or more coups were attempted. This variable builds on the Powell and Thyne (2011) dataset.

The sample for the second step builds on that for the first but is limited to only those cases in which the dictator has used deterrence. The sample therefore contains those cases in which a dictator opted to restrict civil liberties as a deterrence strategy in the face of a mass crisis. The sample size is thus substantially reduced to 74 observations for 42 countries.[13]

The estimation results for the second step are presented in the first column of Table 5. The main coefficient of interest, *Weak Despotic Dictator*, is positive and statistically significant related to a successful coup d'état. This confirms

13 See Appendix I for a list of countries included in the second-step estimations.

Table 4: First Step with Robustness Tests

	(1)	(2)
Weak Collective Dictator	-1.423**	-1.445*
	(0.718)	(0.799)
GDP Growth	0.003	0.002
	(0.024)	(0.025)
GDP per capita	0.052	0.313
	(0.267)	(0.312)
Urban Population	0.003	0.005
	(0.013)	(0.014)
Ethnic Fractionalization	0.254	0.008
	(0.528)	(0.484)
Logrent	-0.046	-0.048
	(0.066)	(0.070)
Logaid	-0.046**	0.007
	(0.021)	(0.051)
Years in Office	0.008	0.004
	(0.014)	(0.015)
Past Mass Crises	0.013	0.020
	(0.017)	(0.018)
Past Elite Crisis	0.033	
	(0.045)	
MENA		-1.533
		(1.094)
Sub-Saharan Africa		-0.0362
		(0.997)
Asia		-0.590
		(1.085)
Latin America		-0.800
		(1.028)
Constant	-1.388	-3.817
	(1.917)	(2.469)
Log Likelihood	-188.331	-185.332
Dictators	122	122
Countries	88	88
Observations	412	412

Note: Logit regression with Restrict Civil Liberties as dependent variable; clustered standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

proposition 3, which predicts that weak despotic dictator who implement deterrence measures are more likely to face an elite-based coup.

To check the robustness of the results, we replace the dependent variable with an alternative measurement of coups taken from a different dataset — namely, the dataset by Marshall and Marshall (2014) and label their variable *Successful Coup_2*. The variable *Past Coups_2* is calculated from the same dataset. The coefficient for *Weak Despotic Dictator* in Column (2) in Table 5 remains positive and highly statistically significant thereby providing additional evidence for our proposition 3.

Table 5: Second Step

	(1)	(2)
Weak Despotic Dictator	5.143**	3.685**
	(2.108)	(1.740)
GDP Growth	0.012	0.011
	(0.030)	(0.026)
GDP per capita	1.584	1.179
	(1.034)	(0.990)
Urban Population	-0.047	-0.029
	(0.047)	(0.050)
Ethnic Fractionalization	0.637	0.652
	(2.144)	(1.429)
Logrent	0.040	0.073
	(0.229)	(0.220)
Years in Office	-0.162	-0.134
	(0.109)	(0.086)
Past Elite Crisis	0.517***	
	(0.183)	
Logaid	-0.157*	-0.074
	(0.089)	(0.062)
Past Mass Crises	-0.105	-0.048
	(0.103)	(0.072)
Past Elite Crisis_2		0.225*
		(0.122)
Constant	-11.680	-10.050
	(7.314)	(6.670)
Log Likelihood	-12.944	-14.647
Coup Data	Powell and Thyne (2011)	Marshall and Marshall (2014)
Countries	42	42
Dictators	60	60
Observations	74	74

Note: Logit regression with Successful Coup as dependent variable in column 1 and Successful Coup_2 in column 2; clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

This paper has examined the interaction between dictators and their ruling elites after the occurrence of mass crisis. Based on a formal model and empirically tested by regression analysis, we have shown that mass crisis may serve as a starting point to ousting a dictator. Although the masses are usually not capable of solving their collective action problem and it is therefore unlikely that they succeed in overthrowing a dictator by themselves, the dictator's deterrence reaction may induce the ruling elite to force the dictator to leave office by staging a coup. Thus despite rarely directly toppling dictators, mass protests have the ability to provoke a reaction on the part of the ruling elite that unseats the autocrat. This is a crucial dilemma that some, but not all, dictators face.

As the implications of our formal model suggest, there are two aspects that help dictators to avoid losing office after implementing deterrence measures in response to a mass crisis: (i) a high degree of infrastructural power and (ii) the incorporation of ruling-elite members into the dictatorial decision-making process. The first aspect ensures that dictators have the power to implement political decisions effectively and thus appear strong, reduces the costs of deterrence, increases the barriers to challenger entry, and decreases the possible loss from a power grab. Therefore, a strong dictator is most likely to deter without facing a subsequent coup irrespective of whether or not the ruling elite is included in decision-making processes.

The second aspect depends on a dictator possessing an ample amount of infrastructural power. After all, a collective dictator who shares crucial information with his ruling elite does not deter if he is weak, since deterrence costs would exceed the potential loss from a challenger entry. However, a collective dictator who holds sufficient infrastructural power is able to deter *and* credibly convince the ruling elite that a power grab is not being carried out. Weak and despotic dictators, on the other hand, find themselves in a political dilemma when seeking to ward off the challenges arising from political unrest. A weak despotic dictator that tries to send a signal of strength (by deterring) to any potential defector from within the ruling elite, may actually provoke the ruling elite to launch a coup. This is because a ruling elite excluded from key decisions cannot be sure about a dictator's true intentions and is therefore inclined to suspect a power grab. The ruling elite therefore responds by seeking to overthrow the dictator.

Thus, what seems to be an outcome of a dictator's irrationality is in fact the result of all involved actors' rational and interest-based actions. The

strength of our model lies in making apparent this interaction of diametrically opposed interests under different conditions of informational asymmetry. It also suggests that any analysis of authoritarian responses to mass crises should take into account potential feedback effects on the relationship between the dictator and the ruling elite.

Appendix I: Country List

Table 6: List of Countries

Albania*	Dominican Republic	Libya	Rwanda*
Algeria*	Ecuador	Madagascar	Saudi Arabia
Angola	Egypt*	Malawi	Senegal*
Argentina*	El Salvador*	Malaysia	Sierra Leone
Armenia	Gabon	Mali	Somalia
Azerbaijan	Georgia	Mauritania*	South Africa*
Bangladesh*	Ghana	Mexico*	South Korea*
Benin	Greece*	Mongolia*	Spain*
Bolivia*	Guatemala*	Morocco	Sri Lanka
Botswana*	Guinea	Mozambique	Sudan
Brazil*	Guinea-Bissau	Namibia	Swaziland
Bulgaria*	Haiti*	Nepal*	Syria
Burkina Faso	Honduras	Nicaragua*	Tajikistan
Burundi	Hungary*	Niger*	Tanzania*
Cambodia	Indonesia*	Nigeria*	Thailand*
Cameroon*	Iran*	Pakistan*	Togo
Central African Republic*	Iraq	Panama*	Tunisia
Chad	Jordan	Paraguay	Uganda
Chile*	Kazakhstan	Peru*	Uruguay
China*	Kenya*	Philippines*	Uzbekistan
Cote d'Ivoire*	Kyrgyzstan	Poland*	Zambia*
Cuba	Liberia	Russia	Zimbabwe

Note: N=88, * refers to all countries included in first step as well as second step regressions.

Unbundling Private- and Public-Sector Corruption: Insights Based on Two New Indicators*

1 INTRODUCTION

Comparative research on corruption — that is, on the abuse of entrusted power for private gain — has flourished over the past fifteen years. Its primary driver has been the availability of more and better data on the global prevalence of corrupt behavior. Although many questions about corruption remain unanswered (Jain 2001; Svensson 2005), we now understand some of the consequences of public-sector corruption. Among the most important are lower overall investment levels, less foreign investment, lower income and higher economic inequality, less government spending on education, higher expenditures for the military, lower environmental quality and less trust in the political system. Lambsdorff (2006) reviews this literature, and a more recent survey by Olken and Pande (2012) concentrates on corruption in developing countries. Although corruption has overall adverse effects, researchers are still trying to identify conditions under which corruption may actually "grease the wheels" of an economy (Dreher and Gassebner 2013).

Given these significant effects, it is not surprising that there has also been extensive research on the causes of corruption. Most of these studies are interested in public-sector corruption without explicitly distinguishing it from other or more specific forms of corruption (see Aidt 2003; Pellegrini

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and Gerlagh 2008; Treisman 2007, 2015 for an overview). However, some authors have analyzed corruption in particular segments of the private or the public sector: Halim (2008) investigates corruption in national bureaucracies, whereas Scott and Pyman (2008) compare levels of corruption in the military across different regions and countries. Voigt and Gutmann (2014) relate the organization of the judiciary to judicial corruption and public-sector corruption more generally. Gutmann (2015) shows how the intensity of competition between religions and the degree to which they are regulated in different markets determine the corruption of religious organizations. Others have dealt with the determinants of corruption in specific settings — for instance, in dictatorships (Chang and Golden 2010; Charron and Lapuente 2011; Hallagan 2009).

In spite of some nuanced research, most economists have limited their attention to public-sector corruption, while still making arguments about corruption in general (Hodgson and Jiang 2007). Consequently they define corruption as a phenomenon that can only occur in the public sector, the abuse of public office for private gain. This definition has become popular in the scientific literature, although it ignores that international conventions, for example by the Council of Europe and the United Nations, do not follow such a narrow delineation and include private sector corruption (OECD 2008). The fact that firms are just as likely to bribe other firms as they are to bribe public officials makes this negligence by academics even more worrisome (Transparency International 2011). The World Bank has argued that public-sector corruption "should be the Bank's main concern, since the Bank lends primarily to governments and supports government policies, programs, and projects" (World Bank 1997, 9). However, the bank at least acknowledges the costliness of private-sector corruption and the importance of controlling it. This situation has led some economists to conclude that private-sector corruption "has been little studied, but ought to be the object of future work" (Rose-Ackerman 2008, 552). The limited availability of reliable data that could be used for this purpose might be one of the main explanations for the shortage of such research.[1]

This paper aims to fill the gap that exists between research on general corruption and studies concerned with the specificities of corruption in the judiciary, the military, religious bodies, etc. We examine the determinants of corruption in the private and public sectors separately in order to improve our understanding of these phenomena. If public- and private-sector

1 Measuring private- and public-sector corruption separately can also be understood as a contribution to recent attempts in the new institutional economics to unbundle the de facto quality of different institutions (see, for example, Acemoglu and Johnson 2005 and Voigt 2013).

corruption have different fundamental causes, the organizations involved in the fight against corruption need to be aware of these. The relevance of this distinction for policy making is supported by Rose-Ackerman's (2010) observation that legal systems differ in their treatment of private- and public-sector corruption. This has motivated the Council of the European Union — in decision 2003/568/JHA — to harmonize the legal definition of private-sector corruption in all member states and to prescribe its incorporation into national criminal law. In contrast, laws on private corruption in the US are still fragmented and differ between states (Green 2013).

Conceptually, corruption takes place in the context of a principal-agent relationship where the agent accepts or requests a private benefit from a third party in return for acting against the principal's interests. One can extend this transaction-based definition to include cases of misuse of one's office for private gain in which no third party is involved. Private-sector corruption can be distinguished from public-sector corruption in that the individual abusing her position of power does not hold a public office and, hence, the harmed principal is a private entity (Rose-Ackerman 2010). Examples of subjects potentially involved in private corruption are sales or purchasing agents who are being asked for favorable treatment, union leaders who use their power to extort managers, pharmaceutical companies that encourage doctors to prescribe their drugs, and development engineers who are involved in corporate espionage against their employer. Della Porta and Vannucci (2012) describe the sports sector as particularly susceptible to corruption, due to the unpredictability of performance and the arbitrariness of referee decisions (see also Borghesi 2008; Duggan and Levitt 2002; Wolfers 2006). The relationship between private- and public-sector corruption can be substitutive — for example, when privatization and procurement are used to take action against public-sector corruption (Heywood 2014, 2) — but it can also be complementary, as corruption is known to spill over into other sectors. Obviously, private corruption is more likely to occur in the face of a corrupt police force or judiciary.

Here we introduce two new measures of corruption in the private and public spheres, which are based on data from the Global Corruption Barometer by Transparency International. By comparing these new indicators with established general and sector-specific measures of corruption, we are able to identify potential problems with the use and interpretation of some of the commonly used corruption indicators. We find that many of the established indicators measure only public-sector corruption, although they claim to be general corruption indicators. The only available cross-country indicator of private-sector corruption to date also seems to capture corruption in the

public sector and not what it purports to measure. We demonstrate the usefulness of our new indicators in two exemplary empirical applications. One empirical analysis shows that there is indeed a difference between the causes of private and public corruption. The quality of a state's bureaucracy and the share of Protestants in the population are predictors of public-sector corruption levels. However, private-sector corruption cannot be ascribed to any of the traditional explanations of public-sector corruption. At most, education may be linked to lower levels of private-sector corruption. Furthermore, we replicate a study by Fisman and Miguel (2007), which shows that diplomats from high-corruption countries were more likely to accumulate unpaid parking violations in Manhattan. We can confirm Fisman and Miguel's results for public-sector corruption, but we find no such relationship for private-sector corruption. This finding has consequences for the interpretation of Fisman and Miguel's results, which are frequently cited in the literature to substantiate the importance of corruption cultures.

The article proceeds as follows: Section 2 deals with the measurement of private- and public-sector corruption. In Section 3, we use these indicators to study sector-specific causes of corruption. Section 3.1 discusses theoretically plausible determinants of corruption levels in both the private and the public sector. We then describe the data used to operationalize the determinants of corruption in Section 3.2. Section 3.3 explicates the empirical approach. A general-to-specific procedure is applied to identify a more parsimonious but encompassing model of the determinants of corruption in both sectors. Section 4 provides a replication and extension of Fisman and Miguel's (2007) analysis, in which we use our sector-specific corruption measures as independent variables to explain the accumulation of unpaid parking violations by UN diplomats. Section 5 summarizes our findings.

2 UNBUNDLING CORRUPTION DATA

2.1 *Creating Two New Indicators of Sector-Specific Corruption Levels*

Most empirical studies of corruption rely on either expert evaluations in the International Country Risk Guide (ICRG) or some composite indicator of corruption, predominantly the World Bank's Control of Corruption (CC) indicator or Transparency International's Corruption Perceptions Index (CPI). The ICRG delivers an assessment of the level of corruption within the political system and of the risk it poses to investors. The CC indicator focuses on variables that clearly capture public-sector corruption, but it also includes

corruption experiences in the media sector. The CPI is based exclusively on public-sector corruption data. The only data set that explicitly accounts for the difference between private- and public-sector corruption in a large cross-section of countries is a Gallup Poll which asks respondents in over 150 countries about their corruption perceptions with respect to businesses (G-PRI) and the government (G-PUB).[2]

Here we introduce two alternative private- and public-sector corruption measures which we have created using data from the most recent Global Corruption Barometer (GCB) by Transparency International (2013). Citizens of over 100 countries were asked for the GCB: "To what extent do you see the following categories in this country affected by corruption?" These categories are political parties, the legislature, the police, businesses, the media, the civil service, the judiciary, health services, NGOs, religious bodies, the military, and the education system.[3] If corruption levels in the private and the public sectors are distinguishable phenomena, this should be reflected in these segments of the private and public spheres. Ex ante, we would expect that most of the categories are, even across countries, clearly attributable to either the private or the public sector. Political parties, the legislature, the police, the civil service, the judiciary, and the military are without doubt parts of the public sector. This is less clear for health services and the education system, even though both are in most countries highly regulated or in large parts owned by the state. In contrast, businesses, NGOs, and religious bodies are private entities. Although the government frequently seeks to exercise control over the media, they are also privately run in most countries. The fact that state-owned media are particularly prevalent in Africa and the MENA region (Djankov et al. 2003), for which our data provides only very limited country coverage, leads us to expect that GCB respondents are even more likely to treat the media in their country as part of the private sector.

We test these theoretical priors in a factor analysis, which finds exactly two latent variables that fulfill the Kaiser criterion underlying the GCB perception measures (eigenvalues of 6.2 and 2.0). The idea behind such a factor analysis is that the variation in our observed corruption indicators mainly reflects the variation in two unobserved latent variables. This is the case

2 The concrete questions are as follows: "Is corruption widespread within businesses located in this country, or not?" and "Is corruption widespread throughout the government in this country, or not?".

3 Answers were possible on a five-point Likert scale ranging from 1 (not at all corrupt) to 5 (extremely corrupt). We use the mean scores for each country, effectively interpreting the survey item according to a linear scale.

Table 1: Rotated Factor Loadings

Variable	Factor 1	Factor 2	Uniqueness
Political Parties	0.456	0.496	0.375
Legislature	0.636	0.384	0.263
Military	0.518	0.329	0.493
NGOs		0.737	0.347
Media		0.862	0.281
Religious Bodies		0.908	0.292
Business		0.622	0.419
Education System	0.818		0.319
Judiciary	0.916		0.242
Medical Services	0.642		0.426
Police	0.941		0.234
Public Officials	0.848		0.171

Note: Factor loadings <0.3 are omitted.

if corruption levels within the private sector and the public sector, respectively, are rather homogenous relative to levels in the other sector. Each observed corruption score is then modelled as a weighted sum of the two latent factors plus an error term. The promax rotated factor loadings in Table 1, which indicate the weighting of each variable in the two factors, tell a clear story. Corruption in the legislature, the police, the military, the civil service, the judiciary, health services, and the education system are different manifestations of public-sector corruption. Corruption in businesses, the media, NGOs, and religious organizations, however, constitutes private-sector corruption. Political parties, surprisingly, cannot be allocated easily to one of these groups.

One possible concern about the data in the Global Corruption Barometer is the interpretation of the questions by survey respondents. It could be argued that laymen do not draw on a consistent model of corruption in answering the questions. They may attribute corruption to private businesses also when business people bribe public officials, which is public-sector corruption as only the public official is abusing the power entrusted to her. This reasonable skepticism is, however, not supported by the data. In the factor analysis we find two clearly distinct latent variables that are associated with private and public sector corruption, respectively.

To inquire further into the identified latent variables, we calculate Cronbach's Alpha individually for each of the two identified groups of (stan-

dardized) variables.[4] Political parties, which our factor analysis does not clearly allocate to one of the two latent factors, are included in both groups. Cronbach's Alpha increases in the intercorrelations among the variables and, hence, in the degree to which a single unidimensional latent construct is measured. Here, Alpha is maximized if corruption in political parties is treated as one form of public-sector corruption, but not of private-sector corruption. The scale reliability coefficient Alpha reaches its maximum at 0.92 for public-sector corruption and 0.87 for the private sector, indicating a high level of internal consistency.[5] Thus, we can construct two summative unweighted scales of the standardized indicators for public- and private-sector corruption, one for each group, which we then label TI-PUB and TI-PRI. These two indicators are finally rescaled to range from 0 to 1, where higher values reflect lower corruption levels. The distribution of both indicators is illustrated by the kernel density plot in Appendix I.

2.2 *On the Relationship Between Private- and Public-Sector Corruption*

Figure 1 shows the spatial distribution of corruption levels across countries for the private sector (left side) and the public sector (right side). The spatial distribution of private- and public-sector corruption differs significantly. Figure 1 also illustrates the geographical coverage of our sample.

Note: Darker colors indicate higher levels of corruption. No data is available for those countries pictured in white.

Figure 1: World Maps of Private- and Public-Sector Corruption

Figure 2 plots the values of TI-PRI and TI-PUB against each other. It shows that for many countries the level of public-sector corruption can be predicted quite well from the level of private-sector corruption and vice versa.

4 This measure goes back to Cronbach (1951). It is important to start with a factor analysis to identify the dimensions to which individual variables can be attributed and thus avoid violating the assumption of unidimensionality.

5 These results are robust for also treating "military" as an ambiguous case. To further test the robustness of our results, we identify possible outliers in the factor analysis, then repeat the factor analysis without these countries and calculate Cronbach's Alpha again. The robustness of our empirical categorization of corruption is confirmed and Alpha is even higher without these outliers (Burundi and Rwanda).

The Pearson correlation coefficient for TI-PRI and TI-PUB is 0.50. However, some countries exhibit substantial differences in their exposure to private and public corruption: Kyrgyzstan's public sector, for example, is more corrupt than its level of corruption in the private sector would suggest. The country actually has the highest level of public-sector corruption in our data set. Norway, Denmark, and Finland have about the same level of private-sector corruption as Kyrgyzstan,[6] but, in contrast to the former Soviet republic, they exhibit some of the lowest levels of public-sector corruption. If our indicators of private- and public-sector corruption measure what they are supposed to, it follows that the distinction between both forms of corruption is important and may lead to a better understanding of the causes and consequences of corruption.

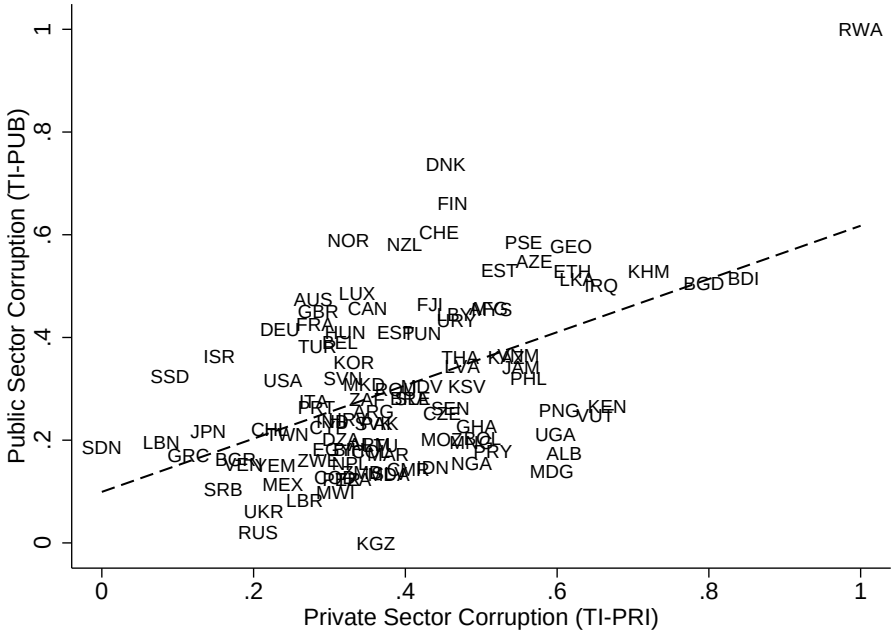

Figure 2: Public- Versus Private-Sector Corruption

2.3 *Quality and Robustness of Our New Corruption Indicators*

Our new indicators have three design-related advantages over those from Gallup: (1) The underlying questions are more concrete in that they list different types of public and private organizations which might be subject to corruption; (2) they use a more fine-grained response scale for the extent of corruption; and (3) the fact that they are based on several variables

6 Similarly counterintuitive country rankings are also observable for the most commonly used corruption indicators (Williams and Siddique 2007, 139). That our results are not perfectly in line with our intuition is as much a reason for concern as it is a justification for why corruption should be measured in the first place.

should mitigate some of the random measurement error. These advantages imply that our indicators are both more valid and more reliable. On the downside, the sample size is limited by the Global Corruption Barometer's country coverage, which at this point in time is substantially lower than Gallup's. In our investigation we start from theoretical priors but eventually rely exclusively on the data to determine which variables are reflective of private- or public-sector corruption. The results, however, are in line with our theoretical predictions.

We can further illustrate the robustness of our indicator construction to reasonable modifications. Some might argue, for example, that corruption in the media or corruption in religious organizations should be excluded from our index on theoretical grounds. After all, both types of organizations have close ties to the public sectors of many countries. To evaluate the impact of removing these variables from the construction of our private-corruption indicator, we construct two alternative indices identical to TI-PRI but each time excluding one of the two debatable components: media and religious organizations. The resulting alternative indicators are highly correlated with each other (at 0.95) and with the original indicator TI-PRI (both correlation coefficients at 0.98). We conclude that even if one remains skeptical about our data-driven approach to aggregating the individual components, the results would not change significantly following such modifications.

2.4 *On the Relationship with Traditional Corruption Indicators*

Next, in Table 2, we show how our new indicators relate to alternative, well-established corruption indicators. The latter indicators — ICRG, CC and CPI — are in their original scale, so that higher values indicate lower levels of corruption. TI-PUB is, as expected, strongly correlated with all three variables. In contrast, TI-PRI is negatively but only weakly correlated with the three indicators. These results are in line with our expectation that standard corruption measures are good indicators of public-sector corruption, but not of private-sector corruption. The Gallup indicators G-PUB and G-PRI are highly correlated with each other (with a Pearson correlation coefficient of 0.95), which should call into question their suitability for measuring two distinct forms of corruption. Our new indicators exhibit a substantially lower positive correlation (of 0.50) with each other. Concerns about the usefulness of Gallup's private-corruption indicator are strengthened by the correlations between our corruption indicators and the Gallup

indicators. G-PUB and G-PRI are both highly correlated with TI-PUB, while they are not at all correlated with TI-PRI.

Table 2: Correlation Matrix B — Established Public-Sector Corruption Indicators

Variable	**ICRG**	**CC**	**CPI**	**G-PUB**	**G-PRI**
Public-Sector Corruption (TI-PUB)	0.63*	0.60*	0.62*	-0.74*	-0.66*
Private-Sector Corruption (TI-PRI)	-0.10	-0.18	-0.16	-0.02	-0.06

Note: N = 87, * $p < 0.05$.

Overall, these results suggest that Gallup does not provide an adequate measure of private-sector corruption, which would make TI-PRI the first indicator of private-sector corruption that is available for a large cross-section of countries. The role of TI-PUB is less unique in that it simply provides one more indicator for public-sector corruption. Yet, this indicator is methodologically most suitable for comparison with TI-PRI. In the following section, we demonstrate the value of these new corruption indicators in an analysis of the different causes of private- and public-sector corruption.

3 Application I: Determinants of Private- and Public-Sector Corruption

3.1 *Theoretical Determinants of Sector-Specific Corruption*

To empirically analyze the causes of public- and private-sector corruption, we first need to identify theoretical candidates for determinants of corruption in each sector. Although there is no systematic literature on the causes of corruption in the private sector, we abstain from developing a theoretical model. Instead, we examine whether corruption levels in the private sector can be explained using the same determinants suggested in the literature for public-sector corruption. In our identification of potential determinants of public-sector corruption we follow Treisman (2007), which is one of the most widely cited and most extensive surveys on the causes of corruption. Treisman classifies the causes of corruption according to four categories: (1) economic development, (2) political institutions, (3) rents and market competition, and (4) other factors. In the corruption literature, income-per-capita levels have been the most robust explanation for cross-country differences in corruption. Treisman (2007) points out that this holds even if development levels from centuries ago are correlated with modern-day corruption. Furthermore, Gundlach and Paldam (2009b) show that long-run

causality has been running exclusively from income to corruption. Closely related to economic development is the accumulation of human capital. Svensson (2005) argues that education should be a standard explanatory factor for corruption, as it is responsible for institutional development.

With regard to political institutions, it is well established that liberal democracies experience lower levels of corruption Treisman (2007).[7] Irrespective of the prevalent political regime, corruption levels should be substantially reduced by a free press that threatens to uncover corruption (Brunetti and Weder 2003). Fisman and Gatti (2002) inquire into the theoretically ambiguous relationship between decentralization and corruption and find that fiscal decentralization is associated with lower corruption levels. Fiorino et al. (2015) also find that countries with more decentralized fiscal powers are less corrupt. We suggest taking into account three additional characteristics of the public sector, which were not studied by Treisman (2007): the size of the public sector, the level of judicial independence, and the quality of the bureaucracy. Acemoglu and Verdier (2000) as well as Alesina and Angeletos (2005) have argued that a larger public sector promotes corruption. An independent judiciary as part of the separation of powers can monitor the legality of conduct in both the legislature and the executive and hence reduce corruption (Alt and Lassen 2008; Voigt and Gutmann 2014). Finally, according to Dahlström et al. (2012), public-sector corruption can be diminished by meritocratic recruitment, but not necessarily by increasing public-sector wages. This implies the need for a high-quality bureaucracy with an established mechanism for recruitment and training.

Corruption can be expected to be higher when there are more rents to be appropriated, which is typically the case in markets with limited competition. Consequently, large rents from natural resources and a country's openness to trade can be important drivers of public-sector corruption (Ades and Di Tella 1999; Leite and Weidmann 2002). In line with this argument, more rigorous regulation of the entry of start-up firms should encourage corruption (Djankov et al. 2003).

7 Furthermore, we can expect differences in the susceptibility of alternative autocratic regime types to corruption. If we attempt to distinguish between the incentive structures of the respective ruling elites, personalist regimes should be more corrupt than party-based or military regimes, as their rule is based on clientele networks and their institutions are less capable of preventing corruption (Chang and Golden 2010; Fisman 2001). We expect that corruption is more common in military than in party-based regimes. Military regimes are more concerned with security questions and their own unity than with governing the country thoughtfully. In contrast to party-based regimes, military regimes are not subject to semicompetitive elections, nor do they need to base their rule on co-opting broader social groups (Charron and Lapuente 2011; Geddes 1999). We do not, however, distinguish between different democratic regime types, since Blume et al. (2009) have found the previously reported relationship between corruption and presidential systems not to be robust.

The two "other" determinants of corruption studied by Treisman (2007) are the variability of inflation and the role of women in politics. More variation in the inflation rate increases the difficulty of monitoring contracts, which allows for an increase in corruption (Braun and Di Tella 2004; Goel and Ram 2013). The share of women in political offices has also been proposed as a predictor of corruption levels (Dollar et al. 2001; Swamy et al. 2001); however, it is not perfectly clear what the relevant transmission channels are or whether the regression is just picking up a spurious correlation. Finally, Treisman (2007) takes into account the potential effect of some additional factors on corruption but treats them only as control variables. Hence, we deem it necessary to also control for a society's fractionalization, the share of Protestants in the population, and whether the state has a common-law legal system or was formerly a colony. Particularly regarding the theoretical relationship between Protestantism and corruption, Treisman (2000) offers more extensive discussion. In the following subsection we discuss the operationalization of the different potential determinants.

3.2 *Operationalizing the Determinants of Corruption*

To measure economic development, we take expenditure-side real GDP per capita at chained PPPs from Feenstra et al. (2013) and use it in logarithmic form. The data set by Barro and Lee (2013) provides information on average years of schooling in the total population aged twenty-five and over that is comparable across countries. To examine the role of political institutions, we start by including political-regime-type dummies obtained from Wahman et al. (2013). They utilize an empirical approach to distinguish between democracies and autocracies by combining the Freedom House Index and the Polity Index into one scale and then determining a threshold empirically.[8] Another indicator for the political environment is the Freedom of the Press Index published by Freedom House (2013). It ranges from 0 to 100 and is based on three areas: economic influence, laws and regulations, and political pressure. A dummy variable by Henisz (2000) indicates whether there are independent subfederal units that impose substantive constraints on national fiscal policy. The size of government is proxied by an indica-

8 To reach a more detailed understanding of the effects of autocracies, this group is alternatively divided into two authoritarian regime types: party-based and military regimes. Wahman et al. (2013) assign autocratic countries to one of the following four authoritarian regime types: military, monarchical, single-party, and multiparty regimes. As our sample contains no monarchy, we can ignore this regime type in our analysis. We further combine one-party and multiparty regimes into one category due to their many shared characteristics.

tor from Feenstra et al. (2013) that measures the share of government consumption in GDP. With respect to the judiciary, the judicial independence variable provided by Cingranelli et al. (2014) shows the level to which other branches of the government or the military can influence the judiciary. A final indicator for political institutions is the bureaucratic quality variable, which reflects the institutional strength and quality of the public administration according to a five-point scale. Differences in this indicator can be explained by different levels of autonomy from political pressure and established mechanisms for recruitment and training, but the variable — as it is defined — does not measure corruption. It is drawn from the International Country Risk Group (2013).

The amount of revenue from natural resources relative to GDP is measured based on the revenues from oil, natural gas, coal, precious metals, and industrial metals recorded by Haber and Menaldo (2011). Imports as a share of GDP, provided by Feenstra et al. (2013), measures the percentage of merchandise imports at current PPP. The average number of days necessary to open a business, as measured by the World Bank (2013), is used as a proxy for the level of regulation of entry.

Following Treisman (2007) and Braun and Di Tella (2004), the inflation indicator is calculated as the log of the annual variance of monthly inflation rates, based on the International Financial Statistics of the International Monetary Fund (2013). The relevance of women in politics is captured by the variable share of female members in national parliaments, which was collected by the Inter-Parliamentary Union (2013).

Linguistic fractionalization measures calculated by Desmet et al. (2012) capture the linguistic variety within a society. The ELF15 measure indicates the likelihood that two randomly selected individuals will speak different languages according to the most disaggregated level of their language typology. The share of Protestants in the population comes from McCleary and Barro (2006). The data set compiled by La Porta et al. (1999) provides a dummy variable for common-law systems, which indicates the British legal origin of the commercial law. Relying on the colonial history classification by Hadenius and Teorell (2005), we create a dummy variable "colonial past", which takes the value 1 for all countries that were colonized after 1700 by a Western colonial power. Appendix II summarizes all the potential determinants of corruption, their theoretically predicted consequences, and the data sources used.

Table 3 shows the descriptive statistics of our data set. The data for the dependent variables — that is, our indicators of private- and public-sector

Table 3: Descriptive Statistics

Variable	Mean	SD	Min	Max
TI-PUB	0.285	0.146	0.020	0.737
TI-PRI	0.375	0.141	0.000	0.794
GDP per Capita (log)	8.967	1.207	5.600	10.822
Education	8.425	2.859	1.203	13.270
Autocracy	0.289	0.457	0.000	1.000
Freedom of the Press	0.434	0.209	0.100	0.830
Fiscal Decentralization	0.145	0.354	0.000	1.000
Share of Government in GDP	0.182	0.092	0.036	0.718
Judicial Independence	0.855	0.847	0.000	2.000
Bureaucratic Quality	2.342	1.027	0.000	4.000
Share of Revenue from Natural Resources in GDP	0.042	0.068	0.000	0.427
Share of Imports in GDP	0.004	0.006	0.001	0.048
Regulation of Entry	23.789	23.747	4.000	141.000
Variation of Inflation Rate (log)	1.164	0.929	-0.829	4.026
Share of Women in Parliament (Lower House)	0.196	0.096	0.003	0.438
Linguistic Fractionalization	0.427	0.304	0.003	0.965
Share of Protestants	0.111	0.213	0.000	0.974
Common Law	0.276	0.450	0.000	1.000
Colonial Past	0.513	0.503	0.000	1.000

Note: N = 76, values based on the sample used in Table 4.

corruption — represent the years 2012 and 2013, whereas our independent variables are averages over the period 2009 to 2011. The averaged values serve to balance out seasonal macroeconomic fluctuations and random measurement error. Our analysis employs only cross-sectional data, as Transparency International has collected the data underlying our dependent variables only for some of the countries over time and has changed the questionnaire repeatedly. Overall, we have 105 and 106 observations for our dependent variables, and for 76 of these countries we also have data on all independent variables. Appendix III lists the countries covered by our new corruption indicators and also denotes which countries are included in the individual regressions.

3.3 *Empirical Analysis*

To analyze the determinants of sector-specific corruption, we estimate the following equation:

$$\text{Corruption}_{s,i} = \alpha_s + \beta_s * X_{s,i} + \epsilon_{s,i}$$

where the subscripts denote the specific sectors ($s \in public, private$) and countries (i). The dependent variables are our new indicators of private- and public-sector corruption, respectively. The independent variables, which are summarized by the vector X in the equation, are the ones discussed in Section 3.2. Column (1) of Table 4 reports the OLS coefficient estimates for the general unrestricted model of public-sector corruption. The general unrestricted model includes all theoretically relevant independent variables. In analogy, Column (2) reports the coefficient estimates for the general unrestricted model of private-sector corruption. The reported heteroscedasticity-consistent standard errors are based throughout on MacKinnon and White (1985).

Among the potential determinants of public-sector corruption, only the coefficient on the share of Protestants is statistically significant. Having more Protestants in the population is, hence, associated with lower corruption levels. As we regress private-sector corruption on the same set of indicators, it is not surprising that we find no statistically significant coefficient estimates. Only education is at least significant at the 10 percent level. Accordingly, higher levels of human capital might reduce private-sector corruption. However, the very low adjusted R^2 value indicates that the plausible causes of public-sector corruption are not a good choice for explaining private-sector corruption. A problem with both general models is their large number of independent variables relative to the number of countries observed, which causes variance inflation factors of up to 9 (for income per capita).

In a next step, we employ the general-to-specific specification search methodology to simplify our regression model (Doornik 2009; Krolzig and Hendry 2001). In this procedure, a general unrestricted model including all theoretically relevant determinants is simplified by a well-defined computer algorithm to a parsimonious encompassing, congruent representation of that model. Starting with the general unrestricted models in columns (1) and (2), we search for more specific representations of each data-generating process. The search algorithm adds impulse response dummies to deal with observations that cause large regression residuals. The specific model for public-sector corruption contains the share of Protestants, an indicator for the quality of the bureaucracy, and an impulse response dummy for Iraq. The coefficient estimates for Protestantism and quality of the bureaucracy are highly statistically significant. If the share of Protestants in the population of a country increases by 1 standard deviation, the model predicts 0.44 standard deviations less public-sector corruption. Correspondingly, a 1 standard deviation improvement in the quality of the bureaucracy is predicted to reduce corruption by 0.36 standard deviations. In contrast, for

Table 4: Determinants of Corruption

	(1)	(2)	(3)
Dependent Variable	**TI-PUB**	**TI-PRI**	**TI-PUB**
GDP per Capita (log)	0.048	-0.080	
	(0.054)	(0.055)	
Education	-0.004	0.020	
	(0.013)	(0.011)	
Autocracy	0.076	0.053	
	(0.062)	(0.069)	
Freedom of the Press	-0.061	-0.186	
	(0.261)	(0.294)	
Fiscal Decentralization	0.008	-0.057	
	(0.047)	(0.066)	
Share of Government in GDP	-0.237	-0.043	
	(0.449)	(0.498)	
Judicial Independence	0.017	-0.046	
	(0.049)	(0.051)	
Bureaucratic Quality	0.006	0.020	0.051**
	(0.038)	(0.044)	(0.012)
Share of Revenue from Natural Resources in GDP	-0.171	-0.026	
	(0.298)	(0.348)	
Share of Imports in GDP	3.980	-2.292	
	(11.830)	(15.760)	
Regulation of Entry	0.000	0.000	
	(0.001)	(0.001)	
Variation of Inflation Rate (log)	-0.006	-0.041	
	(0.030)	(0.038)	
Share of Women in Parliament (Lower House)	0.006	0.001	
	(0.171)	(0.213)	
Linguistic Fractionalization	0.020	0.027	
	(0.099)	(0.124)	
Share of Protestants	0.304**	0.075	0.303**
	(0.086)	(0.110)	(0.059)
Common Law	0.019	0.002	
	(0.053)	(0.070)	
Colonial Past	0.010	0.048	
	(0.072)	(0.086)	
Outlier Dummy	no	no	yes
Adj.-R^2	0.383	0.049	0.474
Observations	76	76	76

Note: OLS regression coefficients, robust standard errors based on MacKinnon and White (1985) in parentheses, constant omitted. Outlier dummy for Iraq in (3): 0.297 (0.329). * p<0.05,** p<0.01.

private-sector corruption all variables in the general unrestricted model are removed during the specification search process. Thus, we display only the specific model of public-sector corruption in column (3) of Table 4.[9]

If these regression results are interpreted as causal effects, we would conclude that public-sector corruption can be fought by establishing a high-quality bureaucracy. However, the level of public-sector corruption is also affected by cultural traits that are largely beyond the control of politicians. Corruption in the private sector cannot be explained using the same potential determinants suggested for the public sector.

4 Application II: Cultural Norms and Sector-Specific Corruption

In an influential article, Fisman and Miguel (2007) have studied the impact of norms and legal incentives on the law-abiding behavior of UN diplomats in Manhattan. Until 2002, diplomatic immunity protected these diplomats from parking enforcement actions, so they were only constrained by internal institutions (see Voigt 2013 for a definition and typology of institutions). As one would expect, diplomats from countries rated as highly corrupt by the CPI have accumulated significantly more unpaid parking violations. The authors claim "that the comparison of parking violations by diplomats from different societies serves as a plausible measure of the extent of corruption social norms or a corruption 'culture'" (Fisman and Miguel 2007, 1021). Fisman and Miguel link their findings with those of studies on the effects of cultural norms held by the general population of a country. If a corruption culture among the general population of their home countries can explain the actions of diplomats, one can expect that both public- and private-sector corruption levels are associated with the accumulation of unpaid parking violations.

In Table 5, we replicate Table 3 of Fisman and Miguel (2007) and replace their CPI corruption indicator with our two indicators of private- and public-sector corruption. We can confirm that diplomats from countries with a high level of public-sector corruption are less law-abiding. However, there is no comparable association with corruption in the private sector. This suggests the necessity of a more nuanced interpretation of the results by Fisman

9 We extend on the empirical results in Table 4 by running the regressions with the two autocratic regime-type variables, military and party-based regimes. The estimated coefficients for the two variables are not significant in the general unrestricted models, nor are they part of the specific models.

Table 5: Unpaid Parking Violations

	(1)	(2)	(3)	(4)
Public-Sector Corruption (TI-PUB)	-3.641***	-2.112**	-1.115	-3.853***
	(1.082)	(0.907)	(0.980)	(1.244)
Private-Sector Corruption (TI-PRI)	1.785*	-0.164	-0.720	0.634
	(1.082)	(0.906)	(0.911)	(1.146)
Post-enforcement Period (post-11/2002)	-4.425***	-4.243***	-4.215***	-4.566***
	(0.166)	(0.142)	(0.136)	(0.356)
Public Corruption x Post-enforcement				-1.428
				(1.187)
Private Corruption x Post-enforcement				2.989***
				(1.071)
Registered Number of Diplomats	0.029	0.052**	0.061***	0.049**
	(0.019)	(0.024)	(0.023)	(0.024)
Log Per Capita Income (1998 USD)		-0.368***	37.307	-0.368***
		(0.104)	(29.727)	(0.103)
Income as a polynominal of degree 4	no	no	yes	no
Log pseudolikelihood	-1014.762	-1008.054	-1003.036	-1006.628
Countries	94	94	94	94
Observations	188	188	188	188

Note: Replication of Table 3 in Fisman and Miguel (2007). Negative binomial regression coefficients, standard errors in parentheses are clustered in countries. The models are equivalent to columns 1, 2, 4 and 5 in Fisman and Miguel (2007,1037), except for the corruption indicators and sample size. Dependent variable: Number of unpaid diplomatic parking violations for a particular country. Constant omitted. * p<0.05,** p<0.01.

and Miguel.[10] The illegal behavior of UN diplomats seems to have its roots in the public sector of their home country and not in the particular society's general culture. It is still possible that this effect is reflective of some cultural norms that primarily affect the behavior of individuals in public service or which are only acquired in office. The latter could be interpreted as a form of corporate culture within public bureaucracies (Guiso et al. 2014). However, the empirical result could also be explained by the recruitment procedures for the public service and the (lack of) training received by public officials, which should be linked to public-sector corruption but not to private-sector corruption.

5 CONCLUSION

Despite recent advances in research on corruption, there is still need for contributions distinguishing between public- and private-sector corruption.

10 Fisman and Miguel acknowledge themselves that their results do not allow for the identification of the precise transmission channel.

We have aimed to fill this gap by introducing two new indicators that measure public- and private-sector corruption separately. By contrasting our new indicators with the established ones from Gallup, we have shown that our indicators are not only more convincing on methodological grounds, but also that they may include the only cross-country indicator of private-sector corruption available at this point.

Our new corruption indicators open up possibilities for future research. An obvious shortcoming of our approach is limited country coverage. This will, however, be resolved as Transparency International continues to increase the scope of its corruption barometer surveys. It will also likely be possible to cross-validate and extend our measurement approach using data provided by the World Justice Project (Botero and Ponce 2011). Another limitation of our study is our reliance exclusively on subjective corruption indicators, something which is a common problem in the empirical corruption literature. Recent studies have shown that perceptions of corruption diverge systematically from reported experiences, and that it is difficult to ascertain which one is the more appropriate measure of actual corruption (Gutmann et al. 2014). Once data on experiences with private-sector corruption becomes available, it would be worthwhile to replicate our analysis using experience-based data.

To demonstrate the usefulness of our new indicators, we have provided an initial analysis of the determinants of private- and public-sector corruption. One positive result is that public-sector corruption could be addressed by improving the quality of the bureaucracy. For policy makers, private-sector corruption appears to be harder to tackle. Future research will have to determine which specific legal institutions or corporate governance instruments could render firms more resistant to corruption. If Gutmann (2015) is an indication, institutions that promote competition might be key in that respect. Finally, our replication of an empirical study by Fisman and Miguel (2007) suggests the necessity of a more nuanced interpretation, relative to what has become customary in the literature, of the role of cultural norms for the corrupt behavior of public officials.

Appendix I: Kernel Density Plot of TI-PUB and TI-PRI

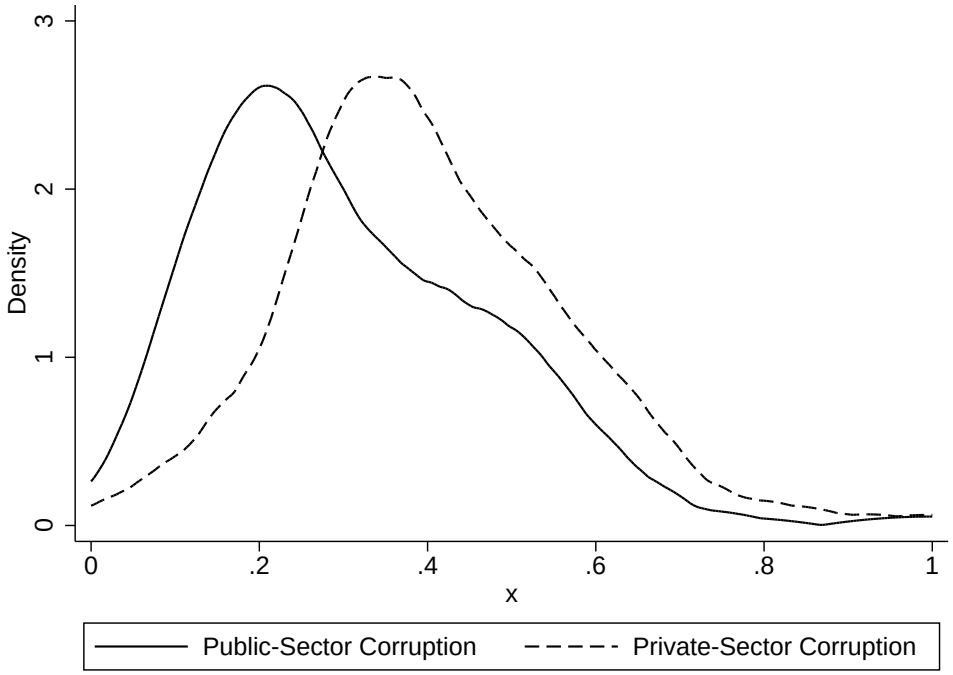

Figure 3: Kernel Density Plot of TI-PUB and TI-PRI

Appendix II: List of Variables, Data Sources, and Theoretically Predicted Effects

Table 6: List of Variables, Data Sources, and Theoretically Predicted Effects

Variable	**Data Source**	**Prediction**
GDP per Capita, PPP-adj. at 2005 USD (log)	Feenstra et al. (2013)	positive
Education (Average Years of Schooling, 25+)	Barro and Lee (2013)	positive
Autocracy	Wahman et al. (2013)	negative
Freedom of the Press	Freedom House (2013)	positive
Fiscal Decentralization	Henisz (2000)	positive
Share of Government in GDP	Feenstra et al. (2013)	negative
Judicial Independence	Cingranelli et al. (2014)	positive
Bureaucratic Quality	International Country Risk Group (2013)	positive
Share of Revenue from Natural Resources in GDP	Haber and Menaldo (2011)	negative
Share of Imports in GDP	Feenstra et al. (2013)	positive
Regulation of Entry	World Bank (2013)	negative
Variation of Inflation Rate (log)	International Monetary Fund (2013)	negative
Share of Women in Parliament (Lower House)	Inter-Parliamentary Union (2013)	positive
Linguistic Fractionalization	Desmet et al. (2012)	negative
Share of Protestants	McCleary and Barro (2006)	positive
Common Law	La Porta et al. (1999)	positive
Colonial Past	Hadenius and Teorell (2005)	negative

Table 7: List of Countries

Afghanistan	Ethiopia[2]	Luxembourg	Sierra Leone [1,2]
Albania[1,2]	Fiji[2]	Macedonia[2]	Slovakia [1,2]
Algeria [2]	Finland [1,2]	Madagascar[2]	Slovenia [1,2]
Argentina [1,2]	France [1,2]	Malawi [1,2]	Solomon Islands
Armenia [1,2]	Georgia [2]	Malaysia [1,2]	South Africa [1,2]
Australia [2]	Germany [1,2]	Maldives	South Sudan
Azerbaijan [2]	Ghana [1,2]	Mexico [1,2]	Spain [1,2]
Bangladesh [1,2]	Greece[1,2]	Moldova [1,2]	Sri Lanka [1,2]
Belgium[1,2]	Hungary [2]	Mongolia[1,2]	Sudan[1,2]
Bolivia [1,2]	India [1,2]	Morocco [1,2]	Switzerland [1,2]
Bosnia and Herzegovina [2]	Indonesia [1,2]	Mozambique [1,2]	Taiwan
Brazil [1,2]	Iraq [1]	Nepal [2]	Tanzania [1,2]
Bulgaria [1,2]	Israel[1,2]	New Zealand [2]	Thailand [1,2]
Burundi [2]	Italy [1,2]	Nigeria[1,2]	Tunisia [1,2]
Cambodia [2]	Jamaica [1,2]	Norway [1,2]	Turkey[1,2]
Cameroon [1,2]	Japan [1,2]	Pakistan[1,2]	Uganda [1,2]
Canada [1,2]	Jordan	Palestine	Ukraine [1,2]
Chile [1,2]	Kazakhstan [1,2]	Papua New Guinea [2]	United Kingdom [1,2]
Colombia [1,2]	Kenya[1,2]	Paraguay [1,2]	United States [1]
Congo, Dem. Republic [1]	Korea, South [1,2]	Peru [1,2]	Uruguay [1,2]
Croatia [1,2]	Kosovo	Philippines [1,2]	Vanuatu
Cyprus [1,2]	Kyrgyzstan [2]	Portugal [1,2]	Venezuela [1,2]
Czech Republic [1,2]	Latvia [1,2]	Romania[1,2]	Vietnam [1,2]
Denmark[1,2]	Lebanon [2]	Russia [1,2]	Yemen [1,2]
Egypt [1,2]	Liberia [2]	Rwanda [2]	Zambia [1,2]
El Salvador [1,2]	Libya [2]	Senegal[1,2]	Zimbabwe [2]
Estonia [1,2]	Lithuania [1,2]	Serbia[1,2]	

Note: Countries listed have data on private- and public-sector corruption, except the Solomon Islands, for which we have no observation on TI-PUB. [1] country sample for Table 4; [2] country sample for Table 5.

Appendix IV: Correlation Matrix A — An Alternative Public-Sector Corruption Indicator

Table 8: Correlation Matrix A — Established Public-Sector Corruption Indicators

Variable	TI-PUB	TI-PRI	Religious Bodies	Media	Political Parties
TI-PUB_2	-0.75	-0.19	-0.08	0.16	0.66*

Note: $^{a} = 105, ^{b} = 106$, * $p < 0.05$.

As an additional check of the appropriate delineation of our sector-specific corruption indicators, we draw on a question in the latest GCB, which asks respondents whether or not they perceive corruption in the public sector as a problem for their country. This indicator (TI-PUB_2) is supposed to capture the level of corruption in the public sector, though less precisely than TI-PUB. The table presents the correlation coefficients of TI-PUB_2 with both our new corruption indicators and some of their components. First, we note that this indicator is strongly correlated with TI-PUB, but not with TI-PRI. There are no significant correlations between TI-PUB_2 and the potentially disputable components of our private-corruption indicator: corruption in religious bodies and corruption in the media. In contrast, the correlation with corruption in political parties is strong, even though this was the public sector-component least clearly associated with the latent variable for corruption in the public sector in our factor analysis. Again, these results support the validity of our newly created corruption indicators.

Conclusion

Through this thesis I have taken some steps to better understand autocracies. The thesis was set out to examine how governance influences policy decisions and outcomes in autocracies. The motivation for dealing with this topic is that autocracies constitute a relevant group of countries due to their impact on the lives of approximately two thirds of the world population. The autocracies are spread all over the world and show some remarkable patterns of persistence. Research on the impact of their varying internal structures on policy outcomes is slowly emerging, though this literature remains inconclusive on the topic.

My results are chapter specific. I will first synthesize the results with respect to the individual research question raised in each chapter, before providing an answer to the overarching research question and discussing the broader implications of this thesis.

1 CHAPTER-SPECIFIC FINDINGS

The role of the type of dictator in power for the relative revenue composition is examined in *chapter 2*. My empirical analysis is based on the idea of fiscal contract literature, that the ruler negotiates with the taxpayers over political influence for revenues. I show this by distinguishing between a despotic and nondespotic dictator that the level of political exchange influences the citizens' tax compliance behavior in autocracies. Nondespotic dictators who include, in contrast to despotic dictators, their ruling elite in the decision-making process are able to raise more taxes from revenue sources with high compliance requirement, e.g. taxes on personal income or taxes on goods and services. The citizens tend to withhold fewer taxes if there is some sort of political exchange between the dictator and his ruling elite, even when they are not directly part of it. This also means that revenue sources which require a low citizens' compliance, such as nontax revenues, are more important for the relative revenue composition in au-

tocracies ruled by a despotic dictator, compared to those ruled by a non-despotic dictator. Therefore, the despotic dictator collects a lower share of taxes on personal income as one revenue source with high compliance requirement, but a higher share of nontax revenue, requiring only low or no citizens' compliance.

By focusing on the impact of the type of dictator in power on the revenue composition, this chapter aims to advance research in this field with regard to autocracies. Based on similar estimation models, it supports the results from prior empirical studies by, for example, Profeta et al. (2013), Timmons (2010), Escribà-Folch (2009) and Kenny and Winer (2006) that the degree of political exchange and representation has an impact on the compliance behavior and thus on the relative revenue composition. Yet this chapter does not find a significant link for all sources of revenue included in the analysis, which is contrary to the finding of Escribà-Folch (2009) the sole other study in the literature concerned with different autocracies.

The analysis does not come without some shortcomings. Endogeneity might be present due to potential feedback effects. Establishing a causal link from cross-country estimations might also be questioned, despite the fact that the estimations are based on theoretical arguments. Further research could try to reduce these shortcomings, e.g. by finding a suitable instrument and examine more carefully if reverse causality is in place. As an extension of the paper, it would be interesting to include the two dictator's tools, repression and benefits, in the empirical analysis. The incorporation of these two tools could help to explain more of the variations of the revenue composition in autocracies. Formal modeling, analyzing the dynamics in autocracies impacting the collection of the different revenues, might be another avenue to refine research.

Chapter 3 analyzes the dictator's reaction when facing an economic shock. Wintrobe's (1998) theoretical prediction about a change in the level of repression as the short-run reaction is tested empirically. The underlying mechanism refers to the dictator's need to secure his office. The dictator can only use repression to balance out economic shocks; in this model loyalty is fixed in the short run. Economic shocks affect the level of support, as the state of the national economy impacts the revenues collected which are used for generating support and repression. Providing some evidence for that claim, the empirical analysis shows that a negative income shock induces the dictator to increase repression, while he lowers the level of repression in the case of a positive income shock.

The results are consistent for negative income shocks with the study of Islam and Winer (2004), while the evidence in this chapter suggests that positive income shocks foster a reduction of repression when using a different measure for operationalizing repression; a result for which Islam and Winer find no empirical evidence in their study. The focus on the empirical analysis in this chapter is narrowed down to the dictator's behavior towards an economic shock, which does not lead to an immediate regime change. The within-regime focus of the analysis enriches the current empirical literature, since the other studies use economic shocks as a starting point to examine this impact on bigger events such as conflict incidence or democratization (Brückner and Ciccone 2011; Burke and Leigh 2010; Miguel et al. 2004 among others).

Concerning the shortcomings of this chapter, the potential presence of endogeneity could be addressed more empirically. The current empirical studies in this area use variations in temperature and shocks in commodity prices as possible instruments. The incorporation of these instruments in the analysis will be one main task for the revised version of this chapter. Future research may use the findings for investigating whether other internal structures of an autocracy could potentially influence the dictator's behavior in moments of economic shock and if there are differences in the dictator's reaction.

The dictator's motive to remain in office is also an essential component of the analysis in *chapter 4*. The chapter examines the dictator's behavior in moments of mass crisis, theoretically based on an entry deterrence game and provides an empirical test for the theoretical predictions. By incorporating the two domestic threats of being overthrown in one analysis, it demonstrates that when a dictator responds to mass crises with deterrence to avoid a challenger entry, his ruling elite may react by staging a coup d'état. This is because ruling elite members fear that a dictator might become too powerful once the crisis is over. A dictator's reaction to mass crises can thus foster the very outcome he is trying to prevent; not due to a mass revolution however, but instead to an elite-based overthrow. One essential result of this analysis is that only a certain type of dictator faces this dilemma and that the dictator's reaction and outcomes depend on the underlying type of dictator in power.

This analysis implies that the essential danger for the dictator emanates from the ruling elite. With this result, the chapter contributes to the debate, whether a mass uprising will actually result in a revolution to remove the dictator from power (e.g., Guttman and Reuveny 2014; Powell 2012; Svo-

lik 2012; Ulfelder 2005). The analysis further suggests that the mass crisis might be the starting point or the trigger to put an end to the dictator's rule. It shows how mass and elite crisis can be closely interconnected, thereby linking the two separate theories for mass crisis and elite crisis with each other.

Nevertheless, some shortcomings are worth mentioning and some provide room for future research. It could be too short-handed to operationalize deterrence solely with restricting civil liberties. Other forms of repression such as the violation of physical integrity or even the increased distribution of benefits, which reduces the amount of rents available for the dictator, might be alternatives. To better capture the sequence of events in the empirical analysis, it would be useful to use data with the exact date of events for mass uprising and deterrence reaction. For now, the Archigos dataset by Goemans et al. (2009) provides data with the precise day, month and year for ruler exit and Powell and Thyne (2011) for coups. Theoretically one could incorporate the possibility of an external intervention in the analysis. If the deterrence reaction of the dictator is based on repressive means, this could incentivize foreign policy makers from other countries to impose sanctions or even send in the military due to the fear of an increase in human rights violations.

Moving away from domestic crisis to corruption, the analysis in *chapter 5* is centered on the private- and public-sector corruption. In addition to developing new indicators for measuring the aforementioned two types of corruption, one main result of this chapter is that both types have different causes. The quality of the bureaucracy and the share of protestants can be negatively linked to the level of public-sector corruption, whereas none of the established determinants for corruption can be associated with private-sector corruption. With regard to autocracies, the findings of the econometric analysis show that neither autocracies in general nor the different authoritarian regimes can be associated with the two types of corruption.

The findings for autocracies shed a different light on the established finding in the literature, that democracies have a corruption-reducing effect (Treismann 2000; 2007), for which no evidence, due to the insignificant coefficient, was found. And the result from the empirical study by Chang and Golden (2010) that levels of corruption differ, even among authoritarian regimes, is also not supported by the results in the chapter.

The analysis in this paper also contains some shortcomings, of which some could be tackled by future research. The new indicators are only available for one time period (2013/14). To cross-check the validity of the approach,

the soon released new wave of underlying the corruption data by Transparency International could be used. This would allow us to move beyond a cross-section analysis. With respect to autocracies, the result that neither autocracies in general nor the different types of authoritarian regimes impact the types of corruption, needs more detailed investigation. One way might be using other measures for authoritarian regimes such as the Democracy and Dictatorship dataset by Cheibub et al.(2010) or the dataset provided by Geddes et al. (2014b) and to investigate whether the type of dictator in power or other internal structures of autocracies do in fact impact the two types of corruption.

2 FINDINGS FOR THE OVERARCHING RESEARCH QUESTION

In addition to the chapter specific research questions, this thesis sought to answer the following overarching research question: how are policy outcomes shaped by formal and informal institutions in autocracies?

My argument here is that due to the different ways of organizing autocracies internally, each dictator faces distinct incentives and constraints for his rule. These distinct incentives and constraints lead to differences in the dictator's behavior and to policy decisions, which in turn result in variations in policy outcomes. The constraints and incentives can also have an impact on the behavior of other individuals in the autocracy, e.g. on members of the ruling elite or citizens. The results of how behavior and in the end differences in policy outcomes are exactly influenced by incentives and constraints, can be drawn from the individual chapters.

Chapter 2 and *4* show that in the case of a despotic dictator, the ruling elite is not included in the decision-making. Not much negotiation or political exchange take place between this type of dictator and the ruling elite, as well as the citizens not being part of the political process. On the one hand, the despotic dictator is less constrained in his decisions and has more policy options. On the other hand, he has different constraints in his policy. The analysis of the revenue collection in *chapter 2* illustrates this point; the citizens are providing him less with taxes requiring their compliance, so he has to rely on other revenue sources, such as nontax revenue, which he can collect with little or no necessity for compliance. Besides distinguishing between despotic and nondespotic dictators, *chapter 4* also includes a differentiation across the infrastructural power of the dictator. Dictators with high infrastructural power can implement and enforce their policies without the help of their ruling elite, whereas dictators with low infrastructural

power cannot. The incorporation of the two ways of differentiating dictators in one analysis, points out that both shape the incentives and constraints for the dictators' behavior and lead to specific reactions.

In *chapter 3* the dictator's behavior is constrained by Wintrobe's theoretical assumption that he can only use repressive means in the short run. This limits his range of reaction possibilities when encountering an economic shock. The underlying reason why the dictator reacts to an economic shock is because the shock determines the amount of revenue available for the dictator to generate support among the citizens. In the case of a negative shock the level of support decreases and in order to secure his rule, the dictator has a strong incentive to react with increasing repression. As we suppose in this chapter, that a tinpot dictator is in power, the analysis outlines the incentives and constraints of such a dictator, but does not allow us to compare the tinpot's behavior to other types of dictators (e.g. the totalitarian dictator in Wintrobe's model).

Though the different underlying authoritarian regimes may produce different incentives and constraints for the dictator's policy decisions in *chapter 5*, they do not necessarily always result in different policy outcomes, as the insignificant results for the levels of private- and public-section corruption show.

3 BROADER IMPLICATIONS OF THIS THESIS

Beyond its contribution to the research on policy outcomes, some broader implications can be drawn from this thesis.

The increased knowledge on the differences in autocracies could be used for studying an autocratic breakdown and ruler exit. It might be helpful to first gain a detailed understanding of which incentives and constraints are generated by the different internal structures and based on this, which sort of behavior by the dictator, ruling elite members and citizens, this can lead to. In the next step one can identify the specific constellations of internal structures which induce the regime breakdown and ruler exit. For instance, as *chapter 4* demonstrates, only the constellation of a despotic dictator who does not hold enough infrastructural power to enforce his decisions is likely to be ousted from power after a mass crisis.

When it comes to policy advice, the thesis may provide policy makers, development agencies and international organizations with some helpful insights, even though the thesis has not aimed for a policy advice focus in

the first place. With respect to collecting revenue, it is important to keep in mind for actors and lawmakers that the degree of political representation affects the citizens' tax compliance behavior in autocracies, as it also stressed out by Winer et al. (2011). The finding of my thesis should be taken into account when making plans to change the revenue system or even introduce a tax, as otherwise the degree of political exchange could foster outcomes, which are unwanted by the dictators (and other policy makers), e.g. lower amount of total revenues collected.

In terms of fighting against corruption, one avenue to lower public sector corruption is to strengthen the public administration. This means for instance that the quality of bureaucracy should be kept at a high level and the personnel should be recruited because of their knowledge and abilities, not due to any family, political or ethnic ties.

Foreign policy makers could use the findings of this thesis to better understand the dictator's behavior. By being more able to identify the underlying interplay of formal and informal institutions and thereby the constraints and incentives of the dictator and other relevant actors, the dictator's way of governance could be better understood. These insights could be used for making more sound predictions about decisions and future developments. In addition, they could also help to decide for which type of dictator and/or authoritarian regime type it is beneficial to intervene and at which point in time.

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Part II

SUPPLEMENTARY MATERIAL

SHORT SUMMARY OF THESIS

The thesis is set out to examine how governance in autocracies influences policy decisions and outcomes. The relevance for this topic is evident considering that autocracies are a major political system affecting the lives of about two thirds of the world population. Autocracies are spread all over the world and show some remarkable patterns of persistence. Research on the impact of their varying internal structures on policy outcomes is slowly emerging, though the literature remains inconclusive. The thesis addresses a research gap between public choice, political economy and authoritarian studies. By differentiating between authoritarian regime types as well as different dictator types, the thesis offers a nuanced analysis how the varying internal structures of autocracies impact a dictator's behavior. The findings are based on four separate papers, each of which analyzes the impact of internal structures on different policies outcomes.

Referring to revenue collection, the first paper shows that the degree of political exchange influences citizens' tax compliance behavior in autocracies. The analysis is based on the idea of fiscal contract literature that the ruler negotiates with the taxpayers over political influence for revenues. The empirical findings reveal that non-despotic dictators who include their ruling elite in the decision-making process, in contrast to despotic dictators, are able to raise more taxes from revenue sources with high compliance requirement, e.g. taxes on personal income or taxes on goods and services. The citizens tend to withhold fewer taxes if there is some sort of political exchange between the dictator and his ruling elite, even when they are not directly part of it. This also means that revenue sources which require a low citizens' compliance, such as nontax revenues, are more important for the relative revenue composition in autocracies ruled by a despotic dictator, compared to those ruled by a nondespotic dictator. Therefore, a despotic dictator collects a lower share of taxes on personal income as one revenue source with high compliance requirement, but a higher share of nontax revenue, requiring only low or no citizens' compliance.

A dictator's reaction when facing an economic shock is analyzed in the next paper. Wintrobe's (1998) theoretical prediction about a change in the level of repression as the short-run reaction is tested empirically. The underly-

ing mechanism refers to the dictator's need to secure his office. Economic shocks affect the level of support, as the state of the national economy impacts the revenues collected which are used for generating support and repression. The dictator can only use repression to balance out economic shocks; in this model loyalty as political support for the dictator is fixed in the short run. Providing some evidence for that claim, the empirical analysis shows that a negative income shock induces the dictator to increase repression, while he lowers the level of repression in the case of a positive income shock.

The following paper examines the dictator's behavior in moments of mass crisis. Theoretically based on an entry deterrence game, the paper provides an empirical test for the theoretical predictions. By incorporating two domestic threats of being overthrown in one analysis, it demonstrates that when a dictator responds to mass crises with deterrence to avoid a challenger entry, his ruling elite may react by staging a coup d'état. This is because ruling elite members fear that a dictator might become too powerful once the crisis is over. A dictator's reaction to mass crises can thus foster the very outcome he is trying to prevent. Instead of a mass revolution however, there is an elite-based overthrow. One essential result of this analysis is that only a certain type of dictator faces this dilemma and that the dictator's reaction and outcomes depend on the underlying type of dictator in power.

The last paper is centered on private- and public-sector corruption. In addition to developing new indicators for measuring the aforementioned two types of corruption, another significant contribution of this paper is that both types have different causes. The quality of the bureaucracy and the share of Protestants can be negatively linked to the level of public-sector corruption, whereas none of the established determinants for corruption can be associated with private-sector corruption. With regard to autocracies, the findings of the econometric analysis show that neither autocracies in general nor the different authoritarian regimes can be associated with the two types of corruption.

Overall, the thesis argues that according to the different ways of organizing autocracies internally, each dictator faces distinct incentives and constraints for his rule. These distinct incentives and constraints lead to differences in the dictator's behavior and to policy decisions, which in turn result in variations in policy outcomes. The constraints and incentives can also have an impact on the behavior of other individuals in the autocracy, e.g. on members of the ruling elite or citizens. The thesis makes a contribution to a

research gap on the relationship between the internal structures and policy outcomes in autocracies.

KURZE ZUSAMMENFASSUNG DER DISSERTATION

Die Dissertation geht der Forschungsfrage nach wie Regierungshandeln in Autokratien funktioniert. Insbesondere untersucht diese Arbeit welche Auswirkungen die internen Strukturen auf Politikentscheidungen und -ergebnisse in Autokratien haben. Autokratien stellen eine nicht unbedeutende Gruppe von Ländern dar, die das Leben von rund zwei Drittel der Weltbevölkerung beeinflussen und in allen Teilen der Welt zu finden sind. Bisher sind die Effekte ihrer unterschiedlichen internen Strukturen auf Politikentscheidungen nur wenig erforscht. Erst seit ein paar Jahren findet die der Dissertation zugrunde liegende Forschungsfrage wissenschaftliche Aufmerksamkeit. Die Forschung widmet sich vorwiegend der Frage des Zusammenbruchs dieser autoritären Regime und die des Sturzes von Diktatoren. Durch ihren Fokus auf die internen Strukturen zielt die Dissertation somit darauf ab die Forschungslücke zwischen Public Choice, Politischer Ökonomie und Autoritarismusforschung zu füllen. In dieser Dissertation werden Autokratien nach ihrem Regimetyp und nach der Art des Diktators unterschieden um eine differenzierte Analyse durchführen zu können. Die Ergebnisse dieser Arbeit basieren auf der Analyse der Auswirkungen dieser internen Strukturen auf die erzielten Politikergebnisse (policy outcomes) in vier Politikfeldern, welche jeweils in einem eigenen, in sich abgeschlossenen Artikel untersucht werden.

Im ersten Artikel wird der Frage nachgegangen ob und wie sich politischer Austausch auf die Bereitschaft Steuern zu zahlen und damit auf die relative Zusammensetzung der Staatseinnahmen auswirkt. Die Analyse basiert hierbei auf der Idee eines hypothetischen Vertrags zwischen dem Herrschenden und den Bürgern, bei dem der Herrsche mit den Steuerzahlern über politischen Einfluss im Austausch für Steuern verhandelt. Hierbei beeinflusst der Grad des politischen Austauschs die Bereitschaft der Bürger ihre Steuern zu zahlen positiv. Auf Autokratien übertragen können nichtdespotische Herrscher, die im Unterschied zu despotischen Diktatoren ihre politische Elite in Entscheidungsprozess miteinbeziehen, relativ gesehen mehr Steuereinnahmen aus jenen Steuerarten erzielen, die eine hohe Bereitschaft der Bürger erfordern diese auch tatsächlich zu zahlen. Diese Steuerarten beziehen sich in diesem Artikel auf Einkommenssteuern und Steuern auf

Güter und Dienstleistungen (vergleichbar zur Mehrwertsteuer). Die Bürger halten weniger Steuern zurück, wenn irgendeine Art von politischem Austausch zwischen dem Diktator und seiner politischen Elite existiert, auch wenn sie nicht Teil dieses sind. Regressionsanalysen liefern empirische Evidenz für einen solchen Zusammenhang.

Die Reaktion eines Diktators im Hinblick auf einen ökonomischen Schock wird im nächsten Artikel näher untersucht. Die empirische Untersuchung als Hauptbestandteil des Artikels konzentriert sich auf die Frage ob der Diktator als Reaktion auf den Schock mit Repression reagiert, so wie es das theoretische Modell von Wintrobe (1998) vorhersagt. Ökonomische Krisen wirken sich auf die Höhe der politischen Unterstützung aus, da die wirtschaftliche Lage einer Volkswirtschaft Auswirkungen auf die Höhe der Steuereinnahmen hat und der Diktator auf diese Einnahmen angewiesen um politische Unterstützung durch Umverteilung zu erzeugen. Kurzfristig kann er allein auf Repression zurückgreifen, da basierend auf Wintrobes Modell politische Unterstützung nur langfristig erzeugt werden kann. Damit ist der Diktator in seinen Handlungsoptionen eingeschränkt. Die empirischen Ergebnisse unterstützen Wintrobes theoretische Erwartung und lassen sich wie folgt zusammenfassen: Während ein negativer ökonomischer Schock zu einer Zunahme an Repression führt, trägt ein positiver Schock zu einer Verringerung dieser bei.

Der darauf folgende Artikel analysiert das Verhalten des Diktators im Umgang mit einer Massenkrise. In diesem Artikel kommt ein selbstentwickeltes theoretisches Modell zur Anwendung, dass auf einem sogenannten entry deterrence game basiert und dessen Hypothesen im zweiten Teil des Artikels empirisch überprüft werden. In diesem Modell werden Massen- und Elitenkrise, die beide eine potentielle Gefahr für den Diktator darstellen, miteinander verbunden. Um zu vermeiden das ein Mitglied aus seiner eigenen Elite sich der Bevölkerung bei Massenprotesten anschließt und gemeinsam mit ihnen seinen Sturz herbeiführt, kann der Diktator auf eine solche Massenkrise mit einer repressiven Maßnahme reagieren, die abschreckend auf das Mitglied wirkt. Diese abschreckende Maßnahme kann von seiner Elite bei fehlender Einbeziehung jedoch auch dahingehend gedeutet werden, dass der Diktator die Situation nur ausnutzt um mehr Macht auf sich zu konzentrieren. In diesem Fall startet die Elite einen coup d'état. Ob dies tatsächlich so eintritt hängt davon ab, welcher Art von Diktator an der Macht ist. Damit zeigt dieser Artikel auf, das Massenkrisen zu einer Situation führen, die der Diktator unbedingt verhindern will; jedoch führt nicht der Protest der Bevölkerung zu seinem Sturz, sondern der coup seiner Elite. Ein wesentliches Ergebnis dieses Artikels ist, dass nur

eine bestimmte Art von Diktatoren vor diesem Dilemma steht, dass jedoch die Reaktion dieses Diktators und das Handeln der beteiligten Elite von der Art des Diktator an der Macht abhängt. Die Aussagen des Modells halten einer empirischen Überprüfung mittels Regressionsanalysen stand.

Im letzten Artikel stehen zwei Formen von Korruption im Mittelpunkt: Korruption im privaten und öffentlichen Sektor. In einem ersten Schritt werden Indikatoren für beide Formen von Korruption entwickelt. Bisher existiert noch kein Indikator zur Messung von Korruption speziell im privaten Sektor, die konventionellen Korruptionsindikatoren erfassen vorwiegend das Ausmaß an Korruption im öffentlichen Sektor. Im nächsten Schritt untersucht dieser Artikel welche Faktoren die oben genannten zwei Formen von Korruption bestimmen. Regressionsanalysen verweisen auf unterschiedliche Determinanten. Eine hohe Qualität der Bürokratie und ein hoher Anteil an Protestanten in der Gesamtbevölkerung können zu einem geringeren Ausmaß an Korruption im öffentlichen Sektor beitragen, während kein in der Literatur etablierter Faktor einen statistisch signifikanten Effekt auf Korruption im privaten Sektor aufweist. Im Hinblick auf Autokratien verweisen die Ergebnisse der ökonometrischen Analyse darauf, dass weder Autokratien im Allgemeinen noch die verschiedenen autoritären Regimes mit den zwei Arten von Korruption in Verbindung gebracht werden können.

Insgesamt zeigt diese Dissertation, dass die unterschiedlich ausgestalteten internen Strukturen Anreize und Handlungseinschränkungen erzeugen, die das Handeln und damit die Politikentscheidungen des Diktators beeinflussen. Das hieraus resultierende Verhalten des Diktators und die damit verbundenen unterschiedlich ausfallenden politischen Entscheidungen haben Konsequenzen auf die Ergebnisse. Jedoch wirken sie nicht allein auf das Handeln des Diktators, sondern vielmehr beeinflussen sie auch das Verhalten anderer Akteure in der Autokratie, die der Mitglieder der herrschenden Elite oder auch der einzelnen Bürger. Die unterschiedlichen Politikergebnisse zeigen sich u.a. bei der Zusammensetzung der Staatseinnahmen, der Reaktion des Diktators auf wirtschaftliche Schocks und bei Massenprotesten.

LIST OF PUBLICATIONS

Some ideas and thoughts have appeared previously in the following publications:

- Korte, Nina and Viola Lucas (2013);
  Entwicklungsfinanzierung: Steuern als wichtiges Instrument, *GIGA Focus Global* 2013:6, Hamburg,
  Link: *http://www.giga-hamburg.de/en/publication/entwicklungsfinanzierung-steuern-als-wichtiges-instrument*.

- Lucas, Viola and Thomas Richter (2012);
  Arbeitsmarktpolitik am Golf: Herrschaftssicherung nach dem Arabischen Frühling, *GIGA Focus Nahost* 2012:12, Hamburg,
  Link: *http://www.giga-hamburg.de/en/publication/arbeitsmarktpolitik-am-golf-herrschaftssicherung-nach-dem-arabischen-Frühling*.

STATEMENTS OF CO-AUTHORSHIPS

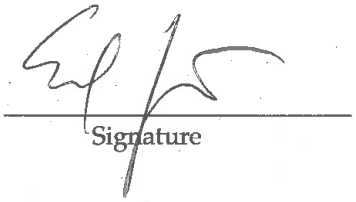
Statement of Co-Authorship

Title of Paper: How do authoritarian regimes react to income shocks? Estimating the Wintrobe model of tinpot behavior
Name of Co-Author: Prof Erich Gundlach (EG)
Located in Chapter: 3

Concept and Theoretical Framework	EG and VL
Data Gathering, Analysis and Interpretation	EG: Creation of Comprehensive Panel Dataset VL: Performed Empirical Analysis EG and VL: Data Interpretation
Manuscript Preparation	EG and VL

With his signature, the co-author consents that the above listed paper can be included in the PhD thesis and the stated contributions of the authors to the paper are accurate.

Date: 29.6.2015



Signature

Statement of Co-Authorship

Title of Paper: The Dilemma of Authoritarian Responses to Mass Crises
Name of Co-Authors: Ferdinand Eibl (FE), Thomas Richter (TR)
Located in Chapter: 4

Concept and Theoretical Framework	FE, VL and TR FE: Development of Formal Model VL: Helped with Formal Model
Data Gathering, Analysis and Interpretation	VL: Create Dataset and Performed Empirical Analysis TR: Helped with Compiling Dataset FE,VL and TR: Data Interpretation
Manuscript Preparation	VL: Preparation of First Draft Version FE, VL and TR: Several Rounds of Editing Manuscript

With his signature, each co-author consents that the above listed paper can be included in the PhD thesis and the stated contributions of the authors to the paper are accurate.

Date: 16 June 2015

Ferdinand Eibl
Signature

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Statement of Co-Authorship

Title of Paper: Unbundling Private- and Public-Sector Corruption: Insights Based on Two New Indicators
Name of Co-Author: Jerg Gutmann (JG)
Located in Chapter: 5

Concept and Theoretical Framework	JG and VL
Data Gathering, Analysis and Interpretation	JG: Factor Analysis and Development of Two New Indicators on Corruption VL: Creation of Dataset and Empirical Analysis JG and VL: Data Interpretation
Manuscript Preparation	JG and VL

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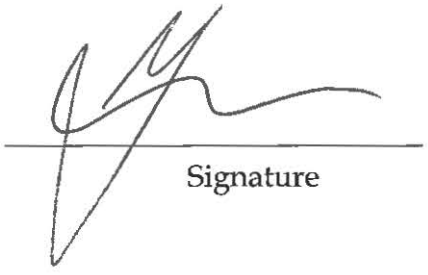

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EIDESSTATTLICHE VERSICHERUNG ZU HILFSMITTELN

Ich, Viola Alexandra Lucas, versichere [1] an Eides statt, dass ich die Dissertation mit dem Titel: "*The Effects of Autocracies on Governance*" selbst und bei einer Zusammenarbeit mit anderen Wissenschaftlerinnen oder Wissenschaftlern gemäß den beigefügten Darlegungen nach § 6 Abs. 3 der Promotionsordnung der Fakultät Wirtschafts- und Sozialwissenschaften vom 24. August 2010 verfasst habe. [2] Andere als die angegebenen Hilfsmittel habe ich nicht benutzt. [3]

Hamburg, August 2015

Viola Alexandra Lucas

ERKLÄRUNG ZU PROMOTIONSBERATUNG

Hiermit erkläre ich, Viola Alexandra Lucas, dass ich für meine Dissertation mit dem Titel: "*The Effects of Autocracies on Governance*" keine kommerzielle Promotionsberatung in Anspruch genommen habe.

Hamburg, August 2015

Viola Alexandra Lucas