



UNIVERSITY OF
LEICESTER

Essays on Natural Resources, Inequality and Political Stability

Thesis submitted for the degree of

Doctor of Philosophy

at the University of Leicester

by

Hind Bader Alofaysan

Economics Division

School of Business

University of Leicester

2017

This thesis is dedicated to my:

Parents, for believing in me

Husband, for love and support

Children; Reema, Hisham, and to my six years old daughter Fajer, who has given me strength and taught me the true meaning of kindness due to her extra chromosome.

Essays on Natural Resources, Inequality and Political Stability

Hind Alofaysan

Abstract

This thesis consists of three distinct essays on natural resources, inequality and stability. In the first essay, we retest the resource curse hypothesis that natural resources have a negative impact on growth. We use a panel fixed effect model to examine the effects of higher resource rents and exports from different types of resources on income level and growth rate. We show no evidence of the resource curse; however, we find that natural resources are beneficial for the economy as higher resource rents and exports increase income level and promote growth.

In the second essay, we develop a theoretical model on the use of public resources by a political regime to generate political groups' consensus and regimes' stability. We analyze a baseline model of a prestige-motivated regime that maximizes consensus from two groups that differ in their political preferences: elite and egalitarian. We show that while an increase in public resources always reduces the probability of coups organized by the elite, it increases (reduces) the probability of revolutions organized by the egalitarian when the initial level of public resources is low (high). Overall, regime's stability is always increasing in public resources. Furthermore, we show that higher political influence and larger size of the elite group increase the regime's stability only for high levels of resources.

In the third essay, we empirically test our theoretical predictions. We first use a semi-parametric regression and obtain strong supporting evidence that higher income increases regime's stability. We show that the probability of coups always decreases with income, whereas the probability of a revolution is a non-linear function of income. We extend the analysis and find that higher income increases democracy, whereas inequality has the opposite effect. We also find that higher income and inequality make the country prone to external conflicts and government repressions.

Acknowledgements

First and foremost, all praises be to Allah for the strengths and His blessing in completing this thesis.

My deepest gratitude goes to my supervisors, Dr. Piercarlo Zanchettin and Dr James Rockey, who have been exceptionally kind, understanding and resourceful in guiding and supporting me throughout this study. I highly appreciate their valuable comments, suggestions and excellent guidance.

I am forever indebted to my pillar of support, my dear husband, Dr Abdulamlik Alhammad. He has been steadfastly by my side, showing remarkable strength and patience in our times of difficulties, and providing me with love, financial support throughout this journey. This thesis would not have been possible without him.

To my children Reema, Fajer and Hisham, I owe them quality bonding times together and would like to thank them for their patience and sacrifice.

I extend my gratefulness to my dear father Bader Alofaysan for believing in me and to my beloved mother Aljohara Althabit for her unconditional love, prayers, and encouragement. I would also like to thank my brothers and sisters for their understanding and support.

My sincere thanks go to my parents-in-law for showing great support and understanding, I really appreciate it.

I would also like to express my appreciation to the Saudi Arabian government for the sponsorship provided during my Master and PhD studies, which has seriously helped me to achieve my goals.

I extend my sincere thanks to the academic staff and PhD colleagues in the Department of Economics, University of Leicester for their assistance. Special thanks to my dear friends Zahra, Hamidah, Valeria, Nadia, Sara Xin and Sara Akbar.

Contents

1	Introduction	1
2	Robustness of the Natural Resource Curse	5
2.1	Introduction	5
2.2	Literature Review	9
2.3	Empirical model	14
2.3.1	Data sources, measurement and methodology	14
2.3.2	Estimation results and discussion	17
2.4	Conclusion	25
3	Group Political Preferences, Inequality and Political Stability: A Theoretical Model	27
3.1	Introduction	27

3.2	Literature Review	33
3.3	The general model	38
3.4	Baseline model: Prestige-motivated regime, inside elite group and out- side egalitarian group	42
3.4.1	Purely proportional privilege elite	48
3.4.2	Positive threshold privilege elite	51
3.4.2.1	Comparative Statics	56
3.5	Extension: Elite-Affiliated regime	60
3.6	Conclusion	63
4	Political Stability, Inequality and Economic Development: An Empir- ical Evidence	65
4.1	Introduction	65
4.2	Literature Review	70
4.3	Theoretical predictions	78
4.4	Empirical model	80
4.4.1	Data sources, measurement and methodology	80
4.4.2	Estimation results and discussion	88

4.4.2.1	Semi-parametric regression	89
	Income and inequality	89
	Income and revolution	90
	Income and political stability	92
4.4.2.2	Probit model estimation	95
4.4.2.3	Fixed effect estimation	98
	Total income, inequality and political stability	98
	Total income, inequality and democracy	104
	Total income, inequality, conflicts and repression	108
	Sensitivity Analysis	112
5	Conclusions	120
5.1	Appendix	122

List of Figures

2.1	Natural resource abundance and growth 1970-1989	6
2.2	Oil rents and GDP per capita growth	15
2.3	Total resource exports and GDP per capita growth	16
3.1	Public resources, inequality and political stability	55
4.1	Theoretical predictions of total public resources, inequality and overall stability	79
4.2	Income and inequality	83
4.3	Income and political stability	84
4.4	B index, political stability and income	85
4.5	Democracy and income	86
4.6	Conflicts, repression and income	88
4.7	Non-linear link between income and inequality	91

4.8	Non-linear link between income and revolution	93
4.9	Non-linear link between income and political stability	95

List of Tables

2.1	Natural resource rents, income level and economic growth (Full sample)	19
2.2	Natural resource exports, income level and economic growth (Full sample)	21
2.3	Natural resource rents, income level and economic growth (Sub sample)	23
2.4	Natural resource exports, income level and economic growth (Sub sample)	24
4.1	The effect of total income on the probability of coups	97
4.2	Fixed effect and 2SLS estimation (dependent variable: political stability)	101
4.3	Fixed effect and 2SLS estimation (dependent variable: democracy score)	107
4.4	Fixed effect and 2SLS estimation (dependent variables: conflict and repression)	111
4.5	Robustness checks of the effect of income and inequality on stability measures (FE)	114
4.6	Robustness checks of the effect of income and inequality on stability measures (2SLS)	115

4.7	Robustness checks of the effect of income and inequality on various democracy measures	117
-----	---	-----

Chapter 1

Introduction

There is strong evidence that wealth generated from natural resources contributes to numerous dysfunctional economic outcomes, a finding that is known as "the resource curse" (Sachs and Warner, 1995; Gylfason et al., 1999). In fact, studies show that natural resource abundant economies tend to grow slower on average than economies without resources. For instance, since discovering oil in Nigeria, growth rates of GDP per capita have decreased remarkably to negative rates in some episodes despite the country's massive oil revenues.

On the contrary, some resource-rich countries have managed to benefit from their resources. For example, diamond-rich Botswana has had the world's highest growth rate since 1965, where its GDP per capita is at least ten times that of Nigeria. In addition, Botswana has the second highest public expenditure on education as a fraction of GNP (Sarraf and Jiwanji, 2001).

Similarly, Norway; the world's third largest petroleum exporter after Saudi Arabia

and Russia, has shown remarkable growth rates since 1970. This can be attributed to the well developed institutions, far sighted management and market friendly policies (Larsen, 2006)

Moreover, a positive shock in the natural resource sector raises the value of being in power and provides political regimes with more income to increase their chances of surviving in power, via different forms of patronage (Robinson et al., 2006) or by investing in repression tools (Ross, 2001b; Cotet and Tsui, 2013; Bueno de Mesquita and Smith, 2009). Therefore, autocratic leaders of resource-rich countries tend to remain longer in power (Ulfelder, 2007; Cuaresma et al., 2011; Andersen and Aslaksen, 2013).

Motivated by these findings, this thesis investigates whether natural resources are negatively correlated with economic growth and development as emphasized in the resource curse literature. Moreover, the thesis investigates how political regimes distribute the total available resources such as natural resource rents among population in order to increase the stability in power.

In particular, this thesis consists of three studies on natural resources, inequality and regime political stability. In chapter 2, we test the robustness of the resource curse hypothesis that natural resources have a negative impact on economic growth. This negative relationship was first investigated by Sachs and Warner (1995) and then confirmed by other scholars who employ similar cross-sectional estimation methods and samples to that of Sachs and Warner.

However, we use different approaches to estimate the effects of natural resources on growth. We use an updated panel dataset and employ fixed effects estimation method. We also test the effects of resource rents and resource exports of different types of natural resources on the level of income and on the rate of economic growth.

We present evidence that the resource curse hypothesis is not robust to changes in the measure of natural resources, to different estimation methods and to different samples. We show that higher rents and higher exports from various types of natural resources have a positive impact on income level and growth rates of GDP and GDP per capita.

In chapter 3, we develop a theoretical model on the use of total public resources by a political regime to generate political consensus among groups of the population which then enhances the regime's political stability. We focus on a baseline specification of a prestige-motivated political regime that maximizes the political consensus from two groups that differ in their political preferences: elite and egalitarian. The elite group provides political consensus to the regime if they obtain a privilege of public resources on top of the share distributed to all population. In contrast, the egalitarian group provides consensus if the total public resources are equally distributed among all population. A low political consensus from the elite group leads to a high risk of coups, whereas a low political consensus from the egalitarian group increases the risk of revolution.

We study the relationship between the probability of coups, revolutions and the overall regime stability in different stages of development. We show that the probability of coups decreases with the increase in public resources. In addition, we show that the probability of revolution is non-monotonic. In particular, there is a high risk of revolution when the regime has limited access to public resources and there is a low risk of revolution when public resources are abundant. Therefore, political regime can always generate stability as public resources increase.

We also show that at early stages of country's development, an increase in the polit-

ical influence or the size of the elite group decreases the regime stability by increasing the probability of coups. In contrast, at advanced stages of development, an increase in the political influence or the size of the elite group enhances the overall regime stability through a decrease in the probability of coups.

In chapter 4, we empirically investigate the theoretical predictions of our model. More specifically, we examine the impact of the increase in total income and inequality on the probability of coups, revolutions and the overall regime stability.

We use a semi-parametric regression model and find consistent evidence with our theoretical model predictions. We show that the probability of revolution is a non-linear function of total income. In particular, the risk of revolution is high in countries with low levels of income, whereas the risk is low in richer countries. Moreover, we use a probit regression model and show that the probability of coups decreases with the increase in total income. In addition, we provide evidence that the overall regime political stability always increases with total income.

We also extend the empirical estimation and study the effects of the increase in income and inequality on the level of democracy and on the probability of external conflicts and government repressions. We show evidence that higher income increases the democracy score of the country, whereas inequality has a negative impact on the country's democracy level. We also show that higher level of income and higher inequality fuel external conflicts and increase government repressions.

In chapter 5, we present summary of the overall findings of this thesis.

Chapter 2

Robustness of the Natural Resource Curse

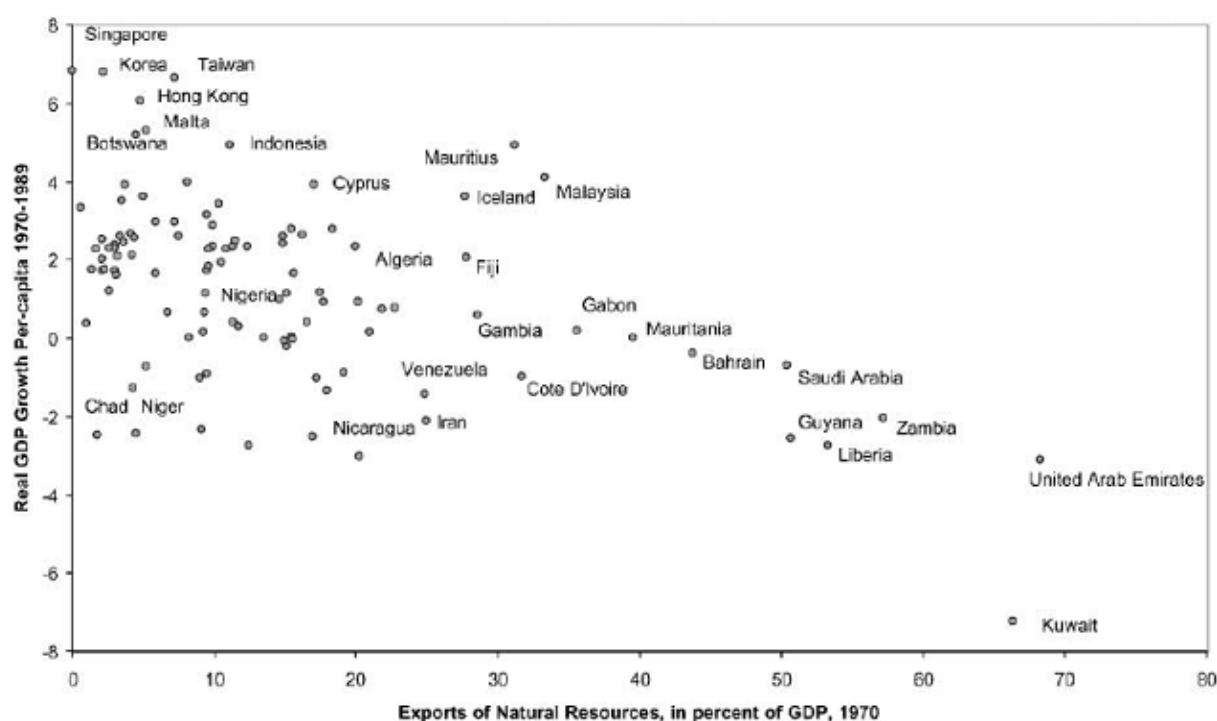
2.1 Introduction

Recent studies have found that natural resource-rich countries lag behind countries with less or no resources in terms of economic growth and development (Sachs and Warner, 1995, 1997, 2001). For instance, Nigeria, Zambia and Venezuela are considered rich in natural resources; however, they experience low GDP growth rates. In contrast, the Asian Tigers: South Korea, Taiwan, Hong Kong and Singapore experience high growth rates despite their limited access to natural resources (Mehlum, Moene and Torvik, 2006). Some large oil exporter countries, such as Iran, Venezuela, Libya and Iraq experienced negative growth rates after discovering oil (Van der Ploeg, 2011).

This counter-intuitive outcome has been known in the literature as the ‘Resource

Curse hypothesis'. This hypothesis has received significant attention since the empirical evidence of Sachs and Warner (1995, 1997, 2001) that a strong negative correlation exists between the share of resource exports to GDP and per capita GDP growth. This result is robust after controlling for geographical, demographic, political and economic differences.

Figure 2.1, produced by Sachs and Warner (2001), shows that on average there is a negative relationship between natural resources and economic growth. We note from the figure that countries that had abundant natural resources in 1970, such as Kuwait, the United Arab Emirates and Liberia, did not grow rapidly for the next 20 years. We also note that most countries that grew during this period are resource-poor, such as Korea, Singapore and Hong Kong.



Source: Sachs and Warner (2001).

Figure 2.1: Natural resource abundance and growth 1970-1989

Some studies have tested this negative relationship between natural resources and growth when controlling for additional factors. Other studies have examined the impact on the growth from different types of natural resources. Other cross-sectional studies have tested the impact of resources on the observed variations in income rather than growth rates by using GDP per capita (Arezki and Van der Ploeg, 2011; Carmignani and Chowdhury, 2012). In fact, a large number of studies on the resource curse literature are based on data from the cross-sectional specifications of Sachs and Warner, where they use the same indicator to measure natural resources. However, the literature on the resource curse has not yet reached a consensus on whether natural resources are a curse for the owning economy.

Therefore, the aim of this study is to further explore the resource curse hypothesis and provide new evidence regarding the impact of natural resources on the level of income and the rate of economic growth by using alternative approaches. We undertake a panel data analysis with country fixed effects to test the impact of natural resources on income level and economic growth. This study uses an updated panel dataset of 148 developing countries for the period 1960-2014. In particular, we test the impact of higher rents and higher exports from different types of natural resources, such as agricultural raw materials, ores and metals, oil, minerals and natural gas. We also test the credibility of our results when extreme growth rate observations are excluded from the sample.

We find significant results that higher rents from oil have a strong positive impact on levels and growth rates of GDP and GDP per capita. This result is significant under OLS and fixed effects specifications. Moreover, we find that higher rents from coal significantly increase growth rates of GDP and GDP per capita. Higher rents from

minerals and natural gas also promote income level and growth rates; however, the results are not statistically significant.

Furthermore, we show that higher fuel exports significantly promote income level and growth rates. These results become more statistically significant when we exclude the extreme growth rate observations from our sample.

We also find that strong dependence on agricultural raw material exports only reduces level of GDP under OLS and fixed effects. However, the estimation results show no significant impact on the level of GDP per capita or growth rates.

Overall, this study does not show supporting evidence for the resource curse; that is higher resource exports negatively affect growth rates of GDP per capita. Hence, we argue that the results from Sachs and Warner are not robust for changes in econometric procedures and country samples. In fact, our results suggest the opposite effect that higher resource rents and exports increase income and growth rates.

Therefore, we argue that using an updated panel dataset, controlling for countries fixed effects and using different measures of natural resources eliminate the symptoms of the resource curse.

The remainder of this chapter is organized as follows. Section 2 reviews the literature. Section 3 presents the empirical model and discusses the estimation results. Section 4 concludes.

2.2 Literature Review

This study contributes to the literature on the impact of natural resources on economic growth. Countries that have abundant natural resources lag behind resource-poor countries in terms of their growth rates. This counter-intuitive relationship is known in the literature as ‘the resource curse hypothesis’. The term was first used by Auty (1993) to describe how countries rich in natural resources seemed unable to use the wealth to boost their economies and to increase the economic growth.

This hypothesis was first investigated by Sachs and Warner (1995, 1997, 1999, 2001) who examined the effect of natural resources on economic growth. Their study focuses on cross-sectional data of 87 countries during 1970-1989. They measure natural resources using the ratio of primary product exports to GNP in 1970. The findings suggest that a significant negative correlation exists between natural resource exports and per capita GDP growth. In particular, a high ratio of natural resource exports causes low growth rates during the subsequent period. This result is robust after controlling for initial level of GDP, trade policy, volatility and income inequality.

In fact, the findings of Sachs and Warner have led to numerous studies in this field. A strand of the literature is concerned with the robustness of this negative effect of natural resources on growth to different sets of variables and to different country samples. Sala-i-Martin (1997) and Doppelhofer, Miller and Sala-i-Martin (2000) test the robustness of each variable used in the studies by Sachs and Warner by computing the probability that the variable belongs to the true regression when different control variables are entered. The findings of their study provide strong evidence of the resource curse. In addition, they classify the natural resource curse as one of the most robust

relationships in the economic growth literature.

Norrbin et al. (2008), re-examine the resource curse hypothesis by extending the period of the study to 1970 to 2000. Their study shows that the negative relationship between natural resources and growth is robust to an extended period. They also show that the resource curse appears sensitive to the sample of countries in the regression in which eliminating a single country reduces the significance of the result.

Similarly, Bruckner (2010) claims that the negative relationship between natural resources and per capita GDP growth is much stronger when using a purchasing power parity adjusted measure. Papyrakis and Gerlagh (2004) empirically examine the direct and indirect effects of natural resources on economic growth. They identify potential channels of transmission for the resource curse by regressing some explanatory variables, such as institutional quality and human capital, on natural resource dependence. They then calculate the indirect effects of resource dependence on growth from the coefficients of these intermediate variables on growth. They conclude that the negative indirect effects of natural resources on growth outweigh the positive direct effect.

Moreover, a study by Mehlum, Moene and Torvik (2006) provides strong evidence that institutions are crucial to the resource curse, a finding that contrasts with the claim of Sachs and Warner that institutions do not play any role in the resource curse. Their study shows that more natural resources increase GDP growth in countries with production-friendly institutions but reduce GDP growth in countries with grabbing-friendly institutions.

Another strand of the literature is concerned with the robustness of the resource curse to different measures of natural resources. Brunnschweiler and Bulte (2008) argue that the widely used measure of natural resource abundance in the literature, the

natural resource exports as a share of GDP, is a misleading index. In fact, it can be best interpreted as a proxy for the dependence on, rather than abundance of, natural resources. They provide evidence that strong dependence, rather than abundance, on resources slows down economic growth.

Similarly, Ding and Field (2005) propose two different measures of natural resources: natural resources capital per capita as a measure of resource abundance and the proportion of total capital that is accounted for by resources capital as a measure of resource dependence. They find evidence that strong dependence on natural resources has a negative effect on the growth rates of GDP, whereas natural resource abundance positively promotes GDP growth.

Other studies are concerned about the effect of different types of natural resources on growth. Gylfason (2001) and Murshed (2004) claim that not all resources have the same impact on economic growth. In fact, oil and mineral resources are more negatively related to growth than agricultural resources. However, Cavalcanti et al. (2011) challenge their finding and show evidence that the real value of oil production, rent or reserves has a strong positive impact on income and economic growth. In fact, oil rich countries can benefit from their wealth by adopting growth-enhancing policies.

Some scholars examine why resource-rich economies might be subject to this curse. One explanation of the negative effect of resources on growth is attributed to the Dutch disease.¹ In particular, an increase in natural resource revenue leads to an appreciation of the real exchange rate, which increases the cost of other industries' exports in foreign currency and causes a decline in the manufacturing sector, the most conducive sector

¹The term was coined in 1977 by The Economist magazine in order to describe the decline of the manufacturing sector in the Netherlands after the discovery of a large natural gas field in the North Sea in 1959.

to growth (Corden and Neary, 1982; Krugman, 1987; Van Wijnbergen, 1984; Neary and Van Wijnbergen, 1986).

Another explanation for the resource curse paradox is based on rent-seeking theories. This explanation states that natural resource abundance generates an incentive for governments to engage in non-productive activities and to provide fewer public goods than the optimum (Lane and Tornell, 1996; Tornell and Lane, 1999; Collier and Hoeffler, 2004).

Manzano and Rigobon (2001) claim that the resource curse can be a debt overhang, which explains the slow growth rate of many resource-rich countries. Moreover, Williams (2011), tests whether the negative impact of resources on growth is attributed to a lack of transparency in the resource-rich countries. The results suggest a strong and robust negative association between minerals and fuel resource export revenue and transparency, where this lack of transparency negatively affects economic growth. Furthermore, Behbudi et al. (2010) investigate the relationship between resource abundance, human capital and economic growth. They conclude that human capital can be the main factor behind the slow growth of resource-rich countries because such countries neglect to develop their human resources. Similarly, Murshed and Serino (2011) explore the relationship between the pattern of trade specialization for a country and its long term economic growth. They claim that the negative impact on growth from resources can be the result of the pattern of trade specialization for a resource-rich country.

Most scholars confirm the negative effects of resources on economic growth on a cross-sectional data. However, Manzano and Rigobon (2001) test the relationship between natural resources and growth using panel data where they show no evidence for the resource curse. They show that the negative effect of resources on growth could

be attributed to the fact that primary exports as a fraction of GNP, which is the most common measure of resources in the literature, is correlated with unobservable characteristics.

Overall, the empirical evidence on the resource curse paradox is still controversial. We emphasize that most empirical studies in this field are based on the cross-sectional specifications of Sachs and Warner, who use the ratio of primary product exports to GDP in the initial period as a measure of resource abundance. Some of these studies confirm the resource curse (Bulte et al., 2005; Gylfason et al., 1999; Rodriguez and Sachs, 1999), whereas others question its validity (Alexeev and Conrad, 2009; Cavalcanti et al., 2015; Van der Ploeg and Poelhekke, 2010).

Therefore, this chapter aims to test the robustness of the resource curse using an updated panel dataset and by employing the fixed effect estimation model. We test the effects of higher rents and exports from different types of natural resources on the level of income and the rate of economic growth.

2.3 Empirical model

In this section, we discuss our indicators, data sources, estimation models and results.

2.3.1 Data sources, measurement and methodology

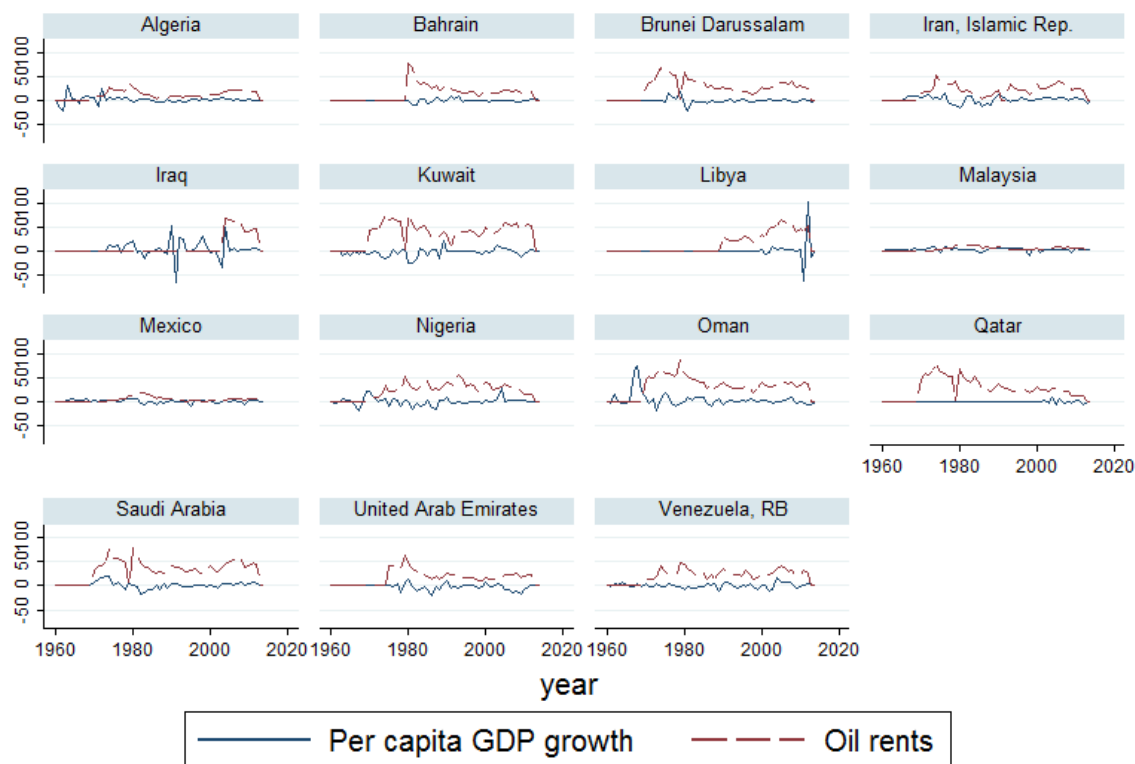
We use a panel data fixed effect estimation model for 148 developing countries from 1960 to 2014, where the dataset is drawn from the World Bank, World Development Indicators. The study tests the effects of higher rents and higher exports from different types of natural resources on the level of income measured by GDP and GDP per capita in constant 2005 US dollars. We also test the impact of higher resource rents and exports on annual growth rates of GDP and GDP per capita.

We obtain measures of natural resource rents, which refer to the wealth generated from the resource sector that represents the difference between the value and the cost of resource production. We measure resource rents as shares of GDP from different types of resources, such as coal, minerals, natural gas and oil.

We also obtain measures of natural resource exports, where higher exports indicate greater dependency on resource revenue. We measure resource exports as a per cent of total merchandise exports from agricultural raw materials, fuel, ores and metals.

Our raw data indicate that, in 1980, there was full dependency on fuel exports from Libya, where 100% of the country's merchandise exports were, in fact, from fuel. Similarly, we note that Saudi Arabian and Brunei Darussalam fuel exports were 99% of their merchandise exports from 1968 to 1981 and from 1965 to 1993, respectively.

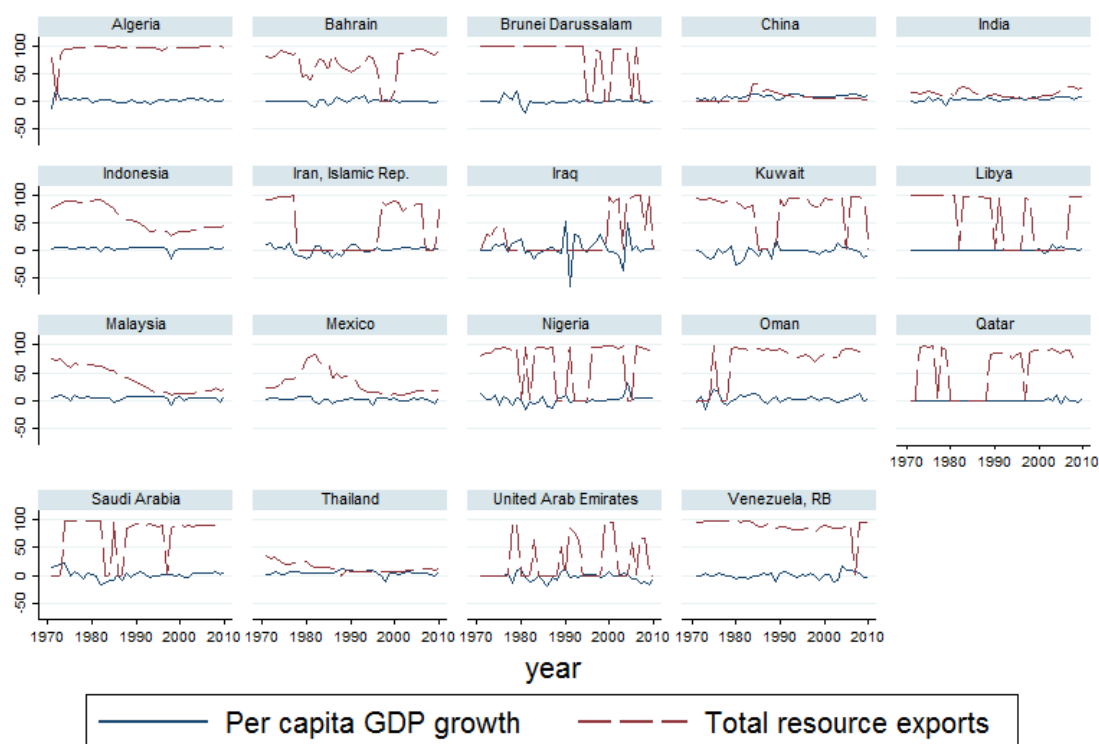
Figure 2.2 represents GDP per capita growth rates in some oil-rich countries during the last few decades. We note from the figure that the growth rate of per capita GDP is relatively low in most countries despite their large oil rents. In fact, this indicates that oil does not guarantee higher growth rates for the owning economy.



Graphs by country1

Figure 2.2: Oil rents and GDP per capita growth

In Figure 2.3, we show the relationship between total natural resource exports and the growth rate of GDP per capita in some countries from our sample. We note that the total value of resource exports is very high in countries such as Algeria, Brunei Darussalam and Venezuela. However, such strong dependence on resources does not benefit the owning economy because the growth rates are relatively low and are negative in some episodes.



Graphs by country1

Figure 2.3: Total resource exports and GDP per capita growth

Our dataset presents some extreme growth rate observations. As an example, Liberia had a very low growth rate from 1989 to 1994 because of the civil war. In fact, its GDP per capita growth rate was reduced by 90% during this period. In addition, in 1991, the Iraqi economy experienced a sharp decline in GDP per capita growth rate of 65% because of the Gulf War. In fact, these extreme growth rate observations can affect the credibility of our results. Therefore, we re-estimate the effects of natural resource rents and exports on income level and growth rate after eliminating such observations. In particular, we exclude from our sample annual growth rates higher or lower than 20%.

2.3.2 Estimation results and discussion

In this section, we first test the effect of higher rents from different types of natural resources on GDP and GDP per capita and their annual growth rates. We report OLS estimation results because most studies that confirm the resource curse employ this method. We also report the fixed effect estimation results because they identify distinct effects of natural resources on growth and avoid some omitted variable bias (Boyce and Emery, 2011).

Table 2.1 shows the estimation results of the effects of higher rents from different types of natural resources for the full sample of countries. We find that higher rents from coal have a positive impact on GDP and GDP per capita growth rates under both OLS and fixed effect estimation models. Higher coal rents have positive but not significant impact on income level of GDP and GDP per capita.

In addition, we find that rents from mineral resources significantly reduce GDP and

GDP per capita under OLS by an estimated coefficient of 1193.4 and 44.97 respectively. Moreover, rents from natural gas strongly increase GDP and GDP per capita under OLS. However, these effects do not hold when we control for the country fixed effect. We also find that mineral and natural gas rents have no significant impacts on the growth rates of GDP and GDP per capita.

Moreover, we show that an increase in oil rents significantly increases GDP and GDP per capita and their annual growth rates. This positive relationship is robust under both OLS and fixed effect.

Dependent variable	GDP		GDP growth		GDP per capita		GDP per capita growth	
	OLS	FE	OLS	FE	OLS	FE	OLS	FE
Coal rents	58467.1** (21442.0)	20912.6 (15516.4)	0.42*** (0.12)	0.39* (0.16)	-80.89 (53.16)	119.6 (76.35)	0.55*** (0.12)	0.39** (0.13)
Minerals rents	-1193.4*** (233.0)	1184.4 (740.1)	0.02 (0.02)	0.03 (0.05)	-44.97*** (7.68)	13.99 (13.56)	-0.02 (0.02)	0.01 (0.04)
Natural gas rents	1333.4*** (397.8)	2001.7 (1294.0)	-0.05 (0.03)	0.00 (0.06)	326.8*** (61.38)	249.7 (163.3)	-0.05 (0.03)	-0.03 (0.06)
Oil rents	660.8*** (92.54)	597.7* (282.3)	0.09*** (0.02)	0.09* (0.05)	153.8*** (12.70)	99.76* (46.68)	0.05** (0.02)	0.08* (0.04)
<i>N</i>	8140	8140	8140	8140	8140	8140	8140	8140
<i>R</i> ²	0.04	0.01	0.02	0.01	0.17	0.09	0.01	0.01
adj. <i>R</i> ²	0.04	0.01	0.02	0.01	0.17	0.09	0.01	0.01

Notes: The table shows the estimation results using four alternative dependent variables and by using both OLS and fixed effect for the full sample of countries. Rents are the difference between the value of production and their total costs. Minerals include tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate. Coal, minerals, natural gas and oil rents are calculated as a percent of GDP. Robust standard errors are shown in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 2.1: Natural resource rents, income level and economic growth (Full sample)

In Table 2.2, we report the estimation results of the effects of higher level of exports from different types of natural resources for the full sample of countries. We find that an increase in agricultural raw material exports strongly reduces GDP under OLS by an estimated coefficient of 472. This negative effect also holds when we control for country fixed effects. Similarly, higher agricultural resource exports significantly decrease GDP per capita by an estimated coefficient of 42.9 under OLS.

Moreover, higher dependency on fuel exports positively increases GDP and GDP per capita. Similarly, higher exports of ores and metals increase the growth rates of GDP and GDP per capita, under the fixed effects, with significant but small estimated coefficients of 0.03.

From this analysis, we find no support for the resource curse hypothesis that natural resources have a significant negative impact on economic growth. Therefore, we re-estimate the effects of resource rents and exports using our sub-sample, through which we eliminate the extreme growth rate observations that can affect the credibility of the results.

Dependent variable	GDP			GDP growth			GDP per capita			GDP per capita growth		
	OLS	FE		OLS	FE		OLS	FE		OLS	FE	
Agriculture exports	-472.0*** (58.83)	-625.3** (234.5)		0.03*** (0.01)	0.02 (0.01)		-42.92*** (2.53)	-7.44 (4.47)		0.01* (0.004)	0.01 (0.01)	
Fuel exports	581.6*** (55.56)	557.0* (226.1)		0.02*** (0.003)	0.01 (0.012)		70.27*** (5.23)	37.09** (13.37)		0.003 (0.002)	0.01 (0.01)	
Ores and Metals exports	121.1* (47.90)	153.0 (120.9)		0.02*** (0.01)	0.03*** (0.01)		8.09 (4.25)	18.25* (8.65)		0.01 (0.005)	0.03** (0.01)	
N	8140	8140		8140	8140		8140	8140		8140	8140	
R2	0.01	0.01		0.01	0.004		0.09	0.03		0.00	0.003	
adj. R2	0.01	0.01		0.01	0.004		0.09	0.03		0.00	0.002	

Notes: The table shows the estimation results using four alternative dependent variables and by using both OLS and fixed effect for the full sample of countries. Exports are calculated as a percent of total merchandise exports. Robust standard errors are shown in parentheses. * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 2.2: Natural resource exports, income level and economic growth (Full sample)

In Table 2.3, we report the estimation results after excluding the extreme growth rate observations. We find that higher coal rents significantly increase the growth rate of GDP and GDP per capita.

An increase in mineral rents negatively decreases GDP and GDP per capita under OLS but has no significant impact on the growth rates of GDP and GDP per capita. In addition, higher natural gas rents increase the level of income under OLS but have no strong effect on annual growth rates.

We also find a significant result that oil rents have a positive effect on the income level and the growth rates of GDP and GDP per capita

In Table 2.4, we re-estimate the effect of higher resource exports in our sub-sample of countries. We show that agricultural raw material exports negatively impact GDP and GDP per capita and positively enhance their growth rates under OLS.

We also find that higher exports from fuel, ores and metals significantly promote the country's income level and economic growth.

Overall, we argue that our estimation results are robust to the elimination of the extreme growth rate observations. In particular, we show evidence that higher natural resource rents promote the economy by increasing the level of income and enhancing economic growth. Higher exports from fuel, ores and metals also promote economic growth and increase income. Furthermore, we note that strong dependence on agricultural raw materials exports negatively affects income level and positively increases the growth rate.

Dependent variable	GDP			GDP growth			GDP per capita			GDP per capita growth		
	OLS	FE		OLS	FE		OLS	FE		OLS	FE	
Coal rents	58342.4** (21425.4)	20144.0 (14919.9)		0.47*** (0.11)	0.39** (0.14)		-75.24 (51.67)	120.8 (76.44)		0.59*** (0.11)	0.40*** (0.11)	
Minerals rents	-1200.2*** (234.4)	1208.8 (758.5)		0.04** (0.01)	0.06 (0.03)		-43.18*** (7.56)	14.19 (13.50)		-0.003 (0.01)	0.03 (0.03)	
Natural gas rents	1295.9** (402.6)	1968.4 (1292.0)		-0.01 (0.0250)	0.03 (0.06)		306.6*** (58.78)	241.4 (156.7)		-0.01 (0.03)	0.001 (0.05)	
Oil rents	750.5*** (102.1)	674.1* (326.8)		0.04*** (0.01)	0.06*** (0.02)		154.0*** (12.21)	99.53* (46.18)		0.001 (0.01)	0.03* (0.02)	
<i>N</i>	8009	8009		8009	8009		8009	8009		8009	8009	
<i>R</i> ²	0.04	0.01		0.01	0.02		0.17	0.09		0.01	0.01	
adj. <i>R</i> ²	0.04	0.01		0.01	0.02		0.17	0.09		0.01	0.01	

Notes: The table shows the estimation results using four alternative dependent variables and by using both OLS and fixed effect for the sub sample of countries, where we eliminate the extreme growth rate observations. Robust standard errors are shown in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Other details are as for table 1.

Table 2.3: Natural resource rents, income level and economic growth (Sub sample)

Dependent variable	GDP			GDP growth			GDP per capita			GDP per capita growth		
	OLS	FE		OLS	FE		OLS	FE		OLS	FE	
Agriculture exports	-483.2*** (59.88)	-630.3** (237.1)		0.04*** (0.004)	0.02 (0.01)		-41.44*** (2.45)	-7.39 (4.50)		0.016*** (0.004)		0.01 (0.01)
Fuel exports	590.1*** (56.77)	571.9* (235.5)		0.01*** (0.002)	0.02*** (0.01)		67.95*** (5.044)	36.43** (13.55)		0.001 (0.002)		0.02* (0.01)
Ores and Metals exports	124.4* (48.92)	156.1 (125.0)		0.021*** (0.003)	0.02** (0.01)		9.13* (4.32)	19.25* (9.46)		0.01* (0.003)		0.02* (0.01)
N	8009	8009		8009	8009		8009	8009		8009		8009
R2	0.01	0.01		0.02	0.01		0.09	0.03		0.002		0.01
adj.R2	0.01	0.01		0.02	0.01		0.09	0.03		0.002		0.01

Notes: The table shows the estimation results using four alternative dependent variables and by using both OLS and fixed effect for the sub sample of countries, where we eliminate the extreme growth rate observations. Robust standard errors are shown in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Other details are as for table 1 and 2.

Table 2.4: Natural resource exports, income level and economic growth (Sub sample)

2.4 Conclusion

In this chapter, we test the robustness of the resource curse that higher exports from natural resources have a strong negative effect on economic growth. This hypothesis was first investigated by Sachs and Warner (1995) and then confirmed by many scholars who similarly employ Sachs and Warner OLS estimation model and cross-sectional frameworks.

We have contributed to this literature by testing the effects of natural resource rents and exports on the level of income and the rate of economic growth. We focus on different types of natural resources that were not previously examined in the literature such as coal, minerals, natural gas and agricultural raw materials resources. Moreover, we have used a large panel dataset that include many developing countries over 50 years where we employ the OLS and the fixed effect estimation models.

The results in this chapter show no supporting evidence for the resource curse hypothesis. In fact, we show evidence that higher resource rents and higher resource exports increase the level of income and promote the rate of economic growth.

More specifically, larger coal rents significantly increase growth rates of GDP and GDP per capita. In addition, we find that oil-rich countries strongly benefit from their oil rents as higher rents strongly increase income level and growth rates.

Moreover, the estimated coefficients on the effects of minerals and natural gas rents on income and growth rates are also positive but are not statistically significant.

Therefore, we claim that higher rents from different types of natural resources promote the economy, which in fact supports the findings by Brunnschweiler and Bulte

(2008) and Ding and Field (2005).

Furthermore, we find that strong dependence on fuel exports has a positive impact on income level and growth rates of the country. Similarly, an increase in the volume of exports from ores and metals increases income level and growth rates of GDP and GDP per capita significantly.

We also find that the estimated coefficient on the effect of agricultural raw materials exports on the level of GDP is negative and significant. However, the effect is positive and insignificant on the growth rates of GDP and GDP per capita.

Therefore, we argue that the negative impact of natural resources on economic growth that was mostly confirmed in cross-country frameworks is not robust when controlling for country fixed effects and using different measures of natural resources and different approaches. We claim that the empirical finding in the cross sectional frameworks is due to omitted variable biases.

In fact, this study challenges the traditional resource curse that suggests that a country is better off without its natural resources. We find strong evidence that, in general, natural resources are a blessing for the economy.

Nevertheless, several limitations still abound. Endogeneity remains an important issue which is not properly addressed in this study. The natural resource measures are potentially endogenous when they are included in growth regressions. In fact, addressing endogeneity is a possible improvement to this chapter which we attempt to consider in a future research.

Chapter 3

Group Political Preferences, Inequality and Political Stability: A Theoretical Model

3.1 Introduction

Political regimes are fundamentally interested in their own stability (Tullock, 1987; Wintrobe, 1998). Political leaders of authoritarian regimes, in particular, can be removed from their power by forces within their support coalition through coups (Bueno de Mesquita et al., 2003; Svolik, 2012). Alternatively, they can be removed by mass political movements through revolutions (Acemoglu and Robinson, 2006). In fact, coups and revolutions are important in shaping a wide variety of economic and political outcomes in autocratic regimes (Gilli and Li, 2015).

In this chapter, we present a theoretical model of the use of total public resources by an authoritarian political regime to secure political support/ consensus for the regime among different groups of the population, which then enhances the regime's political stability.

The population is segmented into groups according to their political preferences. Each group political consensus is an increasing function of that group-specific index of appreciation of the regime's policies, which incorporates the group's ideal vision of the political and social order.

Regime stability is modelled as a weighted average of the groups' political consensus, where the weights depend on the size of the groups and their relative political influence or importance to the regime. Finally, we account for different specifications of a political regime's preferences. We label "purely prestige-motivated regime" a regime where the ruler(s) is (are) just interested in gaining the "prestige" assured by their political power; that is, the ruler just aims at securing political stability. An "affiliated regime" is, on the contrary, a regime whereby a combination of the political preferences of a subset of the population's groups are reflected in the ruler(s) preferences. Finally an "appropriative regime" also aims at directly appropriating part of the country's resources.

In this chapter, we focus on a baseline specifications where a prestige-motivated political regime seeks political consensus from two groups of the population, an inside elite group and an outside egalitarian group, which is the most frequently considered case in the previous literature (e.g., Acemoglu and Robinson, 2008, and Gilli and Li, 2015).

The elite group provides political consensus if they are granted the privilege of extra public resources on top of the share distributed to all population. In particular, the elite

group ideal demand of extra resources comprises a fraction of the total public resources and a fixed transfer.

The outside egalitarian group, on the contrary, offers political consensus if the regime grants equal access of the public resources to all population, the ideal political view of this group being that total public resources are equally distributed among the population. A low political consensus from the elite group leads to a higher risk of coups, whereas a low political consensus from the egalitarian group increases the risk of revolutions.

We focus on inequality in the access of public resources, probability of coups and revolutions, and overall regime stability in different stages of development of a political regime/country, where the latter are assumed to be positively correlated with the total amount of public resources available to the regime.

The main findings of the chapter are that while the probability of a coup always decreases with the total amount of public resources available to the regime (i.e., the development stage of a country/regime), inequality and the probability of a revolution are non-monotonic.

At an early stage of development, an increase in public resources increases both inequality and the probability of a revolution, whereas at a more advanced stage of development, an increase in public resources reduces both inequality and the probability of a revolution. The overall stability of the political regime, however, always increases with public resources.

More specifically, at early stages of the country/ regime development (i.e. when the regime's resources are relatively scarce), an increase in total public resources induces the regime to increase the transfer to the elite group in order to consolidate their political support. Hence, the regime widens the resource distribution inequality among the population. As a consequence, the probability that the elite group will stage a coup decreases with higher resources, whereas the probability that a revolution is organized by the other group increases. We show that the net effect on the overall stability of the regime is always positive.

At sufficiently advanced stages of development (i.e. when resources are relatively abundant), as consensus from the elite group has been consolidated, the regime tends to increase basic access to public resources equally granted to all population, thereby reducing inequality. In this stage, the probability of a revolution decreases and hence stability is secured from both sources; the elite and the egalitarian group.

The above results, in fact, offer testable predictions on the probability of coups, revolutions and overall regime stability in different stages of the country's development, which we empirically test in the following chapter.¹

Another result of this chapter is that the effect of an increase in the political influence adjusted index of the elite group size depends on the country stage of development. At early stages, an increase in the adjusted size of the elite group decreases the regime stability by increasing the probability of coups. On the contrary, at more advanced stages of development, an increase in the adjusted size of the elite group enhances the overall regime stability through a decrease in the probability of coups.

¹We find empirical evidence that higher level of GDP per capita increases inequality in the access to public goods and the probability of revolutions in poor countries, whilst it reduces inequality and the risk of revolutions in richer countries. We also find that the probability of coups always decreases with higher levels of income.

More specifically, when there is a limited access to public resources, the regime struggles to secure the political consensus of the elite group if the group is large in size and/ or more important to the regime. Therefore, the probability of coups increases and the regime overall stability is negatively affected. On the contrary, a rich regime can easily meet the optimal transfer to the large and more influential elite, which then implies a lower probability of coups and higher regime stability.

We also extend the baseline model to the case of an elite-affiliated regime, where we confirm the same pattern of inequality, coup and revolution risks, and regime overall stability in the different stages of development. As expected, in comparison with the case of a non-affiliated regime, in any given stage of development, an affiliated regime produces higher inequality, lower stability, higher risk of revolutions and lower risk of coups. Interestingly, however, inequality and risk of revolutions will start decreasing at an earlier stage of development.¹

Although we do not fully exploit its potential in this chapter, our general model presents a simple but rich and flexible setting which can encompass a wide class of regime typologies (alternative partitions of the population in groups with different political influence, combined with alternative preferences profiles of the regime). For instance, the model can be adapted to explore the case of a competition between elite groups for privileges from the regime. Furthermore, the model is simple enough to be incorporated in a proper general equilibrium model and/or in a proper dynamic model. The general regime typology model is therefore one of the contributions of this chapter. Moreover, as we argue in the next section, our analysis of the political-channel-joint determination of inequality in the access to public resources, stability, coup and revolution risks, along a country/regime development process is novel in the literature on

¹This is another testable implication of our analysis, which we leave for future empirical work.

the political economy of development. Finally, we show testable joint hypotheses on the pattern of inequality, revolution and coups risks which, as shown in chapter four, find confirmation in the data.

The rest of this chapter is organized as follows: section two provides a review of the relevant literature. Section three presents the general model. Section four shows the baseline model and derives the main results. Section five extends the baseline model to the case of an elite-affiliated regime. Section six concludes.

3.2 Literature Review

In this section, we review the literature on authoritarian political institutions, threats of coups and revolutions and political survival in power.

Our study relates to different strands of the literature. Substantial studies argue that fiscal reliance on natural resources, particularly oil, helps to create authoritarian political regimes. The origin of this idea is traced back to Mahdavy (1970), who developed the ‘Rentier states’ theory where the term refers to the states that derive large part of their national income from the exploitation of natural resources. The theory states that petroleum revenues constitute an external source of rents that accrue directly to the governments and encourage a dysfunctional form of economic development.

Yates (1996) argues that due to the poor governance in the rentier states, political leaders use the large rents from the resource sector to meet unpopular objectives. Political leaders who have access to resource rents can enhance their security in power by investing in repression tools (Ross, 2001b; Cotet and Tsui, 2013; Bueno de Mesquita and Smith, 2009). Larger amount of resources is associated with longer durations in political leadership (Andresen and Aslaksen, 2013; Smith, 2004; Ulfelder, 2007).

We share with this literature the idea that authoritarian regimes directly control and use public resources to secure their political stability. However, instead of focusing on the static and dynamic inefficiencies caused by said use of public resources, we concentrate on the evolution of inequality and instability in a country development process as a function of the population political typology and the regime’s profile of preferences.

In this respect, our study is closely related to recent studies on the political survival

of different types of non-democratic regimes. Acemoglu et al. (2004) develop a model of kleptocratic regimes that use a "divide and rule" political strategy to undermine cooperation among members of a society that can threaten the regime's stability. The regime, distributes rents from natural resources to bribe some groups of the population in order to maintain the stability in power. Wintrobe (1998) shows that autocratic regimes tend to purchase political support by providing access to economic resources, licenses and public jobs.

Robinson and Torvik (2005) and Robinson et al. (2006) develop a model on the political incentives triggered by resource booms. In their model, the main objective of the political leaders is to secure the power in order to benefit from current and future resource rents. These rents can be easily hidden and allocated to the leader's private consumption and to increase political stability via different forms of patronage, tax cuts or political oppression.

Similarly, Gallego and Pitchik (2004) and Cuaresma et al. (2011) analyze a model of an autocratic regime that uses resource rents for their own enrichment and to pay off potential opposition from staging a coup.

In fact, the above studies suggest that higher rents from resources increase the regime's stability by reducing the probability of coups, which is consistent with our model predictions.

Bueno de Mesquita et al. (2003) propose a 'Selectorate model', which examines how political leaders make policies to ensure their political survival. According to this theory, there are three groups affect the leader's stability; nominal selectorate (all registered voters), real selectorate (i.e. who cast a vote), and winning coalition, whose support is vital for ensuring the leader's stability. The leader provides public goods

to all members of society, such as national defence and environmental protection. In addition, the leader provides private goods only to their coalition members in order to purchase their support and, hence, consolidate the leader's authority.

The Selectorate model also shows that the choice of providing private benefits or public goods is driven by the size of the winning coalition. More specifically, when the size of the winning coalition is small, as in autocracies, the leaders use private goods to satisfy the coalition. On the contrary, when the size of the winning coalition is large, as in democracies, the leader satisfies the coalition by providing public goods.

Bueno de Mesquita and Smith (2009) and Smith (2008) extend the theoretical analysis of the 'Selectorate model' to include revolutionary threat by the citizens. They show that leaders can minimize the risk of losing power because of a revolution by either suppressing public goods such as freedom of assembly and freedom of information or by appeasing potential revolutionaries through providing more public goods. However, once a revolution is organized, then more public goods increase the chances of the revolution to be successful.

The model also shows that increasing or suppressing public goods depends on the source of government resources. More specifically, if the resources, which are important to generate coalition support, are obtained by taxing productive economic activities, then suppressing public goods is not an optimal policy since it reduces productivity and then total resources. However, when the leaders have access to labour free resources (i.e. natural resources or foreign aid), then they can still suppress revolution and generate support from the coalition.

Bueno de Mesquita and Smith (2010) find empirical evidence of the Selectorate model predictions. They show that political leaders are more likely to survive in power

when they have a small coalition of supporters and access to free resources that does not require a significant economic participation by the citizens.

This study, however, departs from the existing literature in this field by establishing a theoretical model of maximizing the political regime stability through the use of the total public resources in order to generate political consensus among groups of the population.

Our model relates to the Selectorate model in many aspects. In particular, we also assume that political regimes maximize stability by securing political support from different groups of the population through the distribution of public resources. However, we emphasize that our focus is on the relationships between the size of the regime public resources and the overall regime stability, the probability of revolutions and the probability of coups.

Similar to the Selectorate theory, we examine the impact of the size of the inside elite group on the regime's stability. However, our focus is on the impact in different stages of country's development. We find a result that is novel to the literature that more political influence and larger size of the elite group reduce the regime stability at an early stage of development, whereas they enhance the regime stability in a more advanced stage.

We also contribute to the literature in the authoritarian political institutions where coups and revolutions are important for economic and political outcomes in autocratic regimes (Gilli and Li, 2015). Some scholars study the threat of coups (Bueno de Mesquita et al., 2003; Egorov and Sonin, 2011; Svolik, 2009, 2012) whereas other studies focus on the threat of revolutions (Acemoglu and Robinson, 2006; Svolik, 2013; Aidt and Jensen, 2014; Gilli and Li, 2014).

The interaction of coups and revolutions is addressed in Gilli and Li (2015). They provide a theoretical analysis of the influence of the interaction of coups and revolutions on the accountability of the leader in terms of economic performance. According to their model, coups by an inside group occur because they fear revolution and the threat of coups can force the leader to implement efficient policies. However, when the cost of revolution is very small, coups and revolutions will not deter a leader from implementing the inefficient policies.

Our model also captures the interaction between coups and revolutions which contributes to the overall regime stability. We show that probability of coups always decreases with total public resources, in line with Cuaresma et al. (2011). We also show that the probability of revolution is a non-monotonic function of the level of resources. In fact, this overall pattern of the inequality effects of the stability maximizing resource allocation chosen by an autocratic regime in different stages of development is novel in this literature.

3.3 The general model

Consider a one period economy model where the population N is segmented into groups according to their political preferences. Within each group, individuals share identical political preferences. The set of all groups is denoted by G , while g identifies a group in the set. The size of each group is denoted by $\beta^g N$, where $\sum_{g \in G} \beta^g = 1$.

Each group is identified by a specific index contrasting the ideal policies which would secure full political consensus to the regime by that group and the actual policies. This index incorporates a group view of society and institutions, so that it actually introduces a component of other groups' regarding preferences.

Individual j in group g has a utility:

$$U_j^g = m(y_j^g) + s^g \left(\frac{d_j^g}{\hat{d}^g} \right) \quad (1)$$

Where the first part, $m(y_j^g)$, is the utility function of the material payoffs income, y_j^g , of individual j who belongs to group g . The function $m(y_j^g)$ has the following standard properties:

$$m'(y_j^g) > 0$$

$$m''(y_j^g) < 0$$

The second part in equation 1, $s^g \left(\frac{d_j^g}{\hat{d}^g} \right)$, is the weighted average of the individuals political consensus; that is the probability of the individuals' political consensus to the regime where; $s^g \in (0, 1)$. $\left(\frac{d_j^g}{\hat{d}^g} \right)$ is a group-specific index of satisfaction, which is a comparison of the consequences of the actual regime policies, d_j^g , and the group ideal

(i.e. maximum) value of that index, $\hat{d}^g$. Each individual in the group has the same political preferences. Hence, the ideal regime policy is the same for all individuals in the group.

The relationship between the index of individuals' satisfaction of regime policies and the probability of the individuals' political consensus is monotonic and positive. The function $s^g(\frac{d_j^g}{d^g})$ is concave for $0 \leq (\frac{d_j^g}{d^g}) < 1$. This implies that the regime can maximize the group political consensus by treating the individuals equally. Hence, $s^g(\frac{d_j^g}{d^g})$ has the following properties:

$$\left\{ \begin{array}{l} s^g(\frac{d_j^g}{d^g}) = 1 \text{ if } (\frac{d_j^g}{d^g}) \geq 1 \\ s^g(\frac{d_j^g}{d^g}) = 0 \text{ if } (\frac{d_j^g}{d^g}) = 0 \\ \frac{ds^g(\frac{d_j^g}{d^g})}{d(\frac{d_j^g}{d^g})} \geq 0 \\ \frac{d^2 s^g(\frac{d_j^g}{d^g})}{d(\frac{d_j^g}{d^g})^2} \leq 0 \end{array} \right\}$$

Our focus in this model is on the relationship between the groups' political preferences and the use of total public resources by the regime to generate political consensus among the population. Therefore, we abstract from the material payoffs in equation 1, which we will discuss in details at the end of this section.

The political regime (i.e. the ruler) distributes a total amount of public resources, Π , among the population groups to generate political consensus. We denote by $T^g \geq 0$ the total transfer of resources to group g , which is modelled as a broad access to resources and services, which will be referred to by 'transfer', where:

$$\Pi = \sum_{g \in G} T^g \quad (2)$$

Given the total amount of public resources, Π , the regime's optimal strategy to maximize the group's political consensus is to provide an equal share of the group's total transfer to all individuals in that group, which is implied by the concavity of the political appreciation function, $s^g(\frac{d_j^g}{d^g})$, such that: $d_j^g = d^g$, $\forall j \in g$. Therefore, the model captures inequality in the distribution of the total public resources between the groups rather than within the groups.

The individuals political consensus contribute to an aggregate index of the regime stability denoted by S . Since individuals in each group are identical in their political preferences, then S is a weighted average of the groups' political consensus. The weight consists of the importance/ influence of the group or the ability of the group to threaten the stability of the regime; $I^g \geq 0$, and the relative size of the group in the total population; β^g . Specifically, the influence adjusted size of any group is $B^g = I^g \beta^g$, where $\sum_{g \in G} B^g = 1$.

Therefore, political stability is given by:

$$S = \sum_g B^g s^g(\frac{d^g}{\hat{d}^g}) \quad (3)$$

We model the utility of the political regime such that it depends on the prestige of being in power; P and the regime's share of the total public resources; T_r . Moreover, the utility reflects the regime's degree of affiliation with the political preference of the preferred group; F , where $F = \sum_{g \in G_r} r^g s^g(\frac{d^g}{\hat{d}^g})$, denoting with G_r the set of groups that enters the political affiliation of the regime with a positive weight; r^g , where $G_r \subseteq G$.

Hence the utility of the political regime is given by:

$$U_r^g = [\gamma_p P + \gamma_{T_r} T_r + \gamma_F F] S \quad (4)$$

Where $\gamma_p, \gamma_{T_r}, \gamma_F \geq 0$ and $\gamma_p + \gamma_{T_r} + \gamma_F = 1$. We note that the regime preferences combine different possible types of political regimes which can all be accommodated in our general model. More specifically, when $\gamma_F = 0$ and $\gamma_p, \gamma_{T_r} > 0$, then the political regime is an appropriative regime that concerns about the prestige of power, the regime stability and the private share of the total public resources. Moreover, when $\gamma_{T_r} = 0$ and $\gamma_p, \gamma_F > 0$, then the political regime is an affiliated regime that concerns about the prestige of power, the regime stability and the degree of affiliation with a group to the other or to some groups with different weights. Furthermore, when $\gamma_F, \gamma_{T_r} = 0$, and $\gamma_p > 0$, then the regime is a purely prestige-motivated regime that only concerns about the prestige of power and stability.

In this model, we abstract from the analysis of the private sector since our focus is on the use of public resources by the regime to generate political consensus among the population. Moreover, we assume that the total amount of public resources is collected through non-distortive taxation such as the extraction of natural resources, which does not cause any static inefficiency in the economy. We note that the trade-off between securing political consensus and generating static inefficiency is already analyzed in the literature and can also be accommodate in our general model.

3.4 Baseline model: Prestige-motivated regime, inside elite group and outside egalitarian group

In this section, we investigate a baseline model where the regime is only concerned about the prestige of being in power; $P > 0$. In terms of our general preferences presented in the general model $\gamma_{T_r} = \gamma_F = 0$ so that $\gamma_p = 1$.

Hence the utility of the regime is:

$$U_r^g = PS \tag{5}$$

Where the probability that the regime will remain in power, S , is a function of the political consensus from two groups of the population; an inside elite group denoted by a and an outside egalitarian group denoted by e . The elite group provides political consensus to the regime if they are granted a privilege of an extra transfer of public resources from the regime above the transfer to the other group. A low political consensus from the elite group increases the risk of staging a coup. The size of the elite group is βN and their political influence or importance to the regime is I^a . Hence, as in the previous section, we denote by B the influence adjusted size of the elite group: $B = I^a \beta$.

The egalitarian group (the rest of the population) provides political consensus to the regime if the privilege to the elite is removed and each individual in the population receives an equal share of the total public resources. Low political consensus from the egalitarian group increases the risk of revolutions. The size of the egalitarian group is

$(1 - \beta)N$ and their political influence or importance to the regime is I^e . Hence, the influence adjusted size of the egalitarian group is $(1 - B) = I^e(1 - \beta)$.¹

Denoting by t^a and t^e the per capita transfer of resources to individuals of the elite and the egalitarian group respectively.

The total public resources is fully distributed between the two groups, T^e which is the total resource transfer to the egalitarian group and T^a that is the total resource transfer to the elite group. Therefore:

$$\Pi = T^e + T^a$$

The elite total transfer, T^a , consists of a basic transfer which equals to the transfer to the egalitarian group t^e and an extra transfer, ΔT such that:

$$T^a = t^e \beta N + \Delta T$$

If positive, the extra transfer ΔT is the privilege to the elite group from the regime and the only source of resources distribution inequality between the two groups.

The distribution of public resources must respect the following constraint:

$$\Pi = t^a \beta N + t^e (1 - \beta) N$$

¹More precisely, since

$$B = I^a \beta$$

$$(1 - B) = I^e (1 - \beta)$$

Then, I^a and I^e are linked as follows:

$$I^e = \frac{1 - \beta I^a}{(1 - \beta)}$$

That is, the influence of the egalitarian group is a decreasing function of the influence and the size of the elite group.

Each individual in the elite group receives:

$$t^a = t^e + \frac{\Delta T}{\beta N}, \quad (6)$$

where the per capita transfer to each individual of the egalitarian group can be written as:

$$t^e = \frac{\Pi - \Delta T}{N} = \frac{T^e}{(1 - \beta)N} \quad (7)$$

As in the general model, each group political preference is a function of the actual policy of the regime d^g over the ideal $\hat{d}^g$. For the egalitarian group, the ideal regime policy is the equal distribution of resources among all population, that is, $\hat{d}^e = \frac{\Pi}{N}$. This ideal position on the preference of individuals in the egalitarian group is contrasted with the basic per capita transfer decided by the regime, which is also equal to the per capita transfer of resources that is received by individuals in the egalitarian group. The basic per capita transfer over the egalitarian transfer is a direct measure of the degree of the egalitarianism of the regime policies, that is, $d^e = \frac{\Pi - \Delta T}{N} = t^e$, Hence:

$$\left\{ \begin{array}{l} \hat{d}^e = \frac{\Pi}{N} \\ d^e = \frac{\Pi - \Delta T}{N} = t^e \end{array} \right\} \quad (8)$$

For the elite group, the ideal regime policy that would secure full support to the regime is to receive $\hat{d}^a$, which is the ideal extra transfer per capita over the transfer per capita of the rest of the population (that is, the egalitarian group).

Hence, the elite group's ideal policy in terms of per capita extra transfer is given by $\hat{d}^a = \frac{K+k\Pi}{\beta N}$, which is positively affected by the richness of the regime through $k \in [0, 1]$. In addition, the per capita extra transfer demanded by the elite group contains a fixed positive component; $K \geq 0$. That is a fixed extra transfer of public resources that does not depend on the richness or the total public resources available to the regime. The actual regime policy to the elite group is given by $d^a = \frac{\Delta T}{\beta N}$, Hence:

$$\left\{ \begin{array}{l} \hat{d}^a = \frac{K+k\Pi}{\beta N} \\ d^a = \frac{\Delta T}{\beta N} \end{array} \right\} \quad (9)$$

We note that for the elite group, the relevant measure of the regime policies to be contrasted with the ideal extra income per capita ($\hat{d}^a$) is the actual extra income per capita distributed to them by the regime, d^a .

We consider the political preference function of each group to be a concave symmetric power function: $s^g \left(\frac{d^g}{\hat{d}^g} \right) = \left(\frac{d^g}{\hat{d}^g} \right)^\alpha$, where $g = (a, e)$ and $\alpha \in (0, 1)$. This specification of the political preference functions satisfies INADA conditions, which rule out corner solutions of fully transferring the total resources to one group. In other words, we posit here that both groups are important to the regime's stability.

Symmetry of the functional forms of the two groups is to avoid the distraction from other sources of asymmetry, then the adjusted political influence and the groups political preferences.

Concavity rules out the differential treatment of the individuals within the same group which is not the focus of our model.

We note that the assumption of symmetric power functions does not restrict the

generality of the results as similar results can be obtained with concave functions and asymmetry.

Hence, substituting equation 8 in the political preference function of the egalitarian group yields:

$$s^e \left(\frac{d^e}{\hat{d}^e} \right) = \left(1 - \frac{\Delta T}{\Pi} \right)^\alpha \quad (10)$$

Substituting equation 9 in the political preference function of the elite group yields:

$$s^a \left(\frac{d^a}{\hat{d}^a} \right) = \left(\frac{\Delta T}{K + k\Pi} \right)^\alpha \quad (11)$$

Then, substituting 10 and 11 in the equation of regime stability 3 yields:

$$S = B \left(\frac{\Delta T}{K + k\Pi} \right)^\alpha + (1 - B) \left(1 - \frac{\Delta T}{\Pi} \right)^\alpha \quad (12)$$

The objective of the regime is to choose the extra transfer to the elite group, ΔT , in order to maximize the regime's utility 5 subject to 12:

$$\max_{\Delta T} U_r = P \left[B \left(\frac{\Delta T}{K + k\Pi} \right)^\alpha + (1 - B) \left(1 - \frac{\Delta T}{\Pi} \right)^\alpha \right]$$

By choosing ΔT , the regime also sets inequality in the resource distribution across the population. Higher inequality increases the chances of revolution. We measure inequality by constructing a simple index, Q , that is the ratio between the elite extra transfer per capita and the basic transfer per capita, such that:

$$Q = \frac{t^a - t^e}{t^e},$$

which using 6 and 7, can be written as:

$$Q = \left(\frac{1}{\beta}\right) \left(\frac{\frac{\Delta T}{\Pi}}{1 - \frac{\Delta T}{\Pi}}\right)$$

The above can be finally written as:

$$Q = \frac{t^a - t^e}{t^e} = \left(\frac{1}{\beta}\right) \left(\frac{\frac{\Delta T}{\Pi}}{1 - \frac{\Delta T}{\Pi}}\right) \quad (13)$$

We note that the Gini index is uniquely determined by, and monotonically increasing in, our measure of inequality, Q . In particular, in our simple model, Gini coefficient takes the simple expression (as $t^a - t^e \geq 0$):

$$G = \frac{(t^a - t^e)(1 - \beta)\beta}{\beta t^a + (1 - \beta)t^e},$$

This expression can be explicitly reformulated in terms of Q as follows:

$$\begin{aligned} G &= \frac{\frac{t^a - t^e}{t^e}(1 - \beta)\beta}{\beta \frac{t^a}{t^e} + (1 - \beta)} \\ G &= \frac{\frac{t^a - t^e}{t^e}(1 - \beta)\beta}{\beta \frac{t^a - t^e}{t^e} + 1} \\ G &= \frac{Q(1 - \beta)\beta}{\beta Q + 1} \end{aligned}$$

We note that β is always taken as given in our analysis of the relationship between total resources available to a regime, the regime policies, and income inequality, we

then calculate:

$$\frac{\partial G}{\partial Q} = \frac{(1 - \beta)\beta(\beta Q + 1) - \beta Q(1 - \beta)\beta}{(\beta Q + 1)^2} = \frac{(1 - \beta)\beta}{(\beta Q + 1)^2} > 0$$

That is, Gini index is uniquely determined by, and monotonically increasing in, our measure of inequality, Q .

In order to start the model analysis, we first consider a purely proportional privilege elite where their ideal regime policy is proportional on total resources. We then consider a positive threshold privilege elite where their ideal regime policy depends on the total public resources of the regime and other fixed extra transfer.

3.4.1 Purely proportional privilege elite

In the proportional case, the elite group ideal regime policy is a proportion of the total public resources such that: $\hat{d}^a = \frac{k\Pi}{\beta N}$, where $K = 0$ and $k \in [0, 1)$. Hence, substituting in 11 yields:

$$s^a \left(\frac{d^a}{\hat{d}^a} \right) = \left(\frac{\Delta T}{k\Pi} \right)^\alpha \quad (14)$$

Hence, the regime stability from equation 12 will be:

$$S = \left\{ \begin{array}{ll} B \left(\frac{\Delta T}{k\Pi} \right)^\alpha + (1 - B) \left(1 - \frac{\Delta T}{\Pi} \right)^\alpha & \text{if } \Delta T < k\Pi \\ B + (1 - B) \left(1 - \frac{\Delta T}{\Pi} \right)^\alpha & \Delta T \geq k\Pi \end{array} \right\} \quad (15)$$

Hence, the utility of the political regime is:

$$U_r = P \left[B \left(\frac{\Delta T}{k\Pi} \right)^\alpha + (1 - B) \left(1 - \frac{\Delta T}{\Pi} \right)^\alpha \right] \quad (16)$$

The following proposition shows the optimal solution that maximizes the political regime utility (16), which crucially depends on whether the following inequality is satisfied:

$$\frac{(B)^{\frac{1}{1-\alpha}}}{(B)^{\frac{1}{1-\alpha}} + (1 - B)^{\frac{1}{1-\alpha}} [k]^{\frac{\alpha}{1-\alpha}}} < k \quad (I_1)$$

We denote by L_1 to the term in the left hand side of the above knife-edge condition I_1 . More specifically, if L_1 is lower than the ideal policy of the elite group k then it is optimal to the regime to transfer L_1 to the elite group to maximize the regime utility. However, if L_1 is greater than k then the optimal strategy for the regime is to just transfer the elite group ideal level k to secure the group full political consensus. Transferring more than the ideal level that is required by the elite group will not generate extra consensus.

Proposition 1 *If I_1 holds, then:*

$$\left(\frac{\Delta T}{\Pi} \right)_{pr}^* = \frac{(B)^{\frac{1}{1-\alpha}}}{(B)^{\frac{1}{1-\alpha}} + (1 - B)^{\frac{1}{1-\alpha}} [k]^{\frac{\alpha}{1-\alpha}}} \quad (17a)$$

Under some conditions, I_1 can be reversed, then:

$$\left(\frac{\Delta T}{\Pi} \right)_{pr}^* = k \quad (17b)$$

Proof. See the Appendix ■

We note that $\left(\frac{\Delta T}{\Pi}\right)_{pr}^*$ is the crucial decision by the political regime in the proportional case to set inequality rates between the two groups and to generate political stability. It is clear from 17a, that an increase in the total public resources has no effect on $\left(\frac{\Delta T}{\Pi}\right)_{pr}^*$. Hence, from 13 and 15, inequality and regime stability are both independent of the country stage of development.

From Proposition 1, the political regime is less able to generate the maximum political consensus from the elite group when I_1 is satisfied. Hence, from 15, the stability of the regime is low. On the contrary, the regime is able to generate the maximum consensus from the elite when I_1 is reversed. Hence, from 15, the regime stability is high.

It is clear that I_1 depends on the level of k and B . Therefore, I_1 is satisfied when the elite group demand of total resources is high (high k) and/ or the size of the elite group is small or the group is less important in terms of maximizing the regime stability (low B). Therefore, the optimal solution that maximizes the utility of the regime is given by 17a.

On the contrary, the regime is able to generate the maximum consensus from the elite when I_1 is reversed, that is when the elite demand of total resources is low (low k) and/ or the elite group is large and relatively important to the regime (high B). Hence, the optimal solution that maximizes the regime utility is given by 17b.

We note that our model under the proportional case specifications provides natural comparative statics. In particular, an increase in B through an increase in the size of the elite or their importance to the regime will increase the elite total extra transfer

$(\frac{\Delta T}{\Pi})_{pr}^*$ because the regime seeks more stability from that group.

Moreover, from equation 13, an increase in B will increase inequality between the two groups through the increase in the total extra transfer to the elite group $(\frac{\Delta T}{\Pi})_{pr}^*$.

3.4.2 Positive threshold privilege elite

In the positive threshold case, the elite group ideal level of transfer is a sum of two components; a positive fixed extra transfer K and a proportion of income $k\Pi$, where $k \in [0, 1)$, such that $\hat{d}^a = \frac{K+k\Pi}{\beta N}$. Hence substituting 11 in 12 yields:

$$S = \left\{ \begin{array}{ll} B(\frac{\Delta T}{\Pi})^\alpha (\frac{\Pi}{K+k\Pi})^\alpha + (1-B) (1 - \frac{\Delta T}{\Pi})^\alpha & \text{if } \Delta T < K + k\Pi \\ B + (1-B)(1 - \frac{\Delta T}{\Pi})^\alpha & \Delta T \geq K + k\Pi \end{array} \right\} \quad (18)$$

The following proposition shows the optimal solution that maximizes the utility of the regime, which crucially depends on whether the following inequality is satisfied:

$$\frac{(B)^{\frac{1}{1-\alpha}}}{(B)^{\frac{1}{1-\alpha}} + (1-B)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi} \right]^{\frac{\alpha}{1-\alpha}}} < \frac{K+k\Pi}{\Pi} \quad (I_2)$$

We denote by L_2 to the term in the left hand side of I_2 . More specifically, if L_2 is lower than the ideal policy of the elite group $\frac{K+k\Pi}{\Pi}$ then it is optimal for the regime to transfer L_2 to the elite group to maximize the regime utility. However, if L_2 is greater than $\frac{K+k\Pi}{\Pi}$ then the optimal strategy for the regime is to transfer $\frac{K+k\Pi}{\Pi}$ to obtain the elite full political consensus.

From I_2 , we note that the LHS is monotonically increasing in Π whereas the RHS

is monotonically decreasing in Π . Hence, there is just one root denoted by Π^c that satisfies I_2 as an equality. Therefore, I_2 can be equivalently restated in terms of Π^c as follows:

$$\Pi < \Pi^c$$

Proposition 2 *If I_2 holds, so that $(\Pi < \Pi^c)$, then:*

$$\left(\frac{\Delta T}{\Pi}\right)_{th}^* = \frac{(B)^{\frac{1}{1-\alpha}}}{(B)^{\frac{1}{1-\alpha}} + (1-B)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}} \quad (19a)$$

Under some conditions, I_2 can be reversed, so that $(\Pi \geq \Pi^c)$, then:

$$\left(\frac{\Delta T}{\Pi}\right)_{th}^* = \frac{K+k\Pi}{\Pi} \quad (19b)$$

Proof. See the Appendix ■

Using the main result of Proposition 2, we study the relationship between the optimal extra transfer to the elite group; $\left(\frac{\Delta T}{\Pi}\right)_{th}^*$, inequality between the two groups and the regime political stability as functions of the total public resources available to the regime.

Proposition 3 *At early stages of development (i.e. $\Pi < \Pi^c$, I_2 holds), as resources increase, the regime increases the optimal extra transfer to the elite group more than proportionally to the increase in resources. On the contrary, at more advanced stages of development (i.e. $\Pi \geq \Pi^c$, I_2 is reversed), the regime increases the elite optimal extra transfer but at a lower rate than the increase in resources. Hence, probability of coups always decreases with higher resources*

Proof. See the Appendix ■

The above proposition shows that below the critical level of total public resources, Π^c , the regime increases the elite group political consensus by increasing their optimal extra transfer more than proportionally to the increase in total resources. Therefore, the risk of coups by the elite is reduced.

When $\Pi \geq \Pi^c$, the regime optimal strategy to secure the elite political consensus is given by 19b. It is clear that the ratio of the ideal target level $(K + k\Pi)$ to the total resources, Π , is decreasing in total public resources. Therefore, the elite extra transfer increases in resources but in a rate that is lower than the rate of the increase in total resources, which hence reduces the probability of coups.

The above, in fact, shows that the total extra transfer to the elite group with respect to total resources is an inverted U-shaped function of total public resources.

From 13, it is clear that there is a monotonic relationship between the extra transfer to the elite group and the inequality index, which we can use to derive:

Corollary 1 *Income inequality and hence probability of revolution are humped shaped functions of total resources. They monotonically increase with resources at early stages of development, whereas they decline with resources at more advanced development stages.*

Our index of inequality is a function of the total extra transfer to the elite group with respect to the total resources; $(\frac{\Delta T}{\Pi})$. Hence, an increase in the elite total extra transfer increases inequality and vice versa.

In particular, at an early stage of development (i.e. $\Pi < \Pi^c$), the regime increases the elite extra transfer (i.e. $\Delta T = K + k\Pi$) more than proportionally with respect to the increase in resources. Therefore, probability of coups decreases and the probability of revolution increases because of the high rate of inequality.

On the contrary, at a more advanced stage of development (i.e. $\Pi \geq \Pi^c$), the regime increases the extra transfer to the elite but at a lower rate than the increase in resources. Hence, probability of coups further decreases and the probability of revolutions also decreases because of the low rate of inequality.

Proposition 4 *The increase in the total public resources monotonically increases the regime political stability*

The political regime uses the total amount of public resources to maximize political consensus among groups of the population. At early stages of development, an increase in resources allows the political regime to increase the total extra transfer to the elite group to generate consensus, which then reduces probability of coups. This increases inequality between the two groups which then generates less political consensus from the egalitarian group and higher probability of revolution. However the political consensus from the elite group is greater in magnitude than that from the egalitarian group. Hence, the regime stability increases.

At more advanced stages of development, as the maximum political consensus from the elite group is secured, the regime increases the total extra transfer to the elite group at a lower rate than the increase in resources, which implies lower probability of coups. Therefore, the regime becomes able to increase the basic transfer to all population which then reduces inequality and causes lower probability of revolution. Overall, the

regime stability always increases with the increase in public resources.

The relationships shown in Proposition 3, Corollary 1 and Proposition 4 are presented in Figure 3.1. We note that the relationship between an increase in the total public resources Π and the total extra transfer to the elite group (LHS graph) shows an inverted U-shaped curve. In particular, when $\Pi = \Pi^c$, the regime transfers the optimal target to the elite group which then creates the maximum inequality, depicted by the maximum point in the curve (RHS graph). We also note that stability (dashed line) is monotonically increasing with the total public resources (RHS graph)

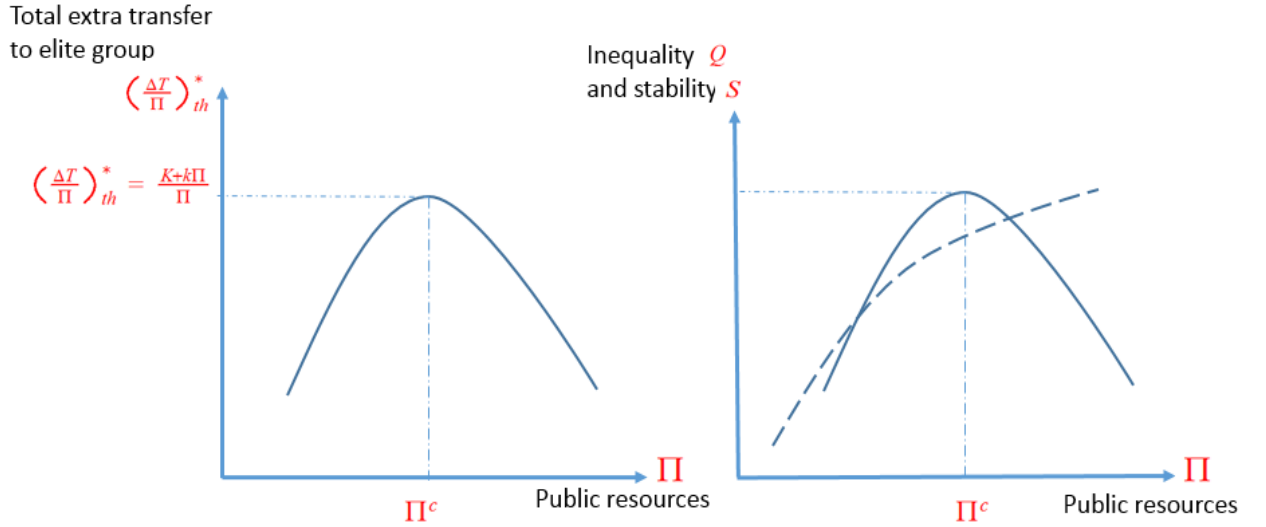


Figure 3.1: Public resources, inequality and political stability

3.4.2.1 Comparative Statics

In this section, we test some comparative statics that are implied from our model. We first test the effect of an increase in B on the regime stability, where B is the adjusted weight of the size and the political importance of the elite group; $B = I^a \beta$. An increase in B is through an increase in the size or the importance of the elite group to the regime.

From 18, the regime stability is:

$$S = B \left(\frac{\Delta T}{\Pi} \right)^{*\alpha} \left(\frac{\Pi}{K + k\Pi} \right)^\alpha + (1 - B) \left(1 - \left(\frac{\Delta T}{\Pi} \right)^* \right)^\alpha$$

Taking the derivative of S with respect to B yields:

$$\frac{dS}{dB} = \left(\frac{\Delta T}{\Pi} \right)^{*\alpha} \left(\frac{\Pi}{K + k\Pi} \right)^\alpha - \left(1 - \left(\frac{\Delta T}{\Pi} \right)^* \right)^\alpha \quad (20)$$

Therefore, an increase in B increases regime stability only when the following condition holds:

$$\frac{\Pi}{K + k\Pi} + 1 > \frac{1}{\left(\frac{\Delta T}{\Pi} \right)^*} \quad (21)$$

Proposition 5 *There exist Π^s such that $0 < \Pi^s < \Pi^c$, where an increase in the level of B promotes the regime stability for higher levels of resources ($\Pi > \Pi^s$) and threatens the regime stability for lower levels of resources ($\Pi < \Pi^s$)*

Proof. See the Appendix ■

This indicates that the effect of B on regime stability depends on the country stage of development. More specifically, higher level of B , through an increase in the size of

the elite group or their importance to the regime, promotes the regime stability only at advanced stages of development ($\Pi > \Pi^s$). Whereas, at the early stages of development ($\Pi < \Pi^s$), higher B threatens the regime stability.

We then test the effect of the increase in B on our inequality index. We separately check the effect of a larger size of the elite group and a more importance of the elite to the regime on the rate of inequality. We note that the two components enter the inequality measure differently. From 13, inequality is:

$$Q = \left(\frac{1}{\beta}\right) \left(\frac{\frac{\Delta T}{\Pi}}{1 - \frac{\Delta T}{\Pi}}\right)$$

Hence, taking the derivatives of inequality with respect to the importance and the size of the elite group lead to the following result.

Result 1 Higher importance of the elite to the regime always increases inequality between the two groups at any level of public resources. Whereas, larger size of the elite group increases inequality at the early stage of development and reduces inequality at more advanced levels of development.

Proof. See the Appendix ■

In particular, as the importance of the elite group to the regime increases, the regime at different stages of development seeks more consensus from that group. Hence, the regime increases the total extra transfer to the elite group, which then causes higher inequality and higher probability of revolution.

Moreover, an increase in the size of the elite induces the regime in the early stage of development to increase the elite total extra transfer in order to increase their con-

sensus. Hence, increasing inequality and the risk of revolution. However, at a more advanced development stage, larger elite group reduces inequality and hence probability of revolution.

We also test the effect of the increase in B on the total extra transfer to the elite group $(\frac{\Delta T}{\Pi})$, where we derive the following proposition.

Proposition 6 *An increase in B , increases the elite optimal extra transfer when $\Pi < \Pi^c$, whereas, higher B has no effect at higher stage of development.*

Proof. See the Appendix ■

From (19a), It is clear that in the early stage of development, higher B through larger size or higher importance to the regime increases the optimal extra transfer to the elite. However, once the full political consensus is obtained from that group, in the advanced stage of development, an increase in B does not affect the optimal extra transfer $(\frac{\Delta T}{\Pi})_{th}^*$.

Moreover, we analyze the effect of the fixed extra transfer; K and the proportion of total resource; k on the optimal extra transfer to elite, inequality and on the regime stability.

Proposition 7 *When the regime has limited access of public resources ($\Pi < \Pi^c$), then the regime could not secure the elite group consensus if they demand a high extra fixed transfer, K and a high proportion of total resources, k . Hence, the elite total extra*

transfer decreases, which then reduces inequality. On the contrary, a richer regime ($\Pi \geq \Pi^c$) can meet the elite's large extra transfer, which then increases inequality. Regime stability always decreases with higher K and k .

Proof. See the Appendix ■

For low levels of total public resources ($\Pi < \Pi^c$), an increase in the the demanded fixed extra transfer by the elite, K , or an increase in the demanded fraction of total public resources, k , reduces the optimal extra transfer decided by the regime to this group. Hence, from 13, inequality between the two groups is reduced.

On the contrary, for high levels of public resources ($\Pi \geq \Pi^c$), an increase in K , increases the optimal extra transfer and hence, inequality is high. In all development stages, an increase in K and k always reduces the regime stability.

In the following, we extend the baseline model to account for the degree of the regime's affiliation with the political preference of the preferred group.

3.5 Extension: Elite-Affiliated regime

In this section, we examine the case when the regime is only affiliated with the political preference of the elite group. In terms of our general preferences presented in the general model: $\gamma_{T_r} = 0$ and $\gamma_F, \gamma_p \geq 0$, whereas the regime's degree of affiliation is $F = s^a(\frac{d^a}{\tilde{d}^a})$ where $r^a = 1$.

From 4, the utility of the elite-affiliated regime is:

$$U_r^a = \left[\gamma P + (1 - \gamma) \left(\frac{\Delta T}{\Pi} \right)^\alpha \left(\frac{\Pi}{K + k\Pi} \right)^\alpha \right] S \quad (22)$$

Where stability is given by 12 that is:

$$S = B \left(\frac{\Delta T}{K + k\Pi} \right)^\alpha + (1 - B) \left(1 - \frac{\Delta T}{\Pi} \right)^\alpha$$

Following the same procedure as in Proposition 2 of the baseline model, we first show that at any stage of development, an elite-affiliated regime transfers higher total extra resources to the elite group with respect to that of the baseline model as long as the condition below is satisfied, that is;

$$\left(\frac{\Delta T}{\Pi} \right)_A^* < \frac{K + k\Pi}{\Pi} \quad (I_3)$$

We denote by L_3 to the term in the left hand side of I_3 . More specifically, if L_3 is lower than the ideal target of the elite group $\frac{K+k\Pi}{\Pi}$ then it is optimal for the regime to transfer L_3 to the elite group to maximize the regime utility. However, if L_3 is greater than $\frac{K+k\Pi}{\Pi}$ then the regime optimal strategy is to transfer $\frac{K+k\Pi}{\Pi}$ to obtain the elite full political consensus.

Proposition 8 *Under the condition I_3 , when the regime is affiliated with the elite group, the optimal extra transfer to the elite; $(\frac{\Delta T}{\Pi})_A^*$ is higher than that when the regime is purely prestige motivated; $(\frac{\Delta T}{\Pi})_N^*$.*

Proof. See the Appendix ■

The above proposition has an immediate corollary that is;

Corollary 2 *Under the condition I_3 , higher optimal extra transfer to the elite induces higher inequality and hence higher probability of revolution and lower overall stability.*

The above proposition shows that relative to the case of a purely prestige-motivated regime, an elite-affiliated regime transfers higher optimal extra resources to the elite group; $(\frac{\Delta T}{\Pi})_A^*$. From 13, inequality between the two groups is higher and hence higher probability of revolution and lower overall stability.

Now we analyze the relationship between different stages of development and the optimal extra transfer to the elite group by following the same pattern as in the baseline model.

Proposition 9 *As condition I_3 holds, $(\frac{\Delta T}{\Pi})_A^*$ is monotonically increasing in Π .*

Proof. See the Appendix ■

Propositions 8 and 9 imply the following corollary;

Corollary 3 *When condition I_3 holds, the elite-affiliated regime enters the advanced stage of development or meet the elite optimal transfer earlier relative to the non-affiliated regime; $\Pi_A^c < \Pi_N^c$, where inequality starts to decrease.*

Given that the elite optimal level of transfer is a function of Π , therefore, a regime that is affiliated with the elite group will meet the elite optimal level of transfer earlier than a regime that is only motivated by their prestige. Hence, the critical level of income where the regime transfers the optimal resources to the elite is lower in an elite-affiliated regime than that in a non-affiliated regime; Π_A^c must be lower than Π_N^c .

We note that the stability of an elite-affiliated regime in general is lower than or equal to the stability of the non-affiliated regime. We also note that below the critical level of income Π_A^c , inequality is increasing, and hence higher probability of revolution. Above this critical level, inequality is decreasing, and hence lower probability of revolution. The probability of coups organized by the elite is decreasing in total public resources.

In fact, this extension of the baseline model confirms our general model and provides intuitive results and testable predictions. We find that a regime that is affiliated with elite group transfers higher resources to this group than a non-affiliated regime. We also find that the elite-affiliated regime enters the advanced stage of development earlier. In this extension, we have not tested the comparative statics, however, they should confirm the same pattern as in the baseline model.

3.6 Conclusion

In this chapter, we provide a theoretical model on the use of the total public resources to generate political consensus among groups of the population where members of each group share identical political preferences. The probability of any group to provide political consensus to the regime is a monotonic function of the group-specific index of their actual and ideal policies by the regime. Higher index implies higher degree of consensus to the regime and hence, lower probability of coups or revolution.

We show that in a regime that is motivated by their prestige of holding the power and when there are two groups; elite and egalitarian, the regime maximizes stability by distributing the total public resources to all citizens and extra resources to the elite to meet their demand level that secures their political consensus.

The model shows that an increase in public resources helps the regime to meet the elite optimal level of transfer and hence generate political consensus which implies a lower probability of coups. However, since this has generated inequality between the two groups, then the probability of revolution increases. However, a further increase in public resources will increase the basic resources to all population which reduces inequality and hence probability of revolution.

We also find that higher political influence or larger size of elite increase the regime stability in richer countries whereas it decreases the regime stability in low income level countries.

Our general model can accommodate other interesting aspects such as political regimes that are motivated by their own enrichment and regimes that are motivated

by their affiliation to more than one group with different weights. The model can also accommodate the case where there are more than two groups competing to be the regime's elites. This extension would cover the importance phenomenon of clashes from different tribes or groups for the power.

Although we have not exploited these potential uses of our model in this chapter, they are a natural extension that is left for future work.

Chapter 4

Political Stability, Inequality and Economic Development: An Empirical Evidence

4.1 Introduction

Survival is a primary objective of political leaders, authoritarian or democratic. There are two important threats face an autocratic leader: coups from within the ruling elite and revolutions from outside the elite within society. Autocrats maximize their political stability by controlling the state revenue (i.e. the resource extraction rates) and setting the income distribution strategy (Mahdavy, 1970; Ross, 2009; Aslaksen, 2010). Bueno de Mesquita and Smith (2010) argue that leaders are most likely to survive in power when they have access to free resources, such as natural resource rents and foreign aid. Leaders can prolong their political power by purchasing political support from the

elite group via different forms of patronage and tax cuts (Arriola, 2009; Caselli and Cunningham, 2009; Robinson et al., 2006; Robinson and Torvik, 2005). Autocratic leaders, therefore, engage in inefficient income distribution strategy and tend to create inequalities among groups of the population which then strongly promote conflict and instability (Cederman et al., 2011).

In this chapter, we empirically test the theoretical predictions of our model proposed in the previous chapter for which the necessary data are available. The model captures how an authoritarian political regime maximizes stability by using total public resources to increase political consensus from two groups: elite and egalitarian. The model focuses on the relationship between an increase in total public resources, risks from coups and revolutions and the overall regime stability in different stages of country's development.

The model predicts that at early stages of country's development, an increase in public resources induces the regime to increase a privilege to the elite group. This increases inequality and hence increases the risk of revolutions. On the contrary, when the regime has abundant public resources, the elite political consensus is secured. Then, an increase in public resources tends to decrease inequality between the two groups and hence lower risk of revolutions.¹

The model also predicts that the probability of coups organized by the elite is monotonically decreasing in income. In addition, higher total income is always a positive driver of the overall regime's stability.

Overall, the model predicts that the rate of inequality first increases with an increase in total income and then declines, in line with the Kuznets curve hypothesis. In

¹This inefficiency in the distribution of total income can occur in any economy that experience growth. However, the effect is expected to be more pronounced in resource-rich economies.

other words, the model gives rise to a "Political Kuznet's Curve" in which the stability maximizing level of redistribution by political leaders first increases and then reduces aggregate inequality.

Therefore, we use a panel data of 122 countries for the period 1960 to 2011 in order to test the effect of an increase in income on inequality and on the level of political stability. We employ a broad measure of inequality levels from the V-Dem data set that captures inequality in the distribution of goods and services in the society. We argue that equal distribution lowers poverty rates and ensures that poorer population can exercise their rights and freedoms and participate in politics. In addition, our measure of inequality is available for a larger set of countries than other inequality indices.¹

We start the empirical estimations with a semi-parametric regression model where we allow the income level to enter the regressions non-parametrically. This allows for a non-parametric analysis of the predictions of the model. We, hence, test the non-linear effect of the level of total income on inequality, probability of a revolution and the overall political stability.

The estimation results of the semi-parametric regressions model provide evidence that strongly supports our theoretical predictions. In particular, we find that the rate of inequality first increases with the increase in total income and then declines. Moreover, we find that the effect of income on the probability of revolutions is non-monotonic, such that higher income increases revolutions in poor countries and decreases revolutions in richer countries. Furthermore, we find that political stability almost always increases with the increase in total income.

¹We support the claim by Ross (2007) that data on income inequality are almost non existent for most of the resource-rich countries. Hence, relying on measures such as Gini and the estimated household income inequality (EHII) may not generate a valid conclusion.

We also use a probit regression model to test the impact of the increase in income on probability of coups, since the data of coups are binary. We, then show evidence of the theoretical prediction that the probability of coups always decreases with an increase in income.

After showing the correspondence between the flexible estimate from our semi-parametric fixed effect model and the predicted effects from our theoretical model, we present fixed-effect two stage least square estimates (FE2SLS) to allow for endogeneity. We first construct commodity exports price indices, as suggested by Deaton and Miller (1995) and Goderis and Malone (2011), and use these indices as instruments for the positive increase in total income.

The results that are obtained using the fixed effect and IV 2SLS estimators support our theoretical predictions. In particular, we find that higher levels of income strongly promote political stability when controlling for country's fixed effects. However, the positive effect of income on stability holds with less significance level when we instrument for the level of income.

Moreover, the estimation results show that inequality rates have a strong negative impact on the regime's political stability where this negative impact becomes more robust once we instrument for the level of income.

In addition, we undertake a further empirical investigation that we have not yet addressed in our theoretical model. More specifically, we examine the casual effect of the increase in income on the degree of democracy in a country using the Vanhanen democracy index. We find supporting evidence to Acemoglu et al. (2008) that an increase in income increases the degree of democracy in a society.

We also examine the effect of an increase in inequality rates on democracy, which has not been fully tested yet in the literature. We find strong evidence that higher inequality has a negative impact on the democracy score of the country.

Finally, we test the effects of income and inequality on the probability of political conflicts and government repressions. The estimation results show that an increase in income can give rise to external conflicts. Higher level of income makes the country more appealing to foreign forces where they can organize violent actions such as cross border conflicts. We also show that higher inequality rates can intensify conflicts, in line with the findings of Østby (2008), Cederman et al. (2011) and Agnello et al. (2016).

The remainder of this chapter is organized as follows. Section 2 presents a review of the relevant literature and section 3 summaries the theoretical predictions of our model that we test empirically. Section 4 reports the empirical analyses and section 5 concludes.

4.2 Literature Review

This section provides a review of the literature on the effects of an increase in the level of income and inequality on political stability of the regime. In addition, we relate to the natural resource literature since resource-rich countries are more likely to have the positive shock in income level that can promote economic development and generate political stability. We also review the literature on the effects of the increase in income level and inequality on the level of democracy.

Our study is a contribution to a number of distinct literatures. First, there is a large literature on the relationship between economic growth and income inequality which has its origin from the work of Kuznets (1955) that shows evidence of an inverted U relationship between economic development and inequality.

Second, the literature on economic growth and political stability shows evidence that an unstable political system can reduce the speed of economic development. Aisen and Veiga (2013) and Jong-a-Pin (2009) show that political instability adversely affects economic growth. However, little is known about the effect of the increase in income on the political stability.

Third, a strand of the literature concerns about the relationship between inequality and stability. Østby (2008) shows that horizontal inequality between social groups is positively related with the outbreak of conflicts and instability.

Fourth, other studies are concerned with how the wealth generated from natural resources affects the stability of the political regime. Studies show that fiscal reliance on resource wealth weakens the state and leads to political instability (Karl, 1997).

Fifth, there is disagreement in the literature on the link between democracy and income inequality. Acemoglu et al. (2013) claim that there is no robust impact of democracy on inequality. However, they provide some evidence suggesting that inequality increases after democratization due to the structural transformation. However, the reverse effect of inequality on democracy is not yet fully investigated in the literature.

Finally, some scholars study the relationship between natural resources and democracy. Studies show that higher resource rents are negatively correlated with the degree of democracy in a country. Countries that strongly depend on the resource revenues tend to be less democratic and less accountable to their citizens since there is no need to levy taxes (Jensen and Wantchkon, 2004; Gadenne, 2015).

In the following, we discuss in more details the papers that are most closely related to ours.

Economic growth and inequality

The relationship between economic growth and income inequality was first investigated by Kuznets (1955) who shows that inequality first increases with the rise in the average per capita income and then declines. However, this finding has been challenged by other studies. For instance, Deininger and Squire (1996) find no confirmation of the inverted U curve after using a large scale cross country and time series data set. However, their study shows a significant negative relationship between income inequality and subsequent growth.

Li and Zou (1998) show theoretically that income inequality may lead to higher economic growth if public consumption enters the utility function. They also show

empirical evidence that income inequality is positively associated with economic growth. Barro (1999) uses a three stage least squares estimator that treats the country specific terms as random. He finds that the effect of inequality on growth is negative in countries where GDP per capita is below US\$ 2000 and is positive in rich countries where GDP per capita is above US\$ 2000 at 1985 prices.

A recent contribution by Banerjee and Duflo (2003) presents evidence suggesting that changes in inequality (in any direction) are associated with reduced growth in the short run; as a result, the standard regression equation might be mis-specified in a way that — misleadingly — makes differences-based estimators indicate a positive relationship.

Moreover, Voitchovsky (2005) argues that inequality coming from the top end of the income distribution is indeed likely to promote economic growth while bottom-end inequality tends to be harmful.

Economic growth and political stability

The literature on political stability shows that economic growth and political stability are deeply interconnected. On the one hand, unstable political system can reduce the speed of economic development. On the other hand, poor economic performance may lead to government collapse and political unrest. Alesina (1996) provides evidence of a negative relationship between political instability and growth rates of GDP per capita. The study focuses on 113 countries from 1950 to 1982 and shows that GDP growth is significantly lower in countries and time periods with high levels of political instability.

Similarly, Chen and Feng (1996) show that regime instability, political polarization

and government repression have a negative impact on economic growth. In a more recent study, Jong-a-Pin (2009) uses a factor analysis to examine the effect of 25 different indicators of political instability on economic growth. The study finds that higher degrees of political instability have a negative impact on economic growth. Aisen and Veiga (2013) provide similar conclusion that political instability adversely affects growth by lowering the rates of productivity.

Inequality and political stability

Another strand of the literature concerns about the relationship between inequality and political stability. Davies (1962) argues that the gap between individual aspirations and actual economic status causes frustration that can lead to revolutions and instability. Gurr (1970) argues that economic and other types of inequality increase the risk of internal strife through frustrated expectations. Similarly, Østby (2008) shows that inequality between social groups seem to be positively related with the outbreak of conflict. In another study that is based on conflict and survey data from sub-Saharan Africa, Østby, Nordas, and Rød (2009) reach a conclusion that both economic and social group-level differences are likely drivers of conflict behavior.

Cederman et al. (2011) argue that horizontal inequalities between politically relevant ethnic groups or states can strongly promote conflicts. In highly unequal societies, different groups tend to fight more often than those groups whose wealth lies closer to the national average. In addition, Agnello et al. (2016) show that inequality in the distribution of income increases the probability of government collapse. However, this adverse effect is reduced when expansionary fiscal programs are put in place.

On the contrary, other studies find no evidence that economic inequality increase the risk of conflict. Fearon and Laitin (2003) and Collier and Hoeffler (2004) focus on political and institutional causes of civil war. They present findings that cast doubt on ethnic and political grievances as explanations of conflict onset. However, they rely on the Gini coefficient as a proxy of inequality which we argue that it does not help to draw a strong conclusion as it suffers from missing data.

Natural resources and political stability

Another branch in the literature is concerned about the effect of natural resources on political stability. The wealth generated by the natural resource sector can affect stability of a country's political regime. At a fundamental level there is an absence of consensus in the academic literature on how the wealth generated from natural resources, particularly from oil, affects the regimes' political stability. One contention is that fiscal reliance on resource wealth weakens the state and leads to political instability (Karl, 1997). Bjorvatn and Farzanegan (2015) shows that higher resource rents promote the political stability of a powerful incumbent. However, if the incumbent is sufficiently weak, higher rents can lead to political instability. Caselli and Tesei (2015) provide related evidence that resource windfalls have a strong negative impact on unstable autocracies and no impact on democracies or stable autocracies. Other studies show that political regimes in resource-rich countries tend to invest in repressive apparatus and military forces to counteract any oppositional groups in order to prolong their hold of power (Ross, 2001b; Tullock, 2005; Aslaksen, 2010; Tsui, 2011).

Income and democracy

There is a large body in the literature on the link between economic growth and democracy. According to the ‘Modernization’ theory, higher income per capita causes a country to be democratic (Lipset, 1959). Similarly, Rodrik (1999) presented evidence from a panel of countries that democracy is associated with higher real wages and higher labour share in national income.

However, Acemoglu et al. (2006) shed considerable doubt on the claim of the strong positive effect of income on democracy. They argue that the positive relationship between income per capita and various measures of democracy disappears once controlling for the fixed effects. Their finding is robust to different samples, democracy indicators, econometric specifications and estimation techniques.

In addition, studies find strong evidence for the reverse effect of democracy on GDP per capita. Acemoglu et al. (2013) confirm that democracy has a significant and robust effect on tax revenues as a fraction of GDP. Another study by Acemoglu et al. (2014) shows that democracy has a significant and robust positive effect on GDP per capita after controlling for country fixed effects and the dynamics of GDP, which can confound the effect of democracy on economic growth. The study shows that democratizations increase GDP per capita by about 20% in the long run. Democracy increases future GDP through encouraging investment, increasing schooling, inducing economic reforms, improving public goods provision, and reducing social unrest.

Inequality and democracy

Other studies focus on the relationship between democracy and income inequality. Gradstein and Milanovic (2004) argue that cross country empirical evidence on democracy and inequality is ambiguous and not robust. Others have claimed that there is

little impact of democracy on inequality and policy among OECD countries (Scheve and Stasavage, 2009, 2010, 2012). Similarly, Acemoglu et al. (2013) claim that there is no robust impact of democracy on inequality. However, they provide some evidence suggesting that inequality increases after democratization due to the structural transformation.

Natural resources and democracy

In resource-rich countries, studies show that higher resource rents are negatively correlated with the democracy level in the country. Countries that strongly depend on the resource revenues tend to be less democratic and less accountable to their citizens since there is no need to levy taxes (Jensen and Wantchekon, 2004). Resource rents eliminate the government's need to tax its citizens. This absence of a tax burden, in turn, reduces the citizens' interest in government accountability (Anderson, 1987; Luciani, 1990). Ross (2001b) takes a further step and claims that discovering resources in an established democracy will bless the economy. Whereas a positive shock in the resource rents gives strength to authoritarian regimes (Wantchekon, 2002; Jensen and Wantchekon, 2004; Ulfelder, 2007; Goldberg et al., 2008; Ross, 2009; Aslaksen, 2010).

In fact, these findings support the rentier state theory that is first proposed by Mahdavy (1970). The theory states that economic and fiscal reliance on resources help create authoritarian political regimes as the rent is directly captured by governments, thereby rendering them unaccountable to citizens. Robinson et al. (2006) show that a boom in the resource sector raises the value of being in power and provides politicians with more income to influence the outcome of elections. Similarly, Cuaresma et al. (2011) and Andersen and Aslaksen (2013) provide evidence that autocratic rulers of

countries with higher resource rents tend to remain longer in power. Resource rents also found to increase the political regimes' durability (Smith, 2004).

A recent study by Haber and Menaldo (2011) investigates the effect of the fiscal reliance on oil and mineral rents on the degree of authoritarianism in the country. The study constructs a data set that starts from a country' first year of independence (or from 1800) to observe the country before and after discovering oil. The study finds no evidence that fiscal reliance on resource rents promotes dictatorship. However, the finding of Haber and Menaldo is challenged by Andersen and Ross (2013) who employ their data and models and show that in the period of 1800 to the 1970s, there is no strong evidence that reliance on resources gives strength to authoritarian regimes. However, since the late 1970s, oil rents have strongly hindered democratization. They claim that the Haber–Menaldo study combines data from 175 years when governments did not typically capture most of these oil rents with data from about 30 years when they did capture them. The powerful anti democratic effects of oil since the late 1970s are hence obscured by the weaker relationship between oil and democracy in the 1800-1975 period.

Overall, our aim in this chapter is to fill a gap in the literature that links regime's political stability, income inequality, economic growth and natural resources. Our emphasis is to empirically test the predictions of our proposed theoretical model on the effect of the positive increase in the level of income on inequality levels and on the probability of revolution, coups and the overall regime's political stability. In addition, we focus on the effect of the increase in income level and inequality rates on the country's level of democracy, external conflicts and government repressions.

4.3 Theoretical predictions

In the previous chapter, we proposed a theoretical model of the use of public resources by a political regime to obtain support from sub-groups of the population, which then enhances the regime's political stability.

In particular, we analyze a model of a prestige-motivated regime that maximizes political support from two groups; elite and egalitarian. The elite group gives their political consensus to the regime only if they receive a privilege of an extra amount of resources on top of the share of the total resources to all population. On the contrary, the egalitarian group (i.e. the rest of population) gives their political consensus to the regime only if the total resources are equally distributed among all population. A low political consensus from the elite group leads to high risk of coups, whereas a low political consensus from the egalitarian group causes higher risk of revolutions.

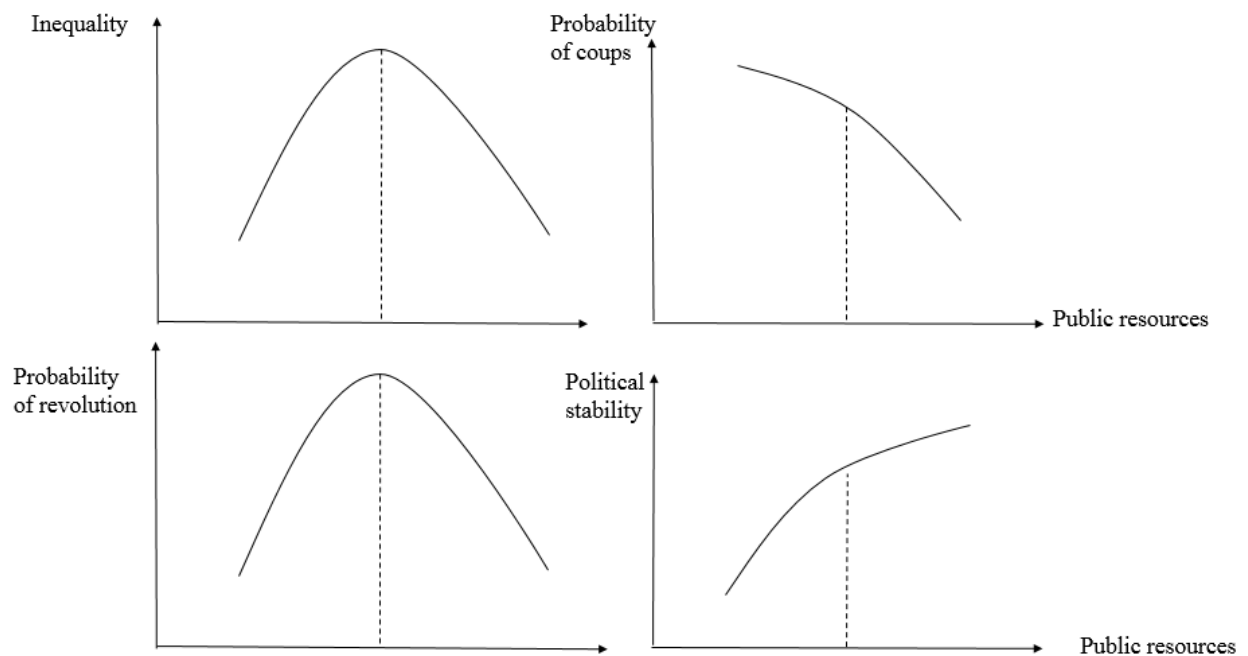
The model focuses on the relationships between the total public resources, probability of coups, probability of revolutions and the overall regime stability in different stages of country's development. The model predicts that at early stages of development, an increase in public resources induces the regime to increase the privilege to the elite group which then increases inequality. At this stage, probability of coups decreases whereas probability of revolution increases.

At advanced stages of development where the elite political consensus is secured, an increase in public resources reduces inequality between the two groups. At this stage, the probability of coups and the probability of revolutions decrease. Overall, regime stability always increases with the increase in public resources.

Figure 4.1 presents the relationship between public resources and inequality, coups,

revolutions and political stability. The top left graph shows the non-linear effect of income on inequality and the bottom left shows the non-linear effect of income on the probability of revolutions.

The top right graph shows the decline in the probability of coups as total public resources increase whereas the bottom right graph shows that the overall political stability is monotonically increasing with total public resources.



Notes: The graphs show our theoretical model predictions. The top left graph presents the nonlinear effect of public resources on inequality, which then causes revolution by the population. Therefore, revolution is a non-monotonic function of total resources (bottom left graph). The top right graph shows that the probability of coups staged by the elite is decreasing in total resources. The bottom right graph shows the overall stability of the political regime.

Figure 4.1: Theoretical predictions of total public resources, inequality and overall stability

4.4 Empirical model

In this section, we discuss our indicators, data sources and estimation models.

4.4.1 Data sources, measurement and methodology

The study uses a panel dataset consisting of 122 countries from 1960 to 2011. The sample selection was guided by data availability.

Since the focus of this study is on the effect of the positive shock in income on the country's political stability. Hence, we use GDP per capita to measure the country level of income. We note that in some low income countries, government resources reflect changes in natural resource rents but in other countries government resources reflect changes in other sectors such as manufacturing. Therefore, we use GDP per capita to remain agnostic about the source of these government resources. Data on GDP per capita is obtained from the World Development Indicators (WDI), the World Bank.¹

We instrument for the increase in income by creating an index of natural resource commodity exports prices, that was first proposed by Deaton and Miller (1995) and then by Goderis and Malone (2011). First, we obtain data for each country and for each year of agricultural and mineral commodities exports, imports and prices. Commodity exports and imports data are obtained from the United Nations Comtrade database.² The commodity world prices are obtained from the International Financial Statistics

¹Real GDP per capita is in constant 2005 US dollars.

²The sample contains 10 mineral commodities (silver, aluminium, coal, copper, iron, zinc, uranium, natural gas, gasoline, petroleum) and 10 agricultural commodities (coffee, tea, cotton, olive oil, rice, wheat, wool, barely, sugar, rubber)

(IFS).¹

We then construct a non time varying and potentially endogenous weights by dividing the individual 1990 export values for each commodity by the total value of 1990 commodity exports for each country. These weights are held fixed over time and applied to the time varying exogenous world price indices of the same commodities to form an exogenous country-specific geometrically weighted index of commodity export prices.² We exploit variations in the world prices of a country's commodity exports in order to identify natural resource booms, as world prices are typically unaffected by individual countries and are therefore likely to be exogenous (Deaton and Miller, 1995).³

Moreover, we obtain a broad measure of inequality from the V-Dem dataset which provides consistent, expert based measures for the period from 1900 to the present. The V-Dem index of inequality that ranges from 0 to 1 measures the extent to which resources are distributed in the society.⁴ The index considers tangible and intangible resources such as food, water, housing, education and health care. We argue that this inequality index provides the best measure for our purpose since an equal distribution of resources lower poverty rates and ensures that all individuals are capable of participating in politics. The index is also available for a larger set of countries compared with other inequality indices. However, as a robustness test, we also include other income inequality measures such as; the Gini coefficient and the Estimated Household Income Inequality (EHII).

¹The commodity price data obtained from International Financial Statistics, International Monetary Fund. We have obtained the price index for each commodity where the base year is 2005.

²See Deaton and Miller (1995) for a detailed description of this approach.

³Some major commodity exporting countries might have an influence on world prices. Therefore, in a future work we will investigate the robustness of the results to the exclusion of such exporters.

⁴Since this index measures the equality of resource distribution, therefore, we re-scale the index in order to measure the level of inequality such that: Inequality = 1 - (equality of resource distribution)

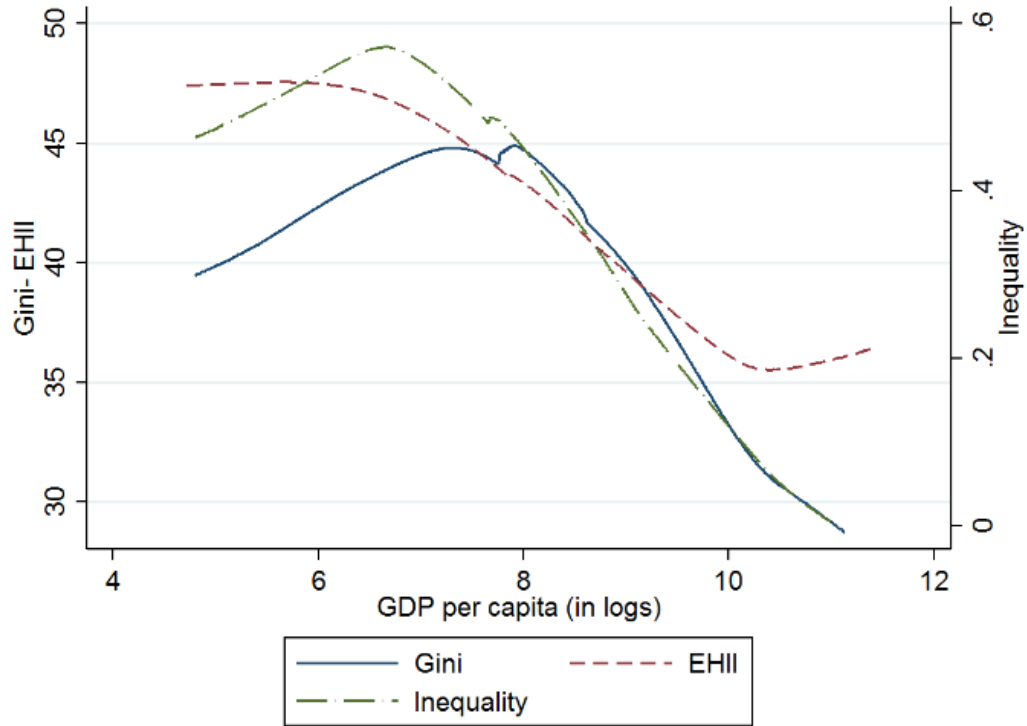
We employ a non-parametric regression methods that is the locally weighted scatter plot smoothing (lowess), a tool that is used in regression analysis to create a smooth line through scatter plots to assess the relationship between variables while making few assumptions initially about the form or strength of the relationship. The objective is to represent the relationship between a response variable and one or more predictor variables. The tool also depicts the local relationship between a response variable and a predictor variable over parts of their ranges, which may differ from a "global" relationship determined using the whole data set.

Hence, we plot in Figure 4.2 the three different measures of inequality that are used in this chapter in order to provide a visual assessment of their relationships with income that is measured by the log of GDP per capita

We note that as per capita income increases, inequality rates first increase and then decline. This, in fact, strongly supports the predictions of our theoretical model that income inequality is an inverted U shaped function of total income.

In addition, we obtain an indicator of the anti system opposition movement from the V-Dem dataset. This indicator is defined as any peaceful or armed movement that is based in the country rather than abroad and is organized in opposition to the current political system.¹ We claim that this measure provides the best estimate of the regime political stability since it reflects the degree in which the opposition movements pose a real threat to the current political regime that aims to change the political system in fundamental ways. However, we also include in our sensitivity analysis other measures of political stability that were used in the literature such as; the ICRG government stability indicator and the absence of violence indicator of Kaufmann et al. (2007).

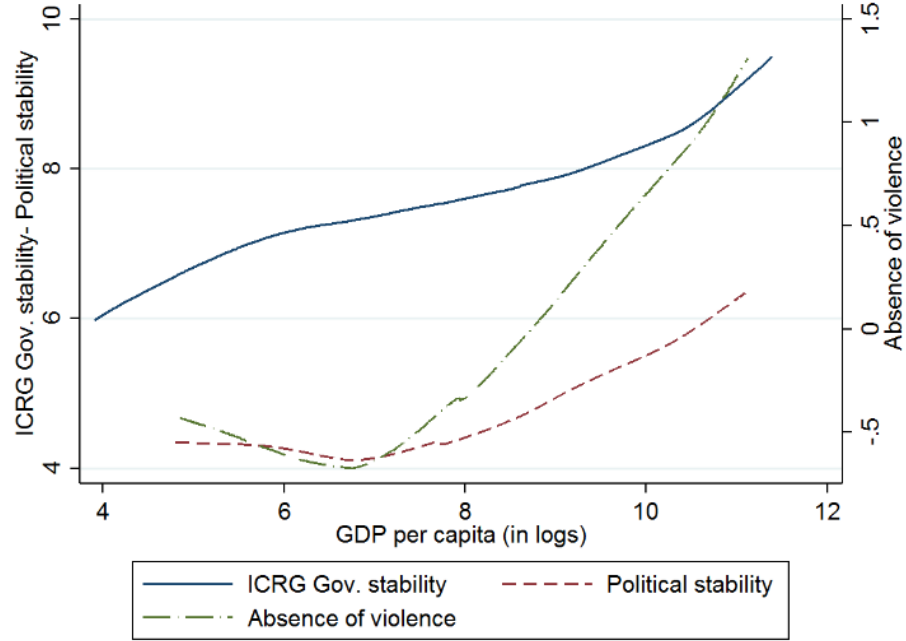
¹Since this study concerns about the regime political stability rather than instability. Therefore, we re-scale this proxy in order to reflect the degree of political stability.



Notes: Our index of inequality (*inequality*) is obtained from the V Dem dataset, where it captures inequality in the distribution of goods and services in the society. The index ranges from 0-1

Figure 4.2: Income and inequality

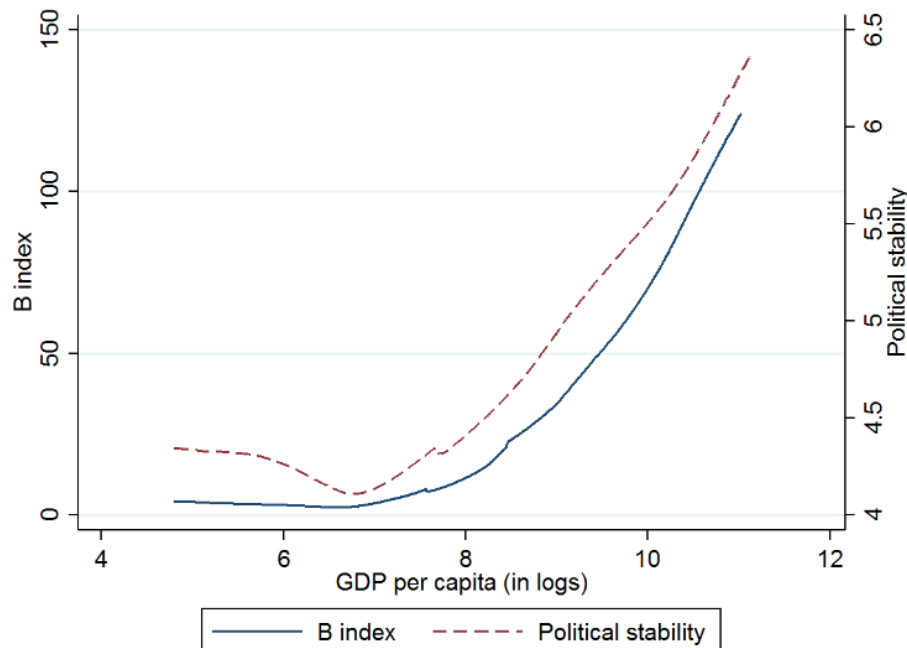
In Figure 4.3, we show the relationship between the total national income and the three different proxies of political stability that are used in this study. The graph shows a quasi-monotonic increase of political stability with the increase in total income. This relationship, in fact, also gives great support to the theoretical model predictions that political stability increases with higher levels of income. In other words, countries with high level of income tend to enjoy greater level of political stability.



Notes: The ICRG Government stability measure is an index from 0-12, where 12 is full stability. Absence of violence measure is obtained from Kaufmann et al. (2007), where higher values indicate more stability. Political stability measure is obtained from the V Dem dataset, where higher values mean higher level of stability.

Figure 4.3: Income and political stability

Moreover, we attempt to strongly link the theoretical model to the empirical testing. Therefore, we use the interaction term of the degree of civil society consultation and the Vanhanen democracy index to proxy for the political influence adjusted size of the elite group (B index). We argue that the measure of civil society consultation gives an indication of the importance of the groups to the political regime. A higher value indicates that the group is important and recognized by the political regime and is routinely consulted on policies relevant to their members. Moreover, the level of democracy gives an indication of the size of political group. Figure 4.4 shows a monotonic increase of B index and political stability with the total national income.



Notes: The political stability measure is obtained from the V Dem dataset, where higher values demonstrate more stability. The B index is the interaction of the level of consultation and the score of democracy, where higher values demonstrate higher importance of the group to the regime and larger size of the group.

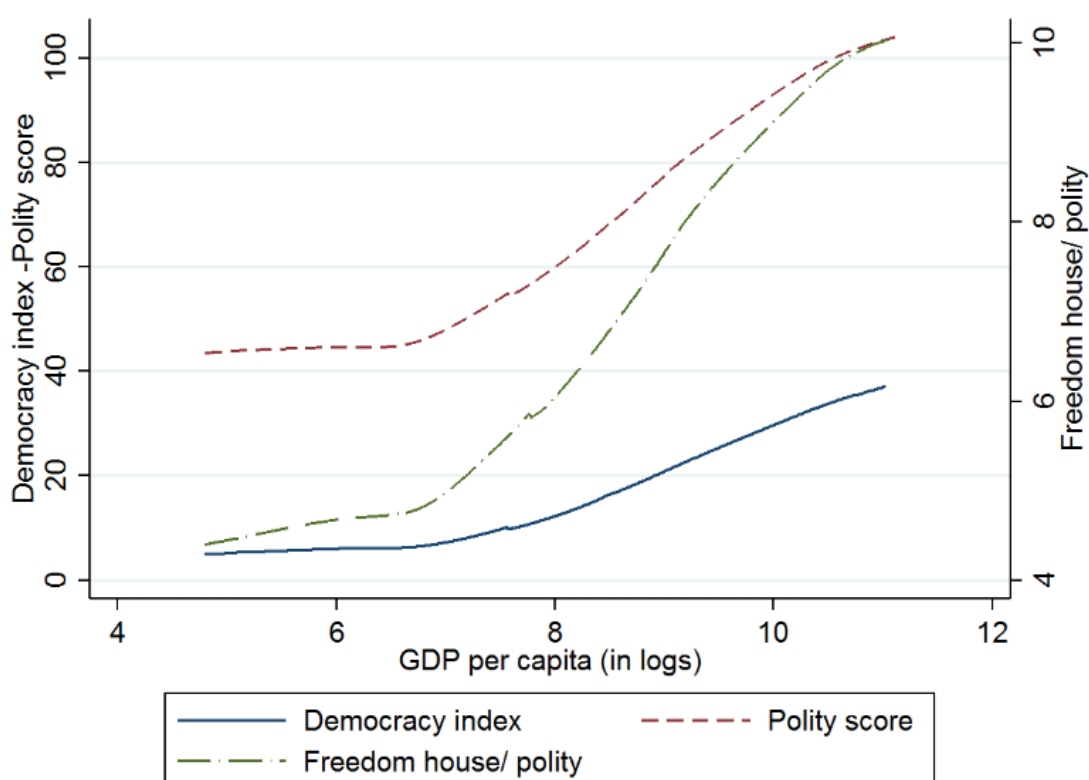
Figure 4.4: B index, political stability and income

Furthermore, we test the effect of the increase in income on the probability of coups that threaten the regime's stability. A coup is defined as any action that leads to the removal of a leader by the military or other elite within a country. Therefore, we obtain an indicator of the number of successful coups in each year from the V-Dem dataset, where the data are binary such that a value of 1 indicates that there is a coup and a value of 0 indicates that no coups has occurred in this year.

In addition, we use internal conflicts measure as a proxy for the probability of a revolution. Revolution is defined as a fundamental change in the political regime when the population rises up in revolt against the political regime. Internal conflicts measure is obtained from the ICRG, where higher values indicate intensive conflicts.

Moreover, the study tests the effect of an increase in total national income on the level of democracy in the country. Therefore we use Vanhanen democracy index as it provides better coverage comparing with other measures of democracy. However, we also include as a robustness check other measures of democracy such as the Freedom House/ Polity score and the normalized Polity score.

In Figure 4.5, we plot the raw data of our three different democracy indices with income. The figure below gives a clear picture that the level of democracy is monotonically increasing with the increase in income.



Notes: The democracy index is the Vanhanen index that ranges from 0 to 50, whereas the freedom house polity score is a scale from 0 to 10. The normalized polity score is obtained from Haber and Menaldo (2011) and it is normalized to run from 0 to 100.

Figure 4.5: Democracy and income

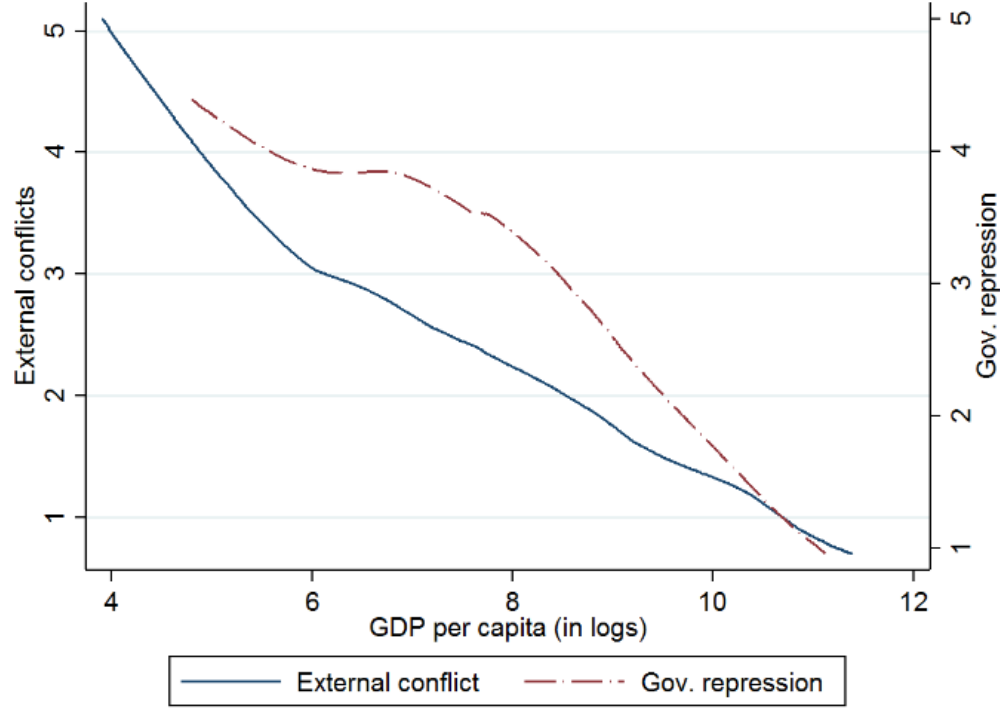
In addition, the study tests the effect of the increase in total income and inequality

on the degree of government repression of civil society organizations. Government repression is the persecution of an individual or group within the society for political reasons. It may include state terrorism, genocide, politicide or crimes against humanity. Repression mostly occurs in dictatorship regimes but also found in some democratic ones. The government repression indicator is obtained from the V-Dem dataset, where higher values indicate higher degree of repression.

We also test the effect of higher income and inequality on external conflicts, which refers to the risk from foreign actions such as cross-border conflicts, diplomatic pressures, trade restrictions, territorial disputes and sanctions. We use the ICRG measure of external conflicts, where higher values indicate intensive conflict.¹

In Figure 4.6, we plot the raw data of income level, external conflicts and government repression. We note from the figure that countries with considerably low per capita GDP are more prone to conflicts. Low income level countries also suffer more from government sanctions, harassments and political repression. On the contrary, higher per capita income countries are more likely to enjoy higher level of stability.

¹Note that we rescale the ICRG index of external conflicts to be consistent with other measures in the study. Hence, a value of 12 indicates intensive conflict.



Notes: The measure of external conflict is obtained from ICRG, where the scale ranges from 0-12. We rescale this index, hence a value of 12 refers to an intensive conflict and a value of 0 to no conflict. The measure of government repression is obtained from the V Dem dataset. We rescale the measure, hence higher values indicate high level of repression.

Figure 4.6: Conflicts, repression and income

4.4.2 Estimation results and discussion

In this section, we first test the non-monotonic relationships predicted by the theoretical model by using a semi-parametric regression model. Then, we use a probit model in order to estimate the effect of the increase in income on the probability of coups, since coups data are binary. After that, we move to a parametric fixed effect regression model where we test the effect of the increase in income and inequality on the regime's political stability after we instrument for the level of income. Moreover, we extend our investigations to test the effects of the increase in income and inequality on the level of

democracy in the country and on the possibility of conflicts and government repression.

4.4.2.1 Semi-parametric regression

We use a semi-parametric panel estimator that helps to understand the non-linear relationships predicted by our theoretical model. Semi-parametric regression includes regression models that combine parametric and non-parametric components, where they are often used in situations where the fully non-parametric model may not perform well. In particular, we use Robinson's (1988) partially linear model in order to test the non-monotonic effect of income on inequality rates, probability of revolution and regime's political stability.¹ Moreover, we aim to check if the non-parametric part of the relation can be well approximated by a polynomial functional form.

Income and inequality In this part, we test the non-linear relationship between the level of income and the degree of income inequality, where the non-parametric part is the level of income measured by the log of GDP per capita and the parametric parts are the educational attainment level (primary schooling) and the level of government repression of civil society organizations. We include educational attainment to the regression as it is emphasized in the literature to be one of the major factors that affect income inequality. Higher spending on education can be an effective policy for reducing income inequality among the population. Moreover, we include the degree of government repression of civil society organizations to the regression as we argue that it may have a strong correlation with income inequality.

¹The model has one variable that enters non-parametrically, therefore we have used *xtsemipar* command that fits Baltagi and Li's (2002) double series fixed effects estimator.

Below is the partially linear model equation where $f[GDPpc]$ is the unknown function of the non-parametric part, the numbers between the parentheses are the standard errors, α_i represents the fixed effect and u_{it} is the idiosyncratic disturbance.

$$Q_{it} = -0.04_{(0.01)} Schooling_{it} + 0.03_{(0.01)} Repression_{it} + f[GDPpc_{it}] + \varepsilon_{it}$$

Where $i = 1, \dots, n; t = 1, \dots, T$

$$\varepsilon_{it} = \alpha_i + u_{it}$$

The equation above clearly shows that the level of education is important for income inequality. Higher level of educational attainment significantly reduces income inequality by 0.04. In addition, the degree of government repression is strongly affecting income inequality. A one unit increase in government repression increases income inequality by 0.03 with 1% level of significance.

Below we graph, $f[GDPpc]$, the non-parametric part that shows the relationship between the income level and inequality rate. In order to obtain a graph that shows a clear fit, we restrict observations of GDP per capita to be between 1,000 and 30,000 US dollars. It is clear from Figure 4.7 below that inequality is a non-monotonic function of income. More specifically, as total income increases, inequality of the distribution of resources first increases and then declines, which is consistent with our model prediction.

Income and revolution In this part, we test the non-linear relationship between the level of income and the probability of a revolution, where income is the non-parametric part and the parametric parts are the level of inequality and the interaction term of

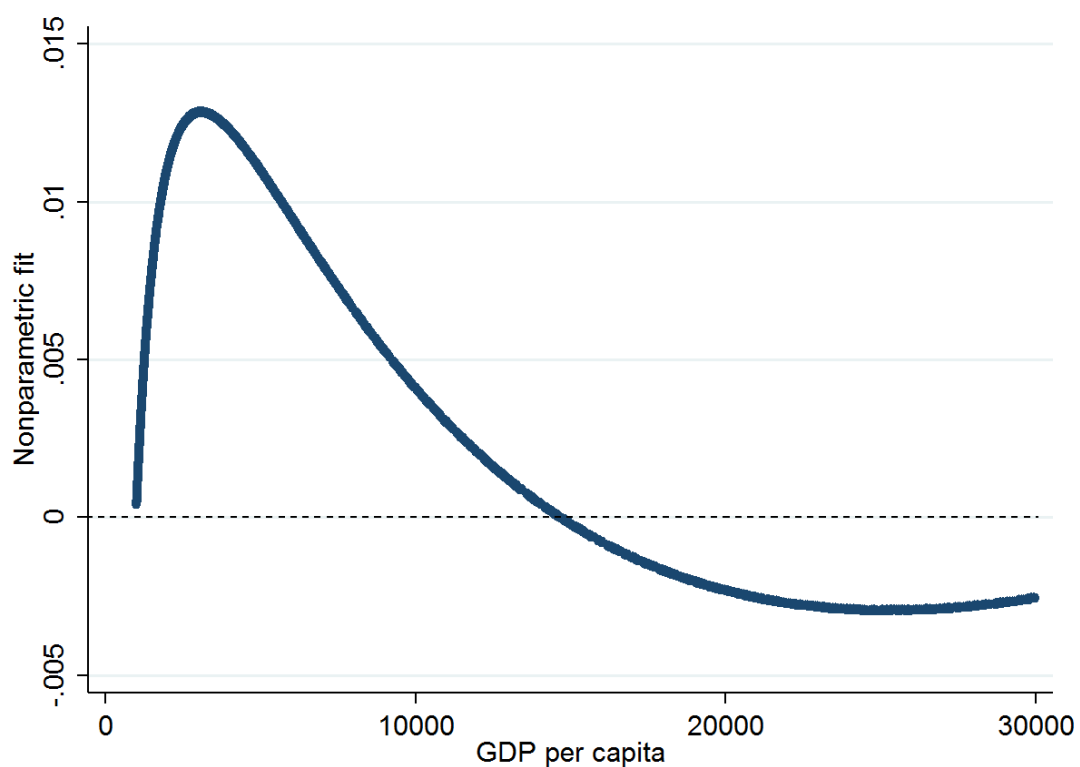


Figure 4.7: Non-linear link between income and inequality

income and inequality. The dependent variable is revolution measured by the possibility of internal conflicts. We test the direct effect of inequality and the interaction effect of income and inequality on the probability of revolution since we claim that higher rate of inequality can cause revolution against the political regime. However, the predictions of the theoretical model show that the effect of income on inequality depends on the level of income or the wealth of the country.

The equation of the partially linear model is presented below, where $R[GDPpc]$ is the unknown function of the non-parametric part, the numbers between the parentheses are the standard errors, α_i represents the fixed effect and u_{it} is the idiosyncratic

disturbance.

$$Revolution_{it} = 20.38_{(7.34)} Q_{it} - 2.20_{(0.96)} \Pi Q_{it} + R[GDPpc_{it}] + \varepsilon_{it}$$

$$\text{Where } i = 1, \dots, n; \quad t = 1, \dots, T$$

$$\varepsilon_{it} = \alpha_i + u_{it}$$

We note that higher level of inequality (Q) has a significant positive impact on the probability of a revolution for low levels of income, where a one point increase in inequality significantly increases possibility of revolution by 20.38. We also note from the interaction term of income and inequality (ΠQ) that higher inequality rate reduces revolution for high levels of income.

Below we graph $R[GDPpc]$, which shows a non-monotonic relationship between the income level and the revolution. We also restrict the observations of GDP per capita in order to obtain a clear graph of the relationship. Therefore, we restrict GDP per capita to be between 1,000 and 25,000 US dollars. Figure 4.8 clearly shows that the probability of revolution is a non-linear function of income. In particular, the probability of revolution is high at a low level of income, whereas it is low at higher level of income. This finding is also in line with the model prediction.

Income and political stability In this part, we test the relationship between the level of income and the degree of the regimes' political stability, where the non-parametric part is the level of income measured by the log of GDP per capita and the parametric parts are the level of government repression of the civil society organizations and the political constraints on policy change.

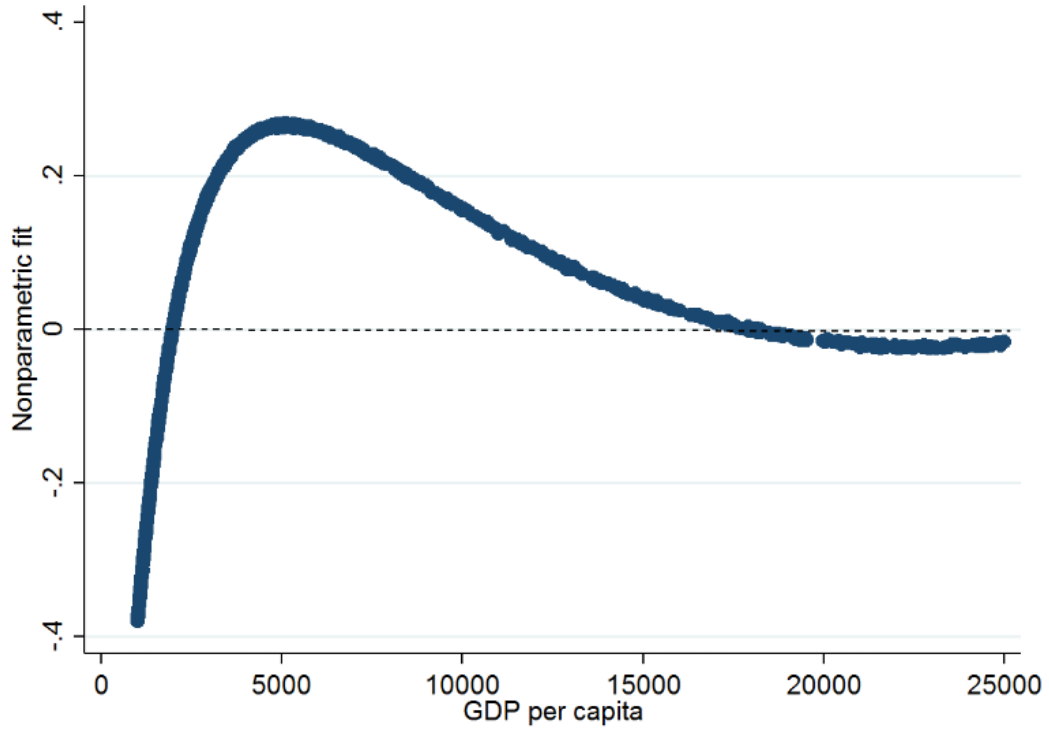


Figure 4.8: Non-linear link between income and revolution

We claim that government repression is highly correlated with regime's stability as political regimes tend to repress oppositional civil society organizations in order to protect the regime's stability. However, high level of repression and sanctions can cause violence and intensify conflicts which then negatively affect stability.

Moreover, we include political constraint to the regression as we argue that more political constraints that reduce the feasibility of policy changes can affect the political stability of the regime. Below is the partially linear model equation where $g[GDPpc]$ is the unknown function of the non-parametric part, the numbers between the parentheses are the standard errors, α_i represents the fixed effect and u_{it} is the idiosyncratic

disturbance.

$$Stability_{it} = -0.17_{(0.06)} Repression_{it} + 0.33_{(0.12)} Political\ constraint_{it} + g[GDPpc_{it}] + \varepsilon_{it}$$

Where $i = 1, \dots, n; t = 1, \dots, T$

$$\varepsilon_{it} = \alpha_i + u_{it}$$

From the equation above, we note that higher level of government repression has a significant negative effect on regime's stability. A one point increase in government repression reduces political stability by 0.17. We argue that as governments engage in more violent repression of civil society organizations, they experience higher rate of political instability. Moreover, the above equation shows that more political constraints on policy change strongly increase the stability of the regime. A one unit increase in the political constraint significantly increases regime's stability by 0.33.

Below we graph the relationship between the income level and the regime's political stability in which we restrict the observations of GDP per capita between 2,000 and 40,000 US dollars in order to clearly show the relationship between income and stability. Figure 4.9 shows that the overall political stability is a non-linear function that increases with the increase in income. The finding is consistent with our model predictions that stability always increases with income.

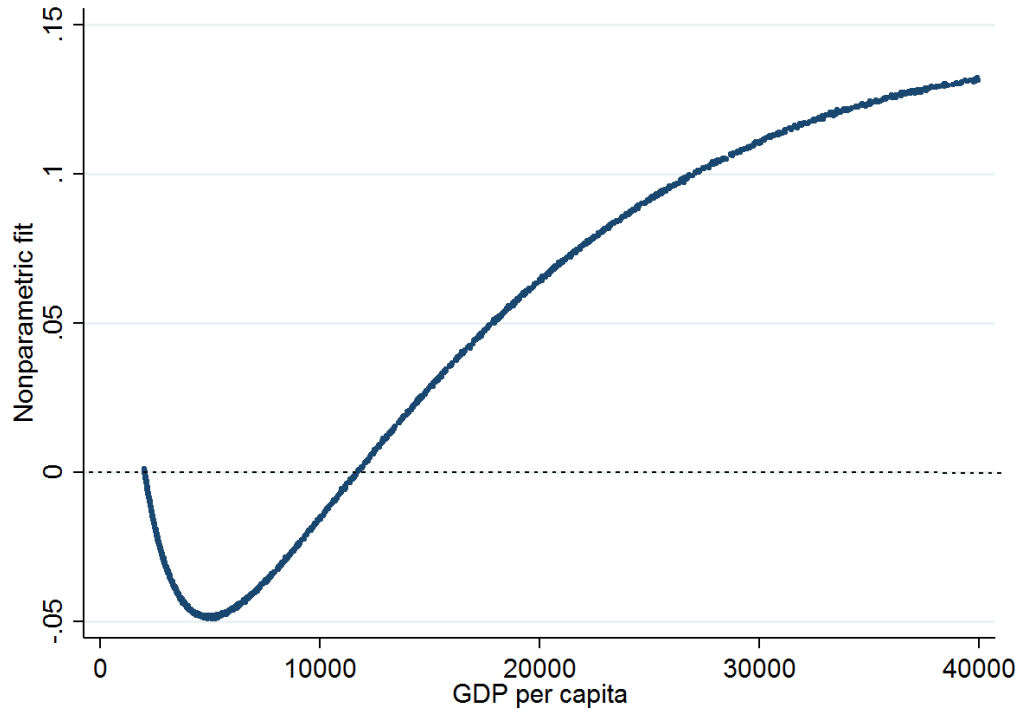


Figure 4.9: Non-linear link between income and political stability

4.4.2.2 Probit model estimation

In this part, we test the effect of the increase in income on the probability of coups organized by the elites. Our theoretical model predicts that the probability of coups always decreases with the increase in income. Therefore, we obtain data of coups that are binary such that 1 indicates the occurrence of a coup in the country and 0 indicates no coups. Hence, we use the probit regression model in order to estimate the effect of the increase in income on the probability of coups. We also compare the results with the fixed effect model.

In the estimation regression, we control for the B index which reflects the importance of the group to the regime that is measured by the interaction of consultation and

democracy. We also control for the interaction term of the B index with the level of income to test if the effect of B index on the probability of coups depends on the level of income.

From Table 4.1, we note that higher level of income reduces the probability of coups significantly (column 1). This result also holds when we control for the B index. The fixed effect estimation results also show that higher income reduces the probability of coups with lower level of significance.

Moreover, we show that higher level of B index reduces the probability of coups when income level is low. In addition, the estimation of the interaction term shows that higher B index also reduces coups for higher level of income. We note that the estimation results on the direct effect and the interaction effect of the B index on coups are not statistically significant. However, they are in line with our theoretical prediction that is the probability of a coup always decreases with the increase in income.

Dependent variable: Probability of coups						
	1	2	3	4	5	6
GDP per capita (π) (in logs)	-1.86*** (0.32)	-1.99*** (0.53)	-1.81 (1.70)	-0.08 (0.07)	-0.08 (0.07)	-0.10 (0.08)
<i>B</i> index		-0.01 (0.01)	0.04 (0.13)		0.0001 (0.0003)	-0.01 (0.01)
B index* GDP per capita (B π)			-0.01 (0.02)			0.001 (0.001)
<i>N</i>	1663	1663	1663	1663	1663	1663
<i>R</i> ²	-	-	-	0.01	0.01	0.02
adj. <i>R</i> ²	-	-	-	0.01	0.01	0.02

Notes: The dependent variable is the number of successful coups that are occurred each year, which is obtained from the V Dem dataset. The data is binary that ranges from 0 to 1. Columns 1, 2 and 3 report the probit model estimation results, whereas columns 4, 5 and 6 report the fixed effect results. *GDP per capita* is in constant 2005 US\$. The *B index* is the interaction of consultation and democracy that measures the relative importance of the political groups to the regime. Robust standard errors are shown in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4.1: The effect of total income on the probability of coups

From the analysis above, we note that the level of income is endogenous to political stability. Hence, the aim of the following section is to move to the parametric estimation models in order to address the issue of endogeneity. We first estimate a fixed effect model and then we present the fixed-effects instrumental variable (FE2SLS) estimates by using our constructed indices of the positive shock of export prices of natural resources; agricultural and mineral as instruments for the increase in income.

4.4.2.3 Fixed effect estimation

In this section, we test the effect of the positive shock in the income level and the effect of the increase in inequality rates on the regime's political stability. Moreover, we use the same dataset to investigate some effects that are not yet addressed in our model. We, therefore, examine the effect of higher income level and inequality on the democracy score of the country. Then, we investigate the impact of higher level of income and inequality on the probability of conflicts and repression.

Total income, inequality and political stability The main purpose of this section is to empirically determine the effects of the increase in the income level and inequality rates on the regimes' political stability. The baseline model is formulated as follows:

$$Stability_{it} = \alpha + \mu_i + \beta_1(\Pi)_{it} + \beta_2(Q)_{it} + \beta_3(B)_{jt} + \beta_4(X)_{it} + u_{it}$$

Where $i = 1, \dots, n$, $t = 1, \dots, T$, $j = 1, \dots, k$

$Stability_{it}$ is the regime's political stability of country i at time t . α is the constant term; μ_i represents the country specific fixed effect. Π is $\log GDPpc$, the per capita GDP expressed in logs for country i at time t . $Inequality (Q)$ measures the degree of inequality in the distribution of resources for country i at time t . B_{jt} captures the B index that is the relative importance and the adjusted size of the political group j at time t . It is empirically measured by the interaction term of consultation and democracy score. X_{it} is a set of other control variables included in the regression such as corruption and educational attainment.

In order to address the issue of endogeneity, we use the fixed effect two stages least square model (FE2SLS). We first construct the commodity export price indices, agricultural and mineral, which identifies natural resource booms. We then use these indices as instrument for the positive shock in the total income.

Table 4.2 presents the estimation results of the fixed effect model estimated using the ordinary least square (OLS) and the two stages least square method (2SLS).

We first assess the extent to which our instruments satisfy the orthogonality condition. Hence, we compute the Hansen J-statistic test, the test of over identifying restrictions. From table 4.2, the p values of the Hansen J-statistics are all far from the rejection of its null at 1% level. This, in fact, indicates that our instrument set is appropriate.

We also include the Kleibergen-Paap rk Wald F statistic for which the null hypothesis is that the instruments are weakly correlated with the endogenous regressor. Table 4.2 shows that Kleibergen-Paap rk Wald F statistics are all well above 10, the rule of thumb to reject the null hypothesis (Baum, 2006). Therefore, we conclude that our instruments are not weakly correlated with the endogenous regressor.

The estimation results show a strong positive impact of GDP per capita on political stability when controlling for the country fixed effect (column 1, 3 and 5). A one per cent increase in GDP per capita significantly increases political stability after controlling for the B index and corruption (column 1). This positive effect still holds when including inequality and education to the regression but with a slight decrease in the estimated coefficient (column 3 and 5). In fact, these results indicate that an increase in the GDP per capita promotes the regime's political stability since it reduces the probability of the anti system opposition movement.

The estimated coefficient of the GDP per capita remains positive and significant at 10% level when we instrument for the increase in income level (column 2). However, the significance disappears once we instrument for the level of income and control for inequality rates and educational attainment (column 4 and 6).

Moreover, our B index of the importance of the political group which we measure by the interaction term of consultation and democracy has a positive impact on political stability under fixed effect and 2SLS specification (column 1 and 2). However, the estimated coefficient is considerably low of 0.01 and with 10% significance level. This indicates that there is only a small impact of the importance of the political group on the regimes' political stability. However, this relationship does not hold when we include inequality rates and education in the regression.

The estimation results also show a strong negative effect of corruption on the regime's political stability. Under the fixed effect specification, a one unit increase in corruption reduces regime stability by 0.13 (column 5). However, when we instrument for the income level, this negative effect of corruption on stability becomes much stronger and significant at the 1% level.

Dependent variable: Political stability						
	1	2	3	4	5	6
GDP per capita (π) (in logs)	1.29*** (0.37)	2.31* (1.07)	0.96** (0.29)	2.03 (1.11)	0.85** (0.32)	1.56 (1.31)
B index	0.01** (0.004)	0.01* (0.004)	0.01 (0.004)	0.004 (0.003)	0.01 (0.005)	0.01 (0.003)
Corruption	-0.19* (0.08)	-0.20*** (0.04)	-0.14* (0.06)	-0.16*** (0.04)	-0.13* (0.06)	-0.15*** (0.04)
Inequality (Q)			-3.85* (1.71)	-3.08*** (0.93)	-3.81* (1.63)	-3.48*** (0.78)
Primary schooling					0.17 (0.22)	0.06 (0.23)
<i>N</i>	1275	1270	1275	1270	1223	1218
<i>R</i> ²	0.19	0.15	0.25	0.21	0.27	0.25
adj. <i>R</i> ²	0.19	0.07	0.25	0.14	0.26	0.18
Hansen J P-value	-	0.82	-	0.80	-	0.83
K-P W. F-stat	-	15.92	-	15.48	-	12.92

Notes: Columns 1, 3 and 5 report the fixed effect estimation results whereas columns 2, 4 and 6 report the 2SLS after instrumenting for income. The instruments are the 1990 natural resource commodity exports price index; agricultural and mineral. *Corruption* is a scale from 0-6 where 6 indicate high level of corruption. *Inequality* is a scale from 0 to 1 where 1 refers to high inequality. *Primary schooling* is expressed in the average years of schooling. The Hansen J statistics is a test of over identifying restrictions where p-values that are statistically insignificant at 1% level means not rejecting the null and hence our instruments are appropriate. The Kleibergen-Paap rk Wald F- statistics is a test of the strength of the instruments, as a rule of thumb for models with one endogenous regressor, the F-statistics should be larger than 10. Robust standard errors are shown in parentheses. * p < 0.05, ** p < 0.01, *** p < 0.001. Other details are as for table 1.

Table 4.2: Fixed effect and 2SLS estimation (dependent variable: political stability)

The results also show that higher inequality in the distribution of resources has a strong negative impact on stability of the regime. In other words, a higher degree of inequality increases the level of anti-system opposition movement activities which causes a real threat to the regimes' stability. This negative effect becomes much stronger once we instrument for income. A one unit increase in the inequality rates strongly reduces political stability by 3.48 (column 6).

In addition, we include the level of educational attainment of primary schooling to the regression in order to test its effect on the regime's political stability. The estimation results show no significant correlations between education and political stability. This result suggests that stability of the political regime is independent of the level of education.

Overall, the estimation results of the linear fixed effect and the 2SLS clearly indicate that political stability increases with the increase in income. This strongly supports our theoretical prediction that an increase in income is a positive driver of political stability. We argue that a positive shock in the total income can change the political regimes' incentives to prolong their hold of political power. Hence, they tend to distribute available income to generate maximal consensus among the population and hence generate more political stability.

Moreover, the results show that higher inequality rates have a significant negative impact on political stability. This finding is strongly supported by other studies in the literature of inequality and stability such as Cederman et al. (2011) and Agnello et al. (2016). We claim that higher inequality rates create higher degrees of frustration among the population who then can organize coups or revolution that can threaten the regimes' stability.

We also find supporting empirical evidence to our theory that the B index of the importance of the political group is an important driver of stability. However, the estimated coefficient is low of 0.01 indicating a small positive effect on stability. This result does not hold when controlling for inequality rates and educational attainment level.

Moreover, the estimation results show a strong negative effect of corruption on regimes' stability. We argue that higher level of corruption can weaken the government and increase the opposition movement against the political regime.

In the following, we extend our empirical analysis to a further investigation of some interesting relationships that we have not yet tested in our theoretical model. We empirically test how an increase in the level of income and inequality rates affects the level of democracy in the country.

Total income, inequality and democracy The empirical literature is far from a consensus on the relationship between democracy, redistribution, and inequality. Most studies, however, focus on the effect of democracy on various economic outcomes related to redistribution and inequality which is important for understanding how democracies use the available policy instruments to affect inequality. Studies find that democratization increase government taxation and revenue as fractions of GDP (Houle, 2009). Similarly, Rodrik (1999) presented evidence from a panel of countries that democracy is associated with higher real wages and higher labour share in national income. In addition, inequality rates tend to increase after democratization when the economy undergone its structural transformation (Acemoglu et al, 2013).

However, little is known about the opposite effect that is the impact of the increase in the inequality rates on the level of democracy. Therefore, we argue that an increase in the level of income can be a positive driver to the democracy in the country. In addition, we claim that the increase in the inequality rates can be a threat to democracy since it increases the incentives of the population to challenge the regime and those of the elites to repress.

Therefore, we aim in this section to examine the effect of a positive boom in the total income level and the high rates of inequality on the level of democracy in the country. We employed three different indices of democracy; Vanhanen democracy index, the

freedom house polity score and the Haber and Menaldo normalized polity score.

In order to test the effect of the increase in income and inequality rates on democracy, we conduct a fixed effect estimation method using the Vanhanen democracy index. The advantage of this index is its extensive coverage. The dataset encompasses all independent countries in the world from 1810 to 2012. The Vanhanen index is captured by the interaction of two dimensions; competition and participation. The degree of competition is defined as the electoral success of smaller parties, that is, the percentage of votes gained by the smaller parties in parliamentary and/or presidential elections. Participation, on the other hand, is measured by the percentage of the total population who actually voted in the election. We stress that the results also hold with our other indicators of democracy; freedom house polity score and the Haber and Menaldo normalized polity score.

We report in Table 4.3 the fixed effect estimates (FE2SLS) to address the issue of endogeneity. We show that an increase in income has a strong positive effect on the level of democracy. This positive impact is stronger when we instrument for income as a one percent increase in GDP per capita increases democracy score by 0.08 under the fixed effect specification and by 0.14 under the 2SLS specification. This positive effect of GDP per capita on democracy score also holds when we control for inequality and corruption. Moreover, the results show that inequality has a significant negative impact on democracy. A one point increase in inequality rate reduces the score of democracy by 41.52 with 1% level of significance. This result also holds when including other variables in the regression. This negative relationship between inequality and democracy could be attributed to the fact that high levels of inequality increases poverty rates that has detrimental effects on health and social conditions. In addition, high levels of resource

inequality undermine the ability of poorer populations to participate in the government (Dahl, 2006).

Furthermore, we have controlled for other variables that seems to have an effect on the level of democracy. The study controls for the index of consultation which reflects the importance of civil society organizations to the regime. Higher consultation level indicates that government routinely consults civil society organizations on policies relevant to their members. Columns 5 to 10 in table 3 show that more consultations from the government have a strong positive impact on democracy. A one point increase in the rate that governments consult major civil society organizations increases the score of democracy by 2.32 under the fixed effect specification and by 1.60 once we instrument for the level of income.

In fact, this relationship between the rate of consultation and democracy is robust with 1% level of significance. We argue that this positive effect is anticipated since more consultation from the government indicates that policy makers seriously take the opinions of the major civil society organizations, which in turn reflects the level of the government democracy.

Moreover, the study controls for the level of corruption to find whether it has any effect on the country's democracy score. The estimation results show that there is no strong effect of the level of corruption on the democracy score. Similarly, the level of education seems to have no significant impact on the level of democracy.

Dependent variable: Democracy score								
	1	2	3	4	5	6	7	8
GDP per capita (π) (in logs)	8.11*** (1.28)	14.07*** (0.94)	3.16** (1.10)	5.11*** (0.96)	0.77 (1.61)	17.20** (6.18)	-0.18 (2.00)	19.44** (7.34)
Inequality (Q)			-41.52*** (5.10)	-39.32*** (1.82)	-25.93*** (7.55)	-14.87* (5.94)	-23.61** (7.36)	-14.22* (5.69)
Consultation					2.32*** (0.57)	1.61*** (0.39)	2.23** (0.57)	1.60*** (0.38)
Corruption					0.27 (0.44)	-0.11 (0.28)	0.29 (0.43)	-0.15 (0.30)
Primary schooling							1.80 (1.41)	-1.21 (1.36)
<i>N</i>	2709	2705	2709	2705	1275	1270	1223	1218
R^2	0.11	0.05	0.38	0.38	0.31	0.08	0.32	0.01
adj. R^2	0.11	0.01	0.38	0.35	0.30	-0.01	0.31	-0.08
Hansen J P-value	-	0.69	-	0.40	-	0.71	-	0.71
K-P W. F-stat	-	368.37	-	276.39	-	16.13	-	13.51

Notes: Columns 1, 3, 5 and 7 report the fixed effect estimation results, whereas columns 2, 4, 6 and 8 report the 2SLS estimation results after instrumenting for income. *Consultation* is an index of whether government consults civil society organization on policies relevant to their members. Robust standard errors are shown in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Other details are as for table 1 and 2.

Table 4.3: Fixed effect and 2SLS estimation (dependent variable: democracy score)

In the following, we empirically test how an increase in the level of income and inequality can affect external conflicts and government repression.

Total income, inequality, conflicts and repression Violent conflict is likely to affect different segments of society to varying degrees. Understanding the underlying causes of such conflicts can help to prevent and mitigate them. The links between inequality and violent conflict are among the oldest concerns in political economy. The conflict-inequality nexus has received lots of attention particularly the effect of inequality on violent conflicts. An inequitable distribution of resources and wealth provoke violent rebellion. Studies find that vertical income inequality does not increase the risk of war (Collier and Hoeffler, 2004; Fearon and Laitin, 2003). However, horizontal inequalities seem to be positively related with the outbreak of conflict (Østby, 2008).

In order to test the effect of the increase in income and inequality on conflicts and government repression, we conduct the fixed effect estimation method. We also undertake the 2SLS to address the issue of endogeneity where we instrument for the level of income by using our constructed commodity export price indices.

From Table 4.4, a one point increase in the per capita GDP increases the possibility of external conflicts by 0.86 when we control for the country fixed effects (column 1) and by 3.35 and higher significance level when we instrument for income (column 2). Therefore, we argue that the increase in income level makes the country more attractive to foreign forces that can threaten the regime's stability.

Moreover, Table 4.4 shows that a one point increase in the income level increases government repression by 0.69 when we instrument for the level of income (column 4).

Higher inequality rates increase the risk of external conflicts, where a one point increase in inequality rate significantly increases conflicts by 3.14 once we use our commodity export price indices to instrument for the level of income.

Moreover, an increase in the inequality rates strongly increases the degree of government repression with 1% level of significance. The estimated coefficient equals to 6.5 with the fixed effect and to 7 with the 2SLS (columns 3 and 4). In other words, the higher the inequality rate, the greater is the government sanctions and repression. This could be attributed to the fact that income inequality generates greater discontent among citizens leading them to involve in civil society organizations where they can strike, express themselves and criticize the government. A higher levels of inequality raises the probability that at least some rebel groups organize for aggressive actions against the political regimes. Therefore, governments tend to act and repress these organizations in order to prolong their hold of power.

We have also control for law and order as we are interested at how the strength of the legal system can have an impact on conflicts and repression. The estimated coefficient of law and order shows that a stronger legal system reduces the possibility of conflicts or could prevent the occurrence of such conflicts substantially. Similarly, stronger legal system can prevent or reduce the government repression and sanctions.

Moreover, we include the level of education to the regression in order to test whether higher level of education could reduce such conflicts. The estimation results show that a one point increase in the level of education reduces possibility of external conflict by 1.19 with 1% level of significance (column 2). Higher education level also decreases the degree of government repression by 0.47 with 1% significance level (column 4).

Furthermore, the estimation results show a strong positive impact of internal con-

flicts on the occurrence of external ones. The estimated coefficient of 0.36 indicates that military conflicts and civil wars can attract foreign forces and cause external conflicts that threaten the regime stability.

Overall, the fixed effect estimation results presented above can be summarized as follows. We found a robust result that higher level of income promotes the regime's political stability. Once we instrument for the level of income, this positive effect still holds but with lower significance level. In addition, we show that higher level of inequality negatively affects the regime's stability. This result strongly holds when we control for other variables and instrument for income level.

Moreover, we found that an increase in income level strongly promotes democracy in the country, whereas, higher level of inequality strongly hinders democratization. This finding is robust to the inclusion of other variables in the regression and to instrumenting for income level.

Furthermore, we show that higher income increases the possibility of external conflicts and higher degree of inequality strengthens such conflicts. In addition, we found higher level of income enables governments to engage in more repression activities and higher inequality rates also increases the level of government repression.

Dependent variable	External conflict		Government repression	
	1	2	3	4
GDP per capita (μ) (in logs)	0.86* (0.39)	3.35*** (0.61)	0.11 (0.17)	0.69** (0.26)
Inequality (Q)	1.07 (1.41)	3.14*** (0.85)	6.46*** (0.89)	6.96*** (0.40)
Law and order	-0.44*** (0.09)	-0.58*** (0.06)	-0.12* (0.06)	-0.16*** (0.03)
Primary schooling	-0.88*** (0.21)	-1.19*** (0.12)	-0.39** (0.14)	-0.47*** (0.05)
Corruption	0.12 (0.07)	-0.11 (0.07)	0.02 (0.05)	-0.02 (0.03)
Internal conflict	0.36*** (0.06)	0.36*** (0.03)		
<i>N</i>	2019	2018	2019	2018
<i>R</i> ²	0.40	0.33	0.49	0.47
adj. <i>R</i> ²	0.40	0.29	0.49	0.44
Hansen J P-value	-	0.18	-	0.11
K-P W. F-stat	-	88.73	-	86.68

Notes: Two dependent variables; external conflict and government repression. Columns 1 and 3 report the fixed effect estimation results, whereas columns 2 and 4 report the 2SLS results. *External conflict* is a scale from 0-12 where 12 refer to an intensive conflict and 0 to no conflict. *Government repression* of civil society is a scale where higher values indicate a strong repression. *Law and order* is a scale from 0-6 where 6 indicate stronger legal system. *Internal conflict* is a scale from 0-12 where 12 indicate intensive conflict and 0 no conflict. Robust standard errors are shown in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Other details are as for table 1 and 2.

Table 4.4: Fixed effect and 2SLS estimation (dependent variables: conflict and repression)

Sensitivity Analysis In this section, we test the robustness of the result of the effect of an increase in income and the high rates of inequality on the regime’s political stability. We compare the estimation results of three different stability indicators namely; the V-Dem political stability, government stability and the absence of violence. The ‘V-Dem Political stability’ is the measure that was used in the main study which is an index of the anti system opposition movement among civil society organizations. ‘Government stability’ is the ICRG measure of the ability of the government to carry out its declared programs and to stay in office. ‘Absence of violence’ is a measure of the likelihood that the government in power will be destabilized or overthrown by violence.

We also test the robustness of the result using three different inequality indices namely; ‘the V-Dem inequality’, ‘GINI index’ and ‘EHII’. The V-Dem inequality is the measure that was used in the main regressions of the study. It is a broad measure of the inequality in the distribution of resources that is obtained from the V-Dem dataset. GINI index is a measure of statistical dispersion of income distribution. The EHII is the international household income inequality index.

We report the fixed effect estimates in Table 4.5 below. We note that an increase in the total national income has a significant positive impact on all three measures of stability under all specification. A one percent increase in the GDP per capita increases political stability by 0.85 and government stability by 3.46 and the indicator of the absence of violence by 0.79.

We also note that the V-Dem inequality has a significant negative impact on political stability (column 1). The estimated coefficient is negative and significant at 10 % indicating that higher inequality threaten the regime’s stability. On the other hand, using the Gini index or the EHII as measures of income inequality does not show

any statistical significance effects on stability. However, we should not draw a strong conclusion from the lack of a relationship between stability and the rate of inequality measured by GINI and EHII as data from these two indices are missing for most of the world's resource rich countries.

Moreover, we report the FE2SLS in Table 4.6 below to addresses the issue of endogeneity. We note that once we instrument for income, an increase in GDP per capita has no significant positive effect on stability. In addition, the effect of V-Dem inequality on political stability holds with more significance after instrumenting for the level of income. A one point increase in the V-Dem inequality reduces stability by 3.48 with 1% level of significance. Similarly, inequality measured by the Gini index negatively affects government stability with a small coefficient of 0.03 and with 10% significance level.

Furthermore, we test the robustness of the result of the effect of an increase in income and inequality rates on the democracy score of the country. We compare the estimation results of three different democracy indices namely; 'the Vanhanen democracy index', 'the Freedom House/ Polity score' and the 'Haber and Menaldo Normalized Polity score'.

Vanhanen democracy index is the measure that is used in our main regressions since it provides better coverage and is captured by the interaction of two dimensions; competition and participation. Freedom house/ Polity score is a scale from 0-10 where 10 indicate more democratic country. The Normalized Polity score ranges from 0-100 where a higher value indicates more democracy.

Dependent variable	Political stability			Government stability			Absence of violence		
	1	2	3	4	5	6	7	8	9
GDP per capita (π) (in logs)	0.85** (0.32)	1.22*** (0.31)	1.11** (0.33)	3.46*** (0.77)	3.31*** (0.84)	3.46*** (0.93)	0.79* (0.36)	0.84* (0.37)	0.65 (0.40)
B index	0.01 (0.005)	0.01* (0.004)	0.01* (0.005)	0.00 (0.01)	0.01 (0.01)	0.01 (0.01)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)
Corruption	-0.13* (0.06)	-0.18* (0.08)	-0.15* (0.06)	0.14 (0.15)	0.14 (0.17)	0.12 (0.18)	-0.11** (0.04)	-0.11** (0.04)	-0.04 (0.04)
Primary schooling	0.17 (0.22)	0.30 (0.27)	0.28 (0.25)	2.96*** (0.37)	3.24*** (0.39)	2.31*** (0.54)	0.03 (0.24)	0.004 (0.25)	0.14 (0.33)
Inequality (Q)	-3.81* (1.63)			-2.73 (2.13)			-0.73 (0.62)		
Gini		0.01 (0.01)			-0.03 (0.02)			-0.002 (0.01)	
EHII			0.01 (0.02)			0.05 (0.05)			-0.03 (0.03)
N	1223	1144	932	1223	1144	932	265	255	194
R ²	0.27	0.22	0.22	0.31	0.31	0.24	0.08	0.08	0.07
adj. R ²	0.26	0.22	0.22	0.30	0.31	0.24	0.07	0.06	0.05

Notes: The table report the fixed effect estimation results of three different dependent variables that measure stability; *Political stability* is the measure that used in the main regression of the study. *Government stability* is the ICRG measure of stability that range from 0 to 12, where 12 indicates a stable government. *Absence of violence* is a measure of the likelihood that government will be destabilized because of violence. *Inequality* is the measure that used in the main regression of the study. *Gini* is the Gini coefficient of inequality. *EHII* is the estimated household income inequality. Robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < .001$. Other details are as for table 1 and 2.

Table 4.5: Robustness checks of the effect of income and inequality on stability measures (FE)

Dependent variable	Political stability			Government stability			Absence of violence		
	1	2	3	4	5	6	7	8	9
GDP per capita (π) (in logs)	1.56 (1.31)	1.70 (1.37)	1.54 (1.31)	2.89 (3.20)	3.06 (3.29)	4.59 (4.35)	-0.73** (0.25)	-0.64** (0.24)	-0.75 (0.44)
B index	0.004 (0.003)	0.01 (0.005)	0.01 (0.005)	0.00 (0.01)	0.01 (0.01)	0.01 (0.02)			
Corruption	-0.15*** (0.04)	-0.19*** (0.04)	-0.16*** (0.04)	0.15 (0.11)	0.15 (0.11)	0.09 (0.14)	0.002 (0.02)	-0.01 (0.02)	0.03 (0.04)
Primary schooling	0.06 (0.23)	0.21 (0.29)	0.18 (0.32)	3.04*** (0.54)	3.29*** (0.66)	2.05* (0.99)	-0.04 (0.09)	-0.04 (0.09)	0.07 (0.16)
Inequality (Q)	-3.48*** (0.78)			-2.99 (1.94)			-0.31 (0.51)		
Gini		0.01 (0.005)			-0.03* (0.01)			0.00 (0.00)	
EHII			0.01 (0.01)			0.06 (0.04)			-0.01 (0.01)
N	1218	1140	952	1218	1140	925	959	924	552
R ²	0.25	0.21	0.21	0.31	0.31	0.24	-0.13	-0.09	0.19
adj. R ²	0.18	0.14	0.12	0.24	0.25	0.15	-0.27	-0.23	-0.40
Hansen J P-value	0.83	0.50	0.41	0.73	0.49	0.16	0.80	0.73	0.12
K-P W. F-stat	12.92	12.54	7.85	12.92	12.54	7.85	84.65	79.28	35.99

Notes: The table reports the 2SLS estimation of three different dependent variables that measure stability. Robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Other details are as for tables 1, 2 and 4.

Table 4.6: Robustness checks of the effect of income and inequality on stability measures (2SLS)

Table 4.7 below shows that an increase in income level has a significant positive effect on democracy only when instrumenting for the income level. A one point increase in GDP per capita significantly increase Vanhanen index by 19.44 and the Normalized polity score by 28.68.

Higher rates of inequality have a strong negative impact on democracy. This result is robust to our various measures of democracy and holds under the fixed effect and the 2SLS specification. A one point increase in inequality rates lowers Vanhanen democracy score by 23.61, Freedom House/ Polity score by 4.61 and the Normalized Polity score by 51.10.

Moreover, we show that higher degree of consultations has a strong positive effect on democracy. This result is robust under fixed effect and 2SLS and with all our various measures of democracy. A one point increase in consultations increases Vanhanen index by 2.23 and the Normalized polity score by 11.07 when controlling for the fixed effect.

Dependent variable	Vanhanen Index		Freedom house/ Polity score		Normalized polity score	
	1	2	3	4	5	6
GDP per capita (π) (in logs)	-0.18 (2.00)	19.44** (7.34)	0.07 (0.30)	1.65*** (0.46)	-3.44 (3.87)	28.68** (9.35)
Inequality (Q)	-23.61** (7.36)	-14.22* (5.69)	-4.61** (1.66)	-3.72*** (0.69)	-51.10** (19.33)	-31.28** (10.30)
Consultation	2.23*** (0.57)	1.60*** (0.38)	0.94*** (0.17)	0.90*** (0.07)	11.07*** (2.07)	9.95*** (0.93)
Corruption	0.29 (0.43)	-0.15 (0.30)	0.07 (0.07)	-0.05 (0.05)	0.15 (1.04)	-1.94** (0.69)
Primary schooling	1.80 (1.41)	-1.21 (1.36)	-0.03 (0.21)	-0.31** (0.12)	4.95 (2.89)	0.55 (1.80)
<i>N</i>	1223	1218	1939	1938	1802	1801
<i>R</i> ²	0.32	0.01	0.43	0.38	0.43	0.31
adj. <i>R</i> ²	0.31	-0.01	0.43	0.34	0.43	0.27
Hansen J P-value	-	0.71	-	0.96	-	0.69
K-P W. F-stat	-	13.51	-	84.33	-	47.51

Notes: The table reports as a robustness checks of three different dependent variables that measure democracy. Vanhanen Index is the measure that is used in our main study that is the interaction of two dimensions; competition and participation. Freedom house/ polity score is a scale ranges from 0-10 where 0 indicates less democratic countries and 10 most democratic. The Normalized polity score is the Haber and Menaldo index that ranges from 0-100. Columns 1, 3 and 5 report the fixed effect estimation results whereas column 2, 4 and 6 report the 2SLS. Robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Other details are as for table 1, 2 and 3.

Table 4.7: Robustness checks of the effect of income and inequality on various democracy measures

Conclusion

In this chapter, we have tested empirically the theoretical predictions of the model we proposed in the previous chapter. We first employ a semi-parametric panel model to estimate the nonlinear relationship between total income and both income inequality and political stability.

The results from the semi-parametric regression provide strong support to the theoretical predictions of our model. More specifically, inequality in the distribution of resources found to be an inverted U-shaped function of total income. In addition, we find that probability of revolution is high at low levels of income and it is relatively low at higher levels of income. We also find that the probability of coups organized by a group of the elites is decreasing in total income. Moreover, we find that an increase in the level of income positively promotes political stability.

Moreover, we examine these effects in a parametric fixed effect model to address the issue of endogeneity. We instrument for the increase in level of income by using the commodity export price indices for both agricultural and mineral resources.

The results of the parametric regression show that an increase in per capita GDP promotes political stability significantly. In addition, the results show that higher inequality rate negatively affects the regime political stability. This negative effect between inequality and political stability is strong and robust when controlling for other variables in the regression and when instrumenting for the level of income.

Furthermore, we extend our investigation to some interesting relationships that we have not yet tested in our theoretical model. More specifically, we investigate the effect of the increase in income level and inequality rates on the level of democracy in the

country. The estimation results show that higher level of income has a strong positive impact on the democracy score. We also find that a higher rate of inequality strongly reduces the democracy level of the country.

Moreover, we test the effect of the increase in the income level and inequality on the probability of external conflicts. The results show that higher level of income significantly increases the probability of external conflicts. This negative effect is stronger when we instrument for income. We claim that higher level of total income particularly from natural resources makes the country more appealing to foreign forces and hence increases the probability of external conflicts. In addition, we find that higher rates of inequality strongly fuel external conflicts.

Finally, we test the impact of higher levels of income and inequality on the level of government repression. We find that an increase in income increases the level of repression when income is instrumented by the commodity exports prices. In addition, we find that an increase in inequality increases government repression significantly. We claim that a higher level of inequality raises the probability of some rebel groups to involve in aggressive actions against the political regime. Therefore, governments tend to repress these organizations in order to prolong their hold of political power.

In future work, we would investigate the effect of the elite group political influence on the probability of organizing a coup and on the regime's political stability at different stages of development as suggested by our theoretical model.

Chapter 5

Conclusions

This thesis provides insights on the role of natural resources and the evolution of a developing country's political regime and institutions along the process of enrichment/development of the country

Contrary to the natural resource curse hypothesis, we find evidence of a growth enhancing effects of natural resources. We also show that higher rents and exports from different types of natural resources increase income level of the resource owning country.

Moreover, whilst abundant resources helps a non-democratic political regime to maximize overall stability, in the initial stages of the country's development inequality between the regimes's elite group and the rest of the populations widens, and hence risk from revolutions is high. In fact, this effect would add to various static and dynamic inefficiencies that are largely analyzed in the literature.

Furthermore, this effect is stronger when the elite group is large and powerful and

when the political regime is more affiliated with the elite group’s political preferences.

On the contrary, at more advanced stages of country’s development, a now consolidated political regime would decrease inequality between the two groups. Hence, the risk of revolution is reduced.

These theoretical predictions have a supporting empirical evidence. We show, using semi-parametric regression, that a positive increase in resources monotonically enhances the regime’s stability. We also show that inequality and hence probability of revolution first increases with the increase in resources and then declines. In addition, using a probit model, we find that probability of coups always decreases with the increase in resources.

In addition, our theoretical model predicts that at any stage of development, an elite-affiliated regime produces higher inequality, lower overall stability, higher risk of revolutions and lower risk of coups. Interestingly, however, inequality and risk of revolutions will start decreasing at an earlier stage of development in comparison with the case of a non-affiliated regime. This is, in fact, another testable implication of our analysis, which we leave for future empirical work.

We also note that our general model can accommodate other relevant cases, such as political regimes that are motivated by their own enrichment or by their affiliation to more than one group with different weights. The model can also accommodate the case of clashes from more than two groups/ tribes competing to be the regime’s elites, which we also leave for future work.

5.1 Appendix

Appendix A (of chapter 2)

Summary statistics of the study variables

Variable	No. of observation	Mean	Std. Dev	Min	Max
Level of GDP (in millions)	8140	38892.38	167413.6	16	4900000
Growth of GDP	8140	3.03	6.92	-64.05	189.83
Level of GDP per capita	8140	2504.65	5793.53	50.04	81947.2
Growth of GDP per capita	8140	1.42	6.22	-65.03	142.07
Coal rents	8140	0.07	0.52	0	24.09
Mineral rents	8140	0.86	3.30	0	56.13
Natural gas rents	8140	0.77	3.71	0	79.57
Oil rents	8140	3.82	11.12	0	95.82
Agriculture exports	8140	4.36	10.62	0	93.82
Fuel exports	8140	9.65	23.94	0	100
Ores and metals exports	8140	5.29	14.21	0	99.07

Appendix B (of chapter 3)

Proof of proposition 1

Maximizing the regime utility (16) and solving for $\frac{\Delta T}{\Pi}$ yields:

$$\begin{aligned} \frac{dU_r}{d\left(\frac{\Delta T}{\Pi}\right)} &= \alpha B \left(\frac{\Delta T}{\Pi}\right)^{\alpha-1} \left(\frac{1}{k}\right)^{\alpha} - \alpha(1-B) \left(1 - \frac{\Delta T}{\Pi}\right)^{\alpha-1} = 0 \\ B \left(\frac{\Delta T}{\Pi}\right)^{\alpha-1} \left(\frac{1}{k}\right)^{\alpha} &= (1-B) \left(1 - \frac{\Delta T}{\Pi}\right)^{\alpha-1} \end{aligned}$$

Hence, the elite optimal extra transfer in the proportional case is:

$$\left(\frac{\Delta T}{\Pi}\right)_{pr}^* = \frac{(B)^{\frac{1}{1-\alpha}}}{(B)^{\frac{1}{1-\alpha}} + (1-B)^{\frac{1}{1-\alpha}} [k]^{\frac{\alpha}{1-\alpha}}}$$

only if (I_1) satisfies, that is:

$$\frac{(B)^{\frac{1}{1-\alpha}}}{(B)^{\frac{1}{1-\alpha}} + (1-B)^{\frac{1}{1-\alpha}} [k]^{\frac{\alpha}{1-\alpha}}} < k$$

Note that $k \in [0, 1)$

Proof of proposition 2

(I_2) is:

$$\frac{(B)^{\frac{1}{1-\alpha}}}{(B)^{\frac{1}{1-\alpha}} + (1-B)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}} < \frac{K+k\Pi}{\Pi}$$

The LHS of (I_2) is monotonically increasing in Π . Hence, for higher levels of Π ;

$$\text{LHS}(\infty) = \frac{(B)^{\frac{1}{1-\alpha}}}{(B)^{\frac{1}{1-\alpha}} + (1-B)^{\frac{1}{1-\alpha}} [k]^{\frac{\alpha}{1-\alpha}}} < 1$$

The RHS of (I_2) is monotonically decreasing in Π . Hence, for higher levels of Π ,

$$\text{RHS}(\infty) = k$$

Therefore, there is just one root denoted by Π^c when $\text{LHS}(\Pi) = \text{RHS}(\Pi)$. So, given that $k < 1$, the second part of proposition 2 (19b) exists only iff:

$$\frac{(B)^{\frac{1}{1-\alpha}}}{(B)^{\frac{1}{1-\alpha}} + (1-B)^{\frac{1}{1-\alpha}} [k]^{\frac{\alpha}{1-\alpha}}} > k$$

Simplifying yields:

$$1 - k > \left(\frac{1-B}{B} \right)^{\frac{1}{1-\alpha}} [k]^{\frac{1}{1-\alpha}}$$

$$\frac{1-k}{(k)^{\frac{1}{1-\alpha}}} > \left(\frac{1-B}{B} \right)^{\frac{1}{1-\alpha}} \quad (A_1)$$

Therefore, from A_1 , the existence of the second part of proposition 2 depends on the parameters k , B and α . For any value of $\alpha \in (0, 1)$, there is always an intersection. Fixing α and increasing B will likely to lead to an intersection where the range of k is wider. If $B = 1$ (one group in the population; the elite) and for any value of k , including when $k = 1$, there is an intersection. On the contrary, if $B = 0$ then the condition above (A_1) can never be satisfied as the important group to the regime (the elite) does not exist.

Proof of proposition 3

From 19a, the optimal extra transfer to the elite is:

$$\left(\frac{\Delta T}{\Pi}\right)_{th}^* = \frac{(B)^{\frac{1}{1-\alpha}}}{(B)^{\frac{1}{1-\alpha}} + (1-B)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}}$$

Simplifying yields:

$$\left(\frac{\Delta T}{\Pi}\right)_{th}^* = \frac{1}{1 + \left(\frac{1-B}{B}\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}} \quad (A_2)$$

Then taking the derivative of A_2 with respect to Π :

$$\frac{d\left(\frac{\Delta T}{\Pi}\right)_{th}^*}{d\Pi} = \frac{\left(\frac{k}{\Pi^2}\right) \left(\frac{\alpha}{1-\alpha}\right) \left(\frac{1-B}{B}\right)^{\frac{1}{1-\alpha}} \left(\frac{K+k\Pi}{\Pi}\right)^{\frac{2\alpha-1}{1-\alpha}}}{\left(1 + \left(\frac{1-B}{B}\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}\right)^2}$$

Hence,

$$\frac{d\left(\frac{\Delta T}{\Pi}\right)_{th}^*}{d\Pi} > 0$$

Therefore, when $\Pi < \Pi^c$, an increase in Π increases the optimal extra transfer to the elite group; $\left(\frac{\Delta T}{\Pi}\right)_{th}^*$.

On the contrary, from 19b, the elite optimal extra transfer is:

$$\left(\frac{\Delta T}{\Pi}\right)_{th}^* = \frac{K + k\Pi}{\Pi}$$

We know that the elite ideal target $(K + k\Pi)$ is increasing in Π , whereas the ratio of the elite ideal target to the total resources decreases in Π . In other words, the elite ideal target level increases in a rate that is lower than the rate of the increase in Π . Therefore, the ratio of the ideal target level to the total resources; that is the optimal extra transfer to the elite group; $(\frac{\Delta T}{\Pi})_{th}^*$ is decreasing in Π .

Proof of proposition 5

An increase in B increases regime stability ($\frac{dS}{dB} > 0$) if condition 21 satisfies, that is:

$$\frac{\Pi}{K + k\Pi} + 1 > \frac{1}{(\frac{\Delta T}{\Pi})^*}$$

We know from the definition of Π^c that when $\Pi < \Pi^c$, the regime transfers $(\frac{\Delta T}{\Pi})^*$ to the elite group which is lower than their ideal level such that; $(\frac{\Delta T}{\Pi})^* < \frac{K+k\Pi}{\Pi}$, which can be written as:

$$\frac{1}{(\frac{\Delta T}{\Pi})^*} > \frac{\Pi}{K + k\Pi} \quad (A_3)$$

We also know that $(\frac{\Delta T}{\Pi})^*$ is monotonically increasing in Π and is lower than one ($(\frac{\Delta T}{\Pi})^* < 1$) from INADA condition. Then, from 21 and A_3 , we get;

$$\frac{\Pi}{K + k\Pi} < \frac{1}{(\frac{\Delta T}{\Pi})^*} < \frac{\Pi}{K + k\Pi} + 1$$

Hence, $\frac{dS}{dB} < 0$ when:

$$\frac{\Pi}{K + k\Pi} + 1 < \frac{1}{(\frac{\Delta T}{\Pi})^*}$$

Therefore, there exists Π^s ($0 < \Pi^s < \Pi^c$), such that;

for $\Pi < \Pi^s$ then $\frac{dS}{dB} < 0$; and

for $\Pi > \Pi^s$ then $\frac{dS}{dB} > 0$

For $\Pi \geq \Pi^c$, then $\frac{dS}{dB} > 0$, from 19b and 21.

Now, we prove that $\Pi^s < \Pi^c$;

Hence, from A₃, Π^c is:

$$\frac{1}{\left(\frac{\Delta T}{\Pi}\right)^*} = \frac{\Pi}{K + k\Pi}$$

and from 21, Π^s is:

$$\frac{1}{\left(\frac{\Delta T}{\Pi}\right)^*} = \frac{\Pi}{K + k\Pi} + 1$$

Since $\frac{\Pi}{K+k\Pi} + 1 > \frac{\Pi}{K+k\Pi}$ and we know that $\left(\frac{\Delta T}{\Pi}\right)^*$ is increasing in Π , so $\frac{1}{\left(\frac{\Delta T}{\Pi}\right)^*}$ is decreasing in Π . Therefore $\Pi^s < \Pi^c$.

Proof of result 1:

From 13, inequality is

$$Q = \left(\frac{1}{\beta}\right) \left(\frac{\frac{\Delta T}{\Pi}}{1 - \frac{\Delta T}{\Pi}}\right)$$

At early stage of development, when $\Pi < \Pi^c$, then from A₂ (or 19a), $\left(\frac{\Delta T}{\Pi}\right)$ is:

$$\left(\frac{\Delta T}{\Pi}\right)^*_{th} = \frac{1}{1 + \left(\frac{1-B}{B}\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}}$$

Then we substitute in 13;

$$Q = \left(\frac{1}{\beta}\right) \left(\frac{1}{1 + \left(\frac{1-B}{B}\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}} \right) \left(\frac{1 + \left(\frac{1-B}{B}\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}}{1 + \left(\frac{1-B}{B}\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}} - 1} \right)$$

Therefore, when $\Pi < \Pi^c$, inequality 13 can be written such as:

$$Q = \left(\frac{1}{\beta}\right) \left(\frac{1}{\left(\frac{1-B}{B}\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}} \right) \quad (A_4)$$

Since $B = I^a \beta$, so we substitute B in the above:

$$Q = \left(\frac{1}{\beta}\right) \left(\frac{1}{\left(\frac{1-I^a \beta}{I^a \beta}\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}} \right)$$

$$Q = \left(\frac{1}{\beta}\right) \left(\frac{1}{\left(\frac{1}{I^a \beta} - 1\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}} \right)$$

Taking the derivative of Q with respect to I^a , we get:

$$\frac{dQ}{dI^a} = \left(\frac{1}{\beta}\right) \left(\frac{\left(\frac{1}{1-\alpha}\right) \left(\frac{1}{I^a \beta} - 1\right)^{\frac{\alpha}{1-\alpha}} \left(\frac{1}{(I^a \beta)^2}\right) \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}}{\left(\left(\frac{1}{I^a \beta} - 1\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}\right)^2} \right)$$

Now we take the derivatives of Q with respect to β :

$$\frac{dQ}{d\beta} = \left(-\frac{1}{\beta^2}\right) \left(\frac{1}{\left(\frac{1}{I^a \beta} - 1\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}} \right) + \left(\frac{1}{\beta}\right) \left(\frac{\left(\frac{1}{1-\alpha}\right) \left(\frac{1}{I^a \beta} - 1\right)^{\frac{\alpha}{1-\alpha}} \left(\frac{I^a}{(I^a \beta)^2}\right) \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}}{\left(\left(\frac{1}{I^a \beta} - 1\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}\right)^2} \right)$$

Simplifying yields:

$$\frac{dQ}{d\beta} = \left(\frac{1}{\beta}\right) \left(\frac{1}{\left(\frac{1}{I^a\beta} - 1\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}} \right) \left[\left(\left(\frac{1}{1-\alpha}\right) \left(\frac{1}{I^a\beta} - 1\right)^{\frac{\alpha-1}{1-\alpha}} \left(\frac{1}{I^a\beta^2}\right) \right) - \left(\frac{1}{\beta}\right) \right]$$

$$\frac{dQ}{d\beta} = \left(\frac{1}{\beta}\right) \left(\frac{1}{\left(\frac{1}{I^a\beta} - 1\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}} \right) \left[\left(\left(\frac{1}{1-\alpha}\right) \left(\frac{1}{I^a\beta} - 1\right)^{-1} \left(\frac{1}{I^a\beta}\right) \right) - 1 \right]$$

Therefore,

$$\frac{dQ}{d\beta} > 0 \text{ only if } \left[\left(\frac{1}{(1-\alpha)(1-I^a\beta)} \right) \right] > 1, \text{ which is always satisfied.}$$

At advanced stages of development, when $\Pi \geq \Pi^c$, then substituting 19b in 13 yields:

$$Q = \frac{1}{\beta} \left(\frac{K + k\Pi}{\Pi - K - k\Pi} \right)$$

which can be written such that;

$$Q = \frac{I^a}{B} \left(\frac{K + k\Pi}{\Pi - K - k\Pi} \right)$$

Taking the derivative of Q with respect to I^a , we get:

$$\frac{dQ}{dI^a} = \frac{1}{B} \left(\frac{K + k\Pi}{\Pi - K - k\Pi} \right)$$

and taking the derivatives of Q with respect to β :

$$\frac{dQ}{d\beta} = -\frac{1}{\beta^2} \left(\frac{K + k\Pi}{\Pi - K - k\Pi} \right)$$

Proof of proposition 6:

When $\Pi < \Pi^c$, then $\left(\frac{\Delta T}{\Pi}\right)_{th}^*$ from (A₂) is;

$$\left(\frac{\Delta T}{\Pi}\right)_{th}^* = \frac{1}{1 + \left(\frac{1-B}{B}\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}}$$

Taking the derivative of $\left(\frac{\Delta T}{\Pi}\right)$ with respect to B yields:

$$\frac{d\left(\frac{\Delta T}{\Pi}\right)}{dB} = \frac{\left(\frac{1}{1-\alpha}\right) \left(\frac{1-B}{B}\right)^{\frac{-\alpha}{1-\alpha}} \left(\frac{1}{B^2}\right) \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}}{\left(1 + \left(\frac{1-B}{B}\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}\right)^2}$$

When $\Pi \geq \Pi^c$, then $\left(\frac{\Delta T}{\Pi}\right)_{th}^*$ from (19b) is;

$$\left(\frac{\Delta T}{\Pi}\right)_{th}^* = \frac{K + k\Pi}{\Pi}$$

$$\frac{d\left(\frac{\Delta T}{\Pi}\right)}{dB} = 0$$

Proof of proposition 7:

When the regime has limited access to resources ($\Pi < \Pi^c$), we first test the effects of higher K and k on inequality;

Inequality (from A₄) is:

$$Q = \left(\frac{1}{\beta}\right) \left(\frac{1}{\left(\frac{1-B}{B}\right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi}\right]^{\frac{\alpha}{1-\alpha}}} \right)$$

Taking the derivative of Q with respect to K yields:

$$\frac{dQ}{dK} = - \left(\frac{1}{\beta} \right) \frac{\left(\frac{\alpha}{1-\alpha} \right) \left(\frac{1-B}{B} \right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi} \right]^{\frac{2\alpha-1}{1-\alpha}}}{\Pi \left[\left(\frac{1-B}{B} \right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi} \right]^{\frac{\alpha}{1-\alpha}} \right]^2}$$

We then take the derivative of Q with respect to k :

$$\frac{dQ}{dk} = - \left(\frac{1}{\beta} \right) \frac{\left(\frac{\alpha}{1-\alpha} \right) \left(\frac{1-B}{B} \right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi} \right]^{\frac{2\alpha-1}{1-\alpha}}}{\left(\left(\frac{1-B}{B} \right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi} \right]^{\frac{\alpha}{1-\alpha}} \right)^2}$$

Second, we test the effects of higher K and k on the elite total extra transfer, $\left(\frac{\Delta T}{\Pi} \right)_{th}^*$;

$\left(\frac{\Delta T}{\Pi} \right)_{th}^*$ from (A₂) is:

$$\left(\frac{\Delta T}{\Pi} \right)_{th}^* = \frac{1}{1 + \left(\frac{1-B}{B} \right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi} \right]^{\frac{\alpha}{1-\alpha}}}$$

Taking the derivative of $\left(\frac{\Delta T}{\Pi} \right)_{th}^*$ with respect to K yields:

$$\frac{d\left(\frac{\Delta T}{\Pi} \right)}{dK} = - \frac{\left(\frac{\alpha}{1-\alpha} \right) \left(\frac{1-B}{B} \right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi} \right]^{\frac{2\alpha-1}{1-\alpha}}}{\Pi \left[1 + \left(\frac{1-B}{B} \right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi} \right]^{\frac{\alpha}{1-\alpha}} \right]^2}$$

and taking the derivative of $\left(\frac{\Delta T}{\Pi} \right)_{th}^*$ with respect to k yields:

$$\frac{d\left(\frac{\Delta T}{\Pi} \right)}{dk} = - \frac{\left(\frac{\alpha}{1-\alpha} \right) \left(\frac{1-B}{B} \right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi} \right]^{\frac{2\alpha-1}{1-\alpha}}}{\left[1 + \left(\frac{1-B}{B} \right)^{\frac{1}{1-\alpha}} \left[\frac{K+k\Pi}{\Pi} \right]^{\frac{\alpha}{1-\alpha}} \right]^2}$$

Third, we test the effects of higher K and k on regime stability, S ;

From (18), S is:

$$S = B\left(\frac{\Delta T}{\Pi}\right)^\alpha \left(\frac{\Pi}{K + k\Pi}\right)^\alpha + (1 - B) \left(1 - \frac{\Delta T}{\Pi}\right)^\alpha$$

Taking the derivative of S with respect to K :

$$\frac{dS}{dK} = -\frac{\alpha B \Pi}{(K + k\Pi)^2} \left(\frac{\Delta T^*}{\Pi}\right)^\alpha \left(\frac{\Pi}{K + k\Pi}\right)^{\alpha-1}$$

Taking the derivative of S with respect to k :

$$\frac{dS}{dk} = -\frac{\alpha B \Pi^2}{(K + k\Pi)^2} \left(\frac{\Delta T^*}{\Pi}\right)^\alpha \left(\frac{\Pi}{K + k\Pi}\right)^{\alpha-1}$$

When the regime is rich in resources ($\Pi \geq \Pi^c$), we first test the effects of higher K and k on inequality;

Inequality (from A₅) is:

$$Q = \left(\frac{1}{\beta}\right) \left(\frac{K + k\Pi}{\Pi - K - k\Pi}\right)$$

Taking the derivative of Q with respect to K yields:

$$\frac{dQ}{dK} = \left(\frac{1}{\beta}\right) \left(\frac{\Pi}{(\Pi - K - k\Pi)^2}\right)$$

Now taking the derivative of Q with respect to k yields:

$$\frac{dQ}{dk} = \left(\frac{1}{\beta}\right) \frac{\Pi^2}{[\Pi - K - k\Pi]^2}$$

Second, we test the effects of K and k on the elite total extra transfer, $(\frac{\Delta T}{\Pi})_{th}^*$;

$(\frac{\Delta T}{\Pi})_{th}^*$ from (19b) is;

$$\left(\frac{\Delta T}{\Pi}\right)_{th}^* = \frac{K + k\Pi}{\Pi}$$

Taking the derivative of $(\frac{\Delta T}{\Pi})_{th}^*$ with respect to K yields:

$$\frac{d(\frac{\Delta T}{\Pi})}{dK} = \frac{1}{\Pi}$$

and the derivative of $(\frac{\Delta T}{\Pi})_{th}^*$ with respect to k is:

$$\frac{d(\frac{\Delta T}{\Pi})}{dk} = 1$$

Third, we test the effects of K and k on regime stability, S ;

From (18), S is

$$S = B + (1 - B)(1 - \frac{\Delta T}{\Pi})^\alpha$$

Taking the derivative of S with respect to K , when $(\frac{\Delta T}{\Pi})^*$ is given by (19b);

$$\frac{dS}{dK} = -\frac{\alpha(1 - B)}{\Pi} \left(\frac{\Pi - K - k\Pi}{\Pi}\right)^{\alpha-1}$$

Taking the derivative of S with respect to k when $(\frac{\Delta T}{\Pi}^*)$ is given by (19b);

$$\frac{dS}{dk} = -\alpha(1-B)\left(\frac{\Pi - K - k\Pi}{\Pi}\right)^{\alpha-1}$$

Proof of proposition 8:

From (4), the utility of the elite-affiliated regime is:

$$U_r^a = \left[\gamma P + (1 - \gamma) s^a \left(\frac{d^a}{\hat{d}^a} \right) \right] S$$

Substituting (11) in the above yields:

$$U_r^a = \left[\gamma P + (1 - \gamma) \left(\frac{\Delta T}{\Pi} \right)^\alpha \left(\frac{\Pi}{K + k\Pi} \right)^\alpha \right] S$$

For simplicity, we denote by X_A the elite total extra transfer $(\frac{\Delta T}{\Pi})$, hence:

$$U_r^a = \left[\gamma P + (1 - \gamma) (X_A)^\alpha \left(\frac{\Pi}{K + k\Pi} \right)^\alpha \right] S$$

From (12) stability is:

$$S = B (X_A)^\alpha \left(\frac{\Pi}{K + k\Pi} \right)^\alpha + (1 - B) (1 - X_A)^\alpha$$

Taking the first order condition of the regime's optimization problem and solve for X_A ;

$$F = \left(\gamma P + (1 - \gamma)(X_A)^\alpha \left(\frac{\Pi}{K + k\Pi} \right)^\alpha \right) \frac{dS}{dX} + (1 - \gamma)\alpha(X_A)^{\alpha-1} \left(\frac{\Pi}{K + k\Pi} \right)^\alpha S = 0 \quad (\text{A}_5)$$

We denote by X_A^* and X_N^* the solutions that maximize the regime's utility, where A and N refer to the affiliated ruler and the non-affiliated ruler (purely prestige) respectively.

In order to find the solution to A_5 , we first assume that there is an interior solution that is: $X_A^* < \frac{K+k\Pi}{\Pi}$.

We then assume whether the solution to A_5 is X_N^* . This implies that $A_5 > 0$ because the first term in A_5 is positive. Therefore, X_N^* can not be the solution.

Then, we assume that the solution is lower than X_N^* . However, we know from the baseline model that X_N^* maximizes stability and therefore at any value that is lower than X_N^* , $\frac{dS}{dX} > 0$ and hence $A_5 > 0$. Therefore, the solution must be greater than X_N^* .

We also roll out corner solutions when $X_A^* = 1$ and $X_A^* = 0$ because of INADA condition. Therefore, we conclude that the solution to A_5 must satisfy the following;

$$0 < X_N^* < X_A^* < 1$$

We check whether $X_A^* > X_N^*$ by taking the second order condition of the regime's optimization problem that yields:

$$\begin{aligned}
\frac{dF}{dX_A} = & \left(\gamma P + (1 - \gamma)(X_A)^\alpha \left(\frac{\Pi}{K + k\Pi} \right)^\alpha \right) \frac{d^2 S}{(dX)^2} + \\
& + (1 - \gamma)\alpha(X_A)^{\alpha-1} \left(\frac{\Pi}{K + k\Pi} \right)^\alpha \frac{dS}{dX} + \\
& + (1 - \gamma)\alpha(X_A)^{\alpha-1} \left(\frac{\Pi}{K + k\Pi} \right)^\alpha \frac{dS}{dX} + \\
& + (1 - \gamma)\alpha(\alpha - 1)(X_A)^{\alpha-2} \left(\frac{\Pi}{K + k\Pi} \right)^\alpha S \quad (\text{A}_6)
\end{aligned}$$

We find that $\frac{dF}{dX} < 0$, which implies that $X_A^* > X_N^*$

Proof of proposition 9:

From A_5 , that is:

$$F = \left(\gamma P + (1 - \gamma)(X_A)^\alpha \left(\frac{\Pi}{K + k\Pi} \right)^\alpha \right) \frac{dS}{dX} + (1 - \gamma)\alpha(X_A)^{\alpha-1} \left(\frac{\Pi}{K + k\Pi} \right)^\alpha S$$

$$F = f(X_A, \Pi)$$

Taking the derivative of F with respect to Π , we obtain:

$$\frac{dF}{d\Pi} + \frac{dF}{dX_A} \frac{dX_A}{d\Pi} = 0$$

Or;

$$\frac{dX_A}{d\Pi} = - \frac{\frac{dF}{d\Pi}}{\frac{dF}{dX_A}}$$

We note that $\frac{dF}{dX_A} < 0$, as guaranteed from A_6 .

Therefore, $\frac{dX_A}{d\Pi} \propto \frac{dF}{d\Pi}$, where “ $\propto$ ” stands for “has the same sign as”. Hence, we

need to sign $\frac{dF}{d\Pi}$.

We also note from A_5 that S and $\frac{dS}{dX}$ are functions of X and Π , and $\frac{dS}{dX}$, must be interpreted as calculated at $X = X_A$.

Hence,

$$\begin{aligned} \frac{dF}{d\Pi} = & \left((1-\gamma)(X_A)^\alpha \alpha \left(\frac{\Pi}{K+k\Pi} \right)^{\alpha-1} \frac{K}{(K+k\Pi)^2} \right) \frac{dS}{dX} + \\ & + \left(\gamma P + (1-\gamma) \left(\frac{\Pi}{K+k\Pi} \right)^\alpha (X_A)^\alpha \right) \frac{d^2 S}{dX d\Pi} + \\ & + \left((1-\gamma) \alpha (X_A)^{\alpha-1} \left(\frac{\Pi}{K+k\Pi} \right)^\alpha \right) \frac{dS}{d\Pi} + \\ & + \left((1-\gamma) \alpha^2 (X_A)^{\alpha-1} \left(\frac{\Pi}{K+k\Pi} \right)^{\alpha-1} \frac{K}{(K+k\Pi)^2} \right) S \quad (A_7) \end{aligned}$$

Notice that:

$$\frac{dS}{dX} < 0 \text{ (since } X_A^* > X_N^* \text{ where } X_N^* \text{ is the interior maximizer of } S)$$

$$\frac{d^2 S}{dX d\Pi} = B \alpha^2 (X_A)^{\alpha-1} \left(\frac{\Pi}{K+k\Pi} \right)^{\alpha-1} \left(\frac{K}{(K+k\Pi)^2} \right) > 0$$

$$\frac{dS}{d\Pi} = B (X_A)^\alpha \alpha \left(\frac{\Pi}{K+k\Pi} \right)^{\alpha-1} \left(\frac{K}{(K+k\Pi)^2} \right) > 0$$

From A_7 , the first term (T_1), is negative because of $\frac{dS}{dX} < 0$, and since we need to show that $\frac{dF}{d\Pi}$ and hence $\frac{dX_A}{d\Pi}$ is positive, it is sufficient to prove that the sum of the first and fourth terms in A_7 is positive. In order to prove it, we first notice from A_5 that:

$$S = - \frac{(\gamma P + (1-\gamma)(X_A)^\alpha (\frac{\Pi}{K+k\Pi})^\alpha)}{(1-\gamma)\alpha(X_A)^{\alpha-1}(\frac{\Pi}{K+k\Pi})^\alpha} \left(\frac{dS}{dX} \right)$$

and the fourth term (T_4) in A_7 that is;

$$T_4 = \left((1 - \gamma)\alpha^2(X_A)^{\alpha-1} \left(\frac{\Pi}{K+k\Pi} \right)^{\alpha-1} \left(\frac{K}{(K+k\Pi)^2} \right) \right) S$$

can be written as;

$$T_4 = - \left((1 - \gamma)\alpha^2(X_A)^{\alpha-1} \left(\frac{\Pi}{K+k\Pi} \right)^{\alpha-1} \left(\frac{K}{(K+k\Pi)^2} \right) \right) \frac{(\gamma P + (1 - \gamma)(X_A)^\alpha \left(\frac{\Pi}{K+k\Pi} \right)^\alpha)}{(1 - \gamma)\alpha(X_A)^{\alpha-1} \left(\frac{\Pi}{K+k\Pi} \right)^\alpha} \left(\frac{dS}{dX} \right)$$

Simplifying,

$$T_4 = - (\gamma P + (1 - \gamma)(X_A)^\alpha \left(\frac{\Pi}{K+k\Pi} \right)^\alpha) \left(\frac{\alpha K}{\Pi(K+k\Pi)} \right) \left(\frac{dS}{dX} \right)$$

$$T_4 = -\gamma P \left(\frac{\alpha K}{\Pi(K+k\Pi)} \right) \left(\frac{dS}{dX} \right) - (1 - \gamma)(X_A)^\alpha \left(\frac{\Pi}{K+k\Pi} \right)^\alpha \left(\frac{\alpha K}{\Pi(K+k\Pi)} \right) \left(\frac{dS}{dX} \right)$$

$$T_4 = -\gamma P \left(\frac{\alpha K}{\Pi(K+k\Pi)} \right) \left(\frac{dS}{dX} \right) - (1 - \gamma)(X_A)^\alpha \left(\frac{\Pi}{K+k\Pi} \right)^{\alpha-1} \left(\frac{\alpha K}{(K+k\Pi)^2} \right) \left(\frac{dS}{dX} \right)$$

Recall T_1 :

$$T_1 = \left((1 - \gamma)(X_A)^\alpha \alpha \left(\frac{\Pi}{K+k\Pi} \right)^{\alpha-1} \left(\frac{K}{(K+k\Pi)^2} \right) \right) \frac{dS}{dX},$$

we have

$$T_4 = -\gamma P \left(\frac{\alpha K}{\Pi(K+k\Pi)} \right) \left(\frac{dS}{dX} \right) - T_1$$

Therefore,

$$T_4 + T_1 = -\gamma P \left(\frac{\alpha K}{\Pi(K+k\Pi)} \right) \left(\frac{dS}{dX} \right)$$

Since $\frac{dS}{dX} < 0$, therefore, $T_4 + T_1 > 0$

Hence, $\frac{dX_A}{d\Pi} > 0$, which implies that the elite-affiliated regime's optimal transfer to the elite group over resources is increasing in the public resources.

Appendix C (of chapter 4)

A1: The study sample

Albania, Algeria, Angola, Argentina, Armenia , Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Belgium, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Cameroon, Canada, Chile, China, Colombia, Congo Brazzaville, Congo Kinshasa, Costa Rica, Croatia, Cuba, Cyprus, Czech, Côte d'Ivoire, Denmark, Dominican, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Gabon, Gambia, Germany, Ghana, Greece, Guatemala, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Latvia, Lebanon, Liberia, Libya, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Malta, Mexico, Moldova, Mongolia, Morocco, Mozambique, Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Saudi Arabia, Senegal, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sri Lanka, Suriname, Sweden, Switzerland, Syria, Tanzania, Thailand, Togo, Trinidad, Tunisia, Turkey, UAE, UK, USA, Uganda, Ukraine, Uruguay, Venezuela, Yemen, Zambia, Zimbabwe.
(122 countries)

A2: Measurements of V-Dem variables

We use four measures from the V-Dem dataset, namely; inequality, political stability, government repression and civil society consultation. These indices are created by combining ratings from experts for a particular country-indicator-year. The country experts rank cases on an ordinal scale from 0-4. Then they generate a single best estimate for each question by employing educational testing methods. Then, they convert the ordinal scale to an interval by using Bayesian item response theory (IRT) (Source: V-dem methodology)

A3: Descriptive statistics

Variable	No. of observation	Mean	Std. Dev	Min	Max
Political stability	4041	4.67	1.30	-0.09	6.94
Government stability	2791	7.69	2.16	1	12
Absence of violence	1362	-0.06	0.92	-3.18	1.66
Log of GDP per capita	5353	8.11	1.57	3.91	11.38
Inequality	4041	0.38	0.27	0.01	0.97
GINI	3549	40.79	10.08	15.8	73.3
EHII	3323	41.65	7.20	20.58	59.95
Consultation	4041	0.71	1.56	-2.11	3.93
Democracy index	2855	14.85	13.62	0	47.08
Freedom house polity score	3225	6.57	3.23	0	10
The normalized polity score	3427	63.49	37.21	0	100
Government repression	4041	3.08	1.58	0.49	7.13
Political constraints	4011	0.43	0.33	0	0.89
Primary schooling	5712	4.02	1.77	0.03	8.88
Corruption	2791	2.81	1.35	0	6
Internal conflict	2791	3.04	2.53	0	12
External conflict	2781	2.21	2.15	0	12
No. of successful coups	1768	0.04	0.20	0	1

A4: Variables definition and sources

Variable	Definition	Source
Political stability	An assessment of the anti-system opposition movements among civil society organizations. The scale is from 0-4 where 0 indicates no movements and 4 is high level of anti-system movement. We rescale the index, therefore, 4 indicates higher political stability.	Pemstein et al, 2015 (V-Dem Dataset)
Inequality	Measures how resources are distributed in society. The index takes the point estimate from a Bayesian factor model of public goods, education and health equality, power distributed by socioeconomic position, social group and by gender. The index refers to equality from 0-1. We rescale the index so 1 indicates high inequality.	Sigman et al, 2015 (V-Dem Dataset)
Democracy	A measure of how democratic is a country. It is derived by multiplying competition and participation and then dividing the product by 100.	Vanhanen, 2000
Consultation	Measures if civil society organisations are consulted by policy makers on policies relevant to their members. The scale ranges from 0-2, where 0 indicate (no), 1 indicate (to some degree) and 2 indicate (yes).	Pemstein et al, 2015 (V-Dem Dataset)
GDP per capita	GDP per capita is in constant 2005 US dollars.	WDI, the world bank, 2016

Variable	Definition	Source
Government repression	Measures the extent that government repress civil society organisations. We rescale the index so higher values indicate higher repression.	Pemstein et al, 2015 (V-Dem Dataset)
Corruption	A 6 point scale that measures the corruption within the political system. We rescale the index so higher values indicate high level of corruption.	ICRG, the PRS Group, 2009
Internal conflicts	A 12 point scale that measures the political violence in the country and its impact on governance. This can be civil war, coups or terrorism. 12 points indicates no conflicts. We rescale the index so higher values indicate more conflict.	ICRG, the PRS Group, 2009
Political constraints	Measure the feasibility of policy change. The scale range from 0-1, where 1 indicates more political constraints.	Henisz, 2000- V dem, 2015
External conflicts	A 12 point scale that measures the risk of foreign actions like cross-border conflicts or trade restrictions. We rescale the index so higher values indicate more conflict.	ICRG, the PRS Group, 2009
Law and order	A 6 points scale that measures the strength of the legal system. 6 points indicates strong law and order.	ICRG, the PRS Group, 2009
Number of successful coups	Measures the number of successful coups in each year.	Przeworski et al., 2013 (V-Dem Dataset)

Variable	Definition	Source
Primary schooling	Measures average years of primary schooling of population aged 15 and over. We linearly interpolate the data since it is available every five years.	Barro and Lee, 2013
Gini index	Measures inequality in the distribution of income. Missing data is imputed by using linear models.	UNU-WIDER 2008- V dem dataset, 2015
EHII	An index that derived from the relationship between UTIP-UNIDO (industrial pay-inequality), other conditioning variables, and the World Bank's Deininger & Squire dataset.	Galbraith and Kum, 2005
Normalized polity score	The polity index is normalized to run from 0 to 100 by adding 10 and multiplying by five.	Haber and Menaldo, 2011-V-dem, 2015
Freedom house/ polity	A scale from 0-10 where 10 indicate most democratic. The scale is obtained by transforming the average of freedom house and polity.	Freedom House, 2006
Government stability	A 12 point scale that measures the government's ability to carry out its declared programs and to stay in office, 12 points indicates a stable government.	ICRG, the PRS Group, 2009
Absence of violence	This index combines several indicators that measure the likelihood that the government will be overthrown by domestic violence and terrorism.	Kaufmann et al., 2007

References

- Acemoglu, D., and Robinson, J. (2001) ‘A Theory of Political Transitions’, *American Economic Review*, 91(4), pp. 938-963.
- Acemoglu, D., Verdier, T. and Robinson, J. (2004) ‘Kleptocracy And Divide-and-Rule: A Model Of Personal Rule’. *Journal of the European Economic Association*, 2(2-3), pp.162-192.
- Acemoglu, D. and Robinson, J. (2006) ‘Economic origins of dictatorship and democracy’. Cambridge, UK: Cambridge University Press.
- Acemoglu, D. and Robinson, J. (2008) ‘Persistence of power, elites, and institutions’, *American Economic Review*, 98(1), pp.267-293.
- Acemoglu, D., Johnson, S., Robinson, J. and Yared, P. (2008) ‘Income and Democracy’, *American Economic Review*, 98(3), pp. 808–842.
- Acemoglu, D., Naidu, S., Restrepo, P. and Robinson, J. (2013) ‘Democracy, Redistribution and Inequality,’ *Handbook of Income Distribution*, Volume 2, 1885–1966.
- Acemoglu, D., Naidu, S., Restrepo, P. and Robinson, J. (2014) ‘Democracy does cause growth’. National Bureau of Economic Research.
- Ades, A. and Di Tella, R. (1999) ‘Rents, competition, and corruption’, *American Economic Review*, 89(4), pp. 982–993.
- Agnello, L., Castro, V., Jalles, J. and Sousa, R. (2016) ‘Income inequality, fiscal stimuli and political (in) stability’. *International Tax and Public Finance*, pp.1-28.

- Aidt, T.S. and Jensen, P. (2014) ‘Workers of the world, unite! Franchise extensions and the threat of revolution in Europe’, 1820–1938. *European Economic Review*, 72, pp.52-75.
- Aisen, A. and Veiga, F. (2013) ‘How does political instability affect economic growth?’. *European Journal of Political Economy*, 29, pp.151-167.
- Alesina, A., Ozler, S., Roubini, N. and Swagel, P. (1996) ‘Political instability and economic growth’, *Journal of Economic Growth*, 1(2), pp. 189-211.
- Alexeev, M. and Conrad, R. (2009) ‘The elusive curse of oil’. *The Review of Economics and Statistics*, 91(3), pp.586-598.
- Andersen, J.J. and Aslaksen, S. (2013) ‘Oil and political survival’, *Journal of Development Economics*, 100(1), pp. 89–106.
- Andersen, J.J. and Ross, M. (2013) ‘The big oil change: A closer look at the Haber-Menaldo analysis’, *Comparative Political Studies*, 47(7), pp. 993–1021.
- Anderson, L. (1987) ‘The State in the Middle East and North Africa’. *Comparative Politics*, 20(1), pp.1-18.
- Arezki, R. and Van der Ploeg, F. (2011) ‘Do natural resources depress income per capita?’. *Review of Development Economics*, 15(3), pp.504-521.
- Arriola, L.R. (2009) ‘Patronage and political stability in Africa’. *Comparative Political Studies*, 42(10), pp.1339-1362.
- Aslaksen, S. (2010) ‘Oil and democracy: More than a cross-country correlation?’, *Journal of Peace Research*, 47(4), pp. 421–431.

- Auty, R. M. (1993) ‘Sustaining development in mineral economies: the resource curse thesis’. Routledge, London
- Baltagi, B. H., and Li, D. (2002) ‘Series estimation of partially linear panel data models with fixed effects’. *Annals of Economics and Finance* 3: 103–116.
- Banerjee, A. and Duflo, E (2003) ‘Inequality and Growth: What Can the Data Say?’, *Journal of Economic Growth*, 8(3), pp. 267-299.
- Barro, R. (1999) ‘Inequality, growth, and investment’, National Bureau of Economic Research, Working Paper 7038. NBER, Cambridge, MA.
- Barro, R. (1999) ‘Determinants of Democracy’, *Journal of Political Economy*, 107(6), pp. 158-183.
- Baum, C.F. (2006) ‘An introduction to modern econometrics using Stata’. Stata press.
- Behbudi, D., Mamipour, S. and Karami, A. (2010) ‘Natural resource abundance, human capital and economic growth in the petroleum exporting countries’. *Journal of Economic Development*, 35(3), p.81.
- Bjorvatn, K. and Farzanegan, M. (2015) ‘Resource rents, balance of power, and political stability’, *Journal of Peace Research*, 52(6), pp. 758–773.
- Boyce, J. and Emery, J. (2011) ‘Is a negative correlation between resource abundance and growth sufficient evidence that there is a “resource curse”?’. *Resources Policy*, 36(1), pp.1-13.
- Brunnschweiler, C. and Bulte, E. (2008) ‘The resource curse revisited and revised: A tale of paradoxes and red herrings’. *Journal of Environmental Economics and Management*, 55(3), pp.248-264.

- Bruckner, M. (2010) ‘Natural resource dependence, non-tradables, and economic growth’. *Journal of Comparative Economics*, 38(4), pp.461-471.
- Bueno de Mesquita, B., Siverson, R., Morrow, J. and Smith, A. (2003) ‘The logic of political survival’. Cambridge, MA: MIT Press.
- Bueno de Mesquita, B. and Smith, A. (2009) ‘Political survival and endogenous institutional change’. *Comparative Political Studies*, 42(2), pp.167-197.
- Bueno de Mesquita, B. and Smith, A. (2010) ‘Leader survival, revolutions, and the nature of government finance’. *American Journal of Political Science*, 54(4), pp.936-950.
- Bulte, E.H., Damania, R. and Deacon, R.T. (2005) ‘Resource intensity, institutions, and development’. *World development*, 33(7), pp.1029-1044.
- Carmignani, F. and Chowdhury, A. (2012) ‘The geographical dimension of the development effects of natural resources’. *Environmental and Resource Economics*, 52(4), pp.479-498.
- Caselli, F. and Cunningham, T. (2009) ‘Leader behaviour and the natural resource curse’. *Oxford Economic Papers*, 61(4), pp.628-650.
- Caselli, F. and Coleman, J. (2011) ‘On the Theory of Ethnic Conflict’ mimeo, LSE
- Caselli, F. and Tesei, A. (2016) ‘Resource windfalls, political regimes, and political stability’, *Review of Economics and Statistics*, 98(3), pp. 573–590.
- Cavalcanti, D.V., Tiago, V., Mohaddes, K. and Raissi, M. (2011) ‘Growth, development and natural resources: New evidence using a heterogeneous panel analysis’. *The Quarterly Review of Economics and Finance*, 51(4), pp.305-318.

- Cavalcanti, D.V., Tiago, V., Mohaddes, K. and Raissi, M. (2015) ‘Commodity price volatility and the sources of growth’. *Journal of Applied Econometrics*, 30(6), pp.857-873.
- Cederman, L.E., Weidmann, N.B. and Gleditsch, K.S. (2011) ‘Horizontal inequalities and ethnonationalist civil war: A global comparison’. *American Political Science Review*, 105(03), pp.478-495.
- Chen, B. and Feng, Y. (1996) ‘Some political determinants of economic growth: Theory and empirical implications’. *European Journal of Political Economy*, 12(4), pp.609-627.
- Collier, P. and Hoeffler, A. (2004) ‘Greed and grievance in civil war’. *Oxford economic papers*, 56(4), pp.563-595.
- Corden, W.M. and Neary, J.P. (1982) ‘Booming sector and de-industrialisation in a small open economy’. *The Economic Journal*, 92(368), pp.825-848.
- Cotet, A.M. and Tsui, K.K. (2013) ‘Oil and conflict: What does the cross country evidence really show?’. *American Economic Journal: Macroeconomics*, 5(1), pp.49-80.
- Cuaresma, J.C., Oberhofer, H. and Raschky, P.A. (2011) ‘Oil and the duration of dictatorships’. *Public Choice*, 148(3-4), pp.505-530.
- Dahl, R. A. (2006) ‘On Political Equality. New Haven’: Yale University Press.
- Davies, J.C. (1962) ‘Toward a theory of revolution’. *American sociological review*, pp.5-19.
- Deaton, A and Miller, R. (1995) ‘International commodity prices, macroeconomic performance, and politics in Sub-Saharan Africa’. Princeton, NJ: Princeton Studies in International Finance, No 79.

- Ding, N. and Field, B.C. (2005) ‘Natural resource abundance and economic growth’. *Land Economics*, 81(4), pp.496-502.
- Doppelhofer, G., Miller, R.I. and Sala-i-Martin, X. (2000) ‘Determinants of long-term growth: A Bayesian averaging of classical estimates (BACE) approach’ (No. w7750). National bureau of economic research.
- Egorov, G. and Sonin, K. (2011) ‘Dictators And Their Viziers: Endogenizing The Loyalty–Competence Trade-Off’. *Journal of the European Economic Association*, 9(5), pp.903-930.
- Fearon, J.D. and Laitin, D.D. (2003) ‘Ethnicity, insurgency, and civil war’. *American political science review*, 97(01), pp.75-90.
- Gadenne, L. (2015) ‘Tax me, but spend wisely? Sources of public finance and government accountability’. *American Economic Journal: Applied Economics*.
- Gallego, M. and Pitchik, C. (2004) ‘An economic theory of leadership turnover’. *Journal of Public Economics*, 88(12), pp.2361-2382.
- Gelb, A.H. (1988) ‘Oil windfalls: Blessing or curse?’. Oxford University Press.
- Gilli, M. and Li, Y. (2014) ‘Accountability in One-Party Government: Rethinking the Success of Chinese Economic Reform’. *Journal of Institutional and Theoretical Economics JITE*, 170(4), pp.616-645.
- Gilli, M. and Li, Y. (2015) ‘Coups, revolutions and efficient policies in autocracies’. *European Journal of Political Economy*, 39, pp.109-124.
- Goderis, B. and Malone, S.W. (2011) ‘Natural resource booms and inequality: Theory and Evidence’, *Scandinavian Journal of Economics*, 113(2), pp. 388–417.

- Goldberg, E., Wibbels, E. and Mvukiyehe, E. (2008) ‘Lessons from strange cases: Democracy, development, and the resource curse in the U.S. States’, *Comparative Political Studies*, 41(4-5), pp. 477–514.
- Gradstein, M. and Milanovic, B. (2004) ‘Does liberté= égalité? A survey of the empirical links between democracy and inequality with some evidence on the transition economies’. *Journal of Economic Surveys*, 18(4), pp.515-537.
- Gurr, T. (1970) ‘Why Men Rebel’. Princeton, NJ: Princeton University Press
- Gylfason, T., Herbertsson, T.T. and Zoega, G. (1999) ‘A mixed blessing. Macroeconomic dynamics’, 3(02), pp.204-225.
- Gylfason, T. (2001) ‘Natural resources, education, and economic development’. *European economic review*, 45(4), pp.847-859.
- Gylfason, T. and Zoega, G. (2003) ‘Inequality and Economic Growth: Do Natural Resources Matter?’ in Eicher, T.S. and Turnovsky, S.J. (eds.), *Inequality and Growth: Theory and Policy Implications*, MIT Press, Cambridge, MA.
- Haber, S. and Menaldo, V. (2011) ‘Do natural resources fuel authoritarianism? A reappraisal of the resource curse’, *American Political Science Review*, 105(01), pp. 1–26.
- Houle, C. (2009) ‘Inequality and Democracy’. *World Politics* 61 (4): 589–622
- Isham, J, Woolcock, M., Pritchett, L and Busby, G. (2005). “The Varieties of Resource Experience: Natural Resource Export Structures and the Political Economy of Economic Growth” *World Bank Economic Review*, 19(2), pp. 141-174.

- Jensen, N. and Wantchekon, L. (2004) ‘Resource wealth and political regimes in Africa’, *Comparative Political Studies*, 37(9), pp. 816–841.
- Jong-A-Pin, R. (2009) ‘On the measurement of political instability and its impact on economic growth’. *European Journal of Political Economy*, 25(1), pp.15-29.
- Karl, T. (1997) ‘The paradox of plenty: Oil booms and petro-states’. 3rd edn. Berkeley: University of California Press.
- Krugman, P. (1987) ‘The narrow moving band, the Dutch disease, and the competitive consequences of Mrs. Thatcher: Notes on trade in the presence of dynamic scale economies’. *Journal of development Economics*, 27(1-2), pp.41-55.
- Kuznets, S. (1955) ‘Economic growth and income inequality’, *American Economic Review*, 45(1), pp. 1–28
- Lane, P.R. and Tornell, A. (1996) ‘Power, growth, and the voracity effect’. *Journal of Economic Growth*, 1(2), pp.213-241.
- Larsen, E.R. (2006) ‘Escaping the Resource Curse and the Dutch Disease? When and Why Norway Caught Up with and Forged Ahead of Its Neighbors’, *American Journal of Economics and Sociology*, 65(3), pp. 605–40
- Leamer, E.E., Maul, H., Rodriguez, S. and Schott, P.K. (1999) ‘Does natural resource abundance increase Latin American income inequality?’, *Journal of Development Economics*, 59(1), pp. 3–42.
- Lei, Y.-H. and Michaels, G. (2014) ‘Do giant oilfield discoveries fuel internal armed conflicts?’, *Journal of Development Economics*, 110, pp. 139–157.

- Li, H. and Zou, H. (1998) 'Income Inequality is not Harmful for Growth: Theory and Evidence' , Review of Development Economics, 2(3), pp. 318-33
- Lipset, S. M. (1959) 'Some Social Requisites of Democracy: Economic Development and Political Legitimacy.' American Political Science Review, 53(1), pp. 69-105.
- Luciani, G. (1990) 'Allocation vs. production states: A theoretical framework'. The Arab State, pp.65-84.
- Mahdavy, H. (1970) 'Patterns and Problems of Economic Development in Rentier States: The Case of Iran', in Studies in the Economic History of the Middle-East, ed. M.A. Cook Oxford University Press.
- Manzano, O. and Rigobon, R. (2001) 'Resource curse or debt overhang?' (No. w8390). National bureau of economic research.
- Mehlum, H., Moene, K. and Torvik, R. (2006) 'Institutions and the resource curse'. The Economic Journal, 116(508), pp.1-20.
- Menaldo, V. (2012) 'The middle east and north Africa's resilient Monarchs', The Journal of Politics, 74(03), pp. 707-722.
- Murshed, S.M. (2004) 'When does natural resource abundance lead to a resource curse?' (No. 24137). International Institute for Environment and Development, Environmental Economics Programme.
- Murshed, S.M. and Serino, L.A. (2011) 'The pattern of specialization and economic growth: The resource curse hypothesis revisited'. Structural Change and Economic Dynamics, 22(2), pp.151-161.
- Neary, J.P. and Van Wijnbergen, S. (1986) 'Natural resources and the macroeconomy'.

- Norrbin, S.C., Pipatchaipoom, O. and Bors, L. (2008) ‘How robust is the natural resource curse?’. *International Economic Journal*, 22(2), pp.187-200.
- Østby, G. (2008) ‘Polarization, horizontal inequalities and violent civil conflict’. *Journal of Peace Research*, 45(2), pp.143-162.
- Østby, G., Nordås, R. and Rød, J.K. (2009) ‘Regional Inequalities and Civil Conflict in Sub-Saharan Africa’. *International Studies Quarterly*, 53(2), pp.301-324.
- Papyrakis, E. and Gerlagh, R. (2004) ‘The resource curse hypothesis and its transmission channels’. *Journal of Comparative Economics*, 32(1), pp.181-193.
- Robinson, J.A. and Torvik, R. (2005) ‘White elephants’. *Journal of Public Economics*, 89(2), pp.197-210.
- Robinson, J.A., Torvik, R. and Verdier, T. (2006) ‘Political foundations of the resource curse’, *Journal of Development Economics*, 79(2), pp. 447–468.
- Rodriguez, F. and Sachs, J.D. (1999) ‘Why do resource-abundant economies grow more slowly?’. *Journal of Economic Growth*, 4(3), pp.277-303.
- Rodrik, D. (1999) ‘Democracies pay higher wages’. *The Quarterly Journal of Economics*, 114(3), pp.707-738.
- Ross, M. (2001) ‘Does oil hinder democracy?’, *World Politics*, 53(03), pp. 325–361.
- Ross, M. (2004) ‘What do we know about natural resources and civil war?’, *Journal of Peace Research*, 41(3), pp. 337–356.
- Ross, M. (2006) ‘A closer look at oil, diamonds, and civil war’, *Annual Review of Political Science*, 9(1), pp. 265–300.

- Ross, M. (2007) ‘How Mineral-Rich States Can Reduce Inequality’, in *Escaping the Resource Curse*, Eds. Humphreys, M., Sachs, J. and Stiglitz, J., New York: Colombia University Press.
- Ross, M. (2009) ‘Oil and Democracy Revisited’ Mimeo, UCLA.
- Sachs, J.D. and Warner, A.M. (1995) ‘Natural resource abundance and economic growth’ (No. w5398). National Bureau of Economic Research.
- Sachs, J.D. and Warner, A.M. (1997) ‘Sources of slow growth in African economies’. *Journal of African economies*, 6(3), pp.335-376.
- Sachs, J.D. and Warner, A.M. (1999) ‘The big push, natural resource booms and growth’. *Journal of development economics*, 59(1), pp.43-76.
- Sachs, J.D. and Warner, A.M. (2001) ‘The curse of natural resources’. *European Economic Review*, 45(4), pp.827-838.
- Sala-i-Martin, X.X. (1997) ‘I just ran two million regressions’. *The American Economic Review*, pp.178-183.
- Sarraf, M. and Moortaza J. (2001) ‘Beating the Resource Curse: The Case of Botswana’, *World Bank Environmental Economics Series* 83. Sauré, Philip. 2010. “Overreporting Oil Reserves.” *Swiss National Bank Working Paper* 2010-7.
- Scheve, K. and Stasavage, D. (2009) ‘Institutions, partisanship, and inequality in the long run’. *World Politics*, 61(02), pp.215-253.
- Scheve, K. and Stasavage, D. (2010) ‘The conscription of wealth: mass warfare and the demand for progressive taxation’. *International Organization*, 64(04), pp.529-561.

- Scheve, K. and Stasavage, D. (2012) ‘Democracy, war, and wealth: lessons from two centuries of inheritance taxation’. *American Political Science Review*, 106(01), pp.81-102.
- Serra, D. (2006) ‘Empirical determinants of corruption: A sensitivity analysis’, *Public Choice*, 126(1-2), pp. 225–256.
- Smith, B. (2004) ‘Oil wealth and regime survival in the developing world, 1960–1999’. *American Journal of Political Science*, 48, pp. 232–246.
- Smith, A. (2008). ‘The perils of unearned income’. *Journal of Politics*, 70(3), 780-793.
- Sokoloff, K.L. and Engerman, S.L. (2000) ‘History lessons: Institutions, factor endowments, and paths of development in the new world’, *Journal of Economic Perspectives*, 14(3), pp. 217–232.
- Subramanian, A. and Sala-i-Martin, X. (2003) ‘Addressing the natural resource curse: An illustration from Nigeria’, *IMF Working Papers*, 03(139), p. 1.
- Svolik, M.W. (2009) ‘Power sharing and leadership dynamics in authoritarian regimes’. *American Journal of Political Science*, 53(2), pp.477-494.
- Svolik, M.W. (2012) ‘The politics of authoritarian rule’. Cambridge University Press.
- Svolik, M.W. (2013) ‘Contracting on violence: the moral hazard in authoritarian repression and military intervention in politics’. *Journal of Conflict Resolution*, 57(5), pp.765-794.
- Tornell, A. and Lane, P.R. (1999) ‘The voracity effect’. *American Economic Review*, pp.22-46.

- Treisman, D. (2000) ‘The causes of corruption: A cross-national study’, *Journal of Public Economics*, 76(3), pp. 399–457.
- Tsui, K.K. (2011) ‘More oil, less democracy: Evidence from worldwide crude oil Discoveries’, *The Economic Journal*, 121(551), pp. 89–115.
- Tullock, G. (1987) ‘Public choice’. *The new Palgrave: a dictionary of economics*, 3, pp.1040-1044.
- Ulfelder, J. (2007) ‘Natural-resource wealth and the survival of autocracy’, *Comparative Political Studies*, 40(8), pp. 995–1018.
- Van der Ploeg, F. and Poelhekke, S. (2010) ‘The pungent smell of “red herrings”: Subsoil assets, rents, volatility and the resource curse’. *Journal of Environmental Economics and Management*, 60(1), pp.44-55.
- Van der Ploeg, F. (2011) ‘Natural resources: Curse or blessing?’, *Journal of Economic Literature*, 49:2, pp. 366-420.
- Van Wijnbergen, S. (1984) ‘TheDutch Disease’: a disease after all?’. *The Economic Journal*, 94(373), pp.41-55.
- Voitchovsky, S. (2005) ‘Does the Profile of Income Inequality Matter for Economic Growth?’. *Journal of Economic Growth*, 10(3), pp. 273-296.
- Wantchekon, L.(2002) ‘Why do Resource Dependent Countries Have Authoritarian Governments?’, *Journal of African Finance and Economic Development* , 2, pp. 57-77.
- Williams, A. (2011) ‘Shining a light on the resource curse: An empirical analysis of the relationship between natural resources, transparency, and economic growth’. *World*

Development, 39(4), pp.490-505.

- Wintrobe, R. (1998) ‘Some Lessons on the Efficiency of Democracy from a Study of Dictatorship’. In The political dimension of economic growth, Palgrave Macmillan UK, pp.20-37.
- Yates, D.A. (1996) ‘The rentier state in Africa: Oil rent dependency and neocolonialism in the Republic of Gabon’. Africa World Press.

Data sources

- Barro, R.J. and Lee, J.W. (2013) ‘A new data set of educational attainment in the world’, 1950–2010. Journal of development economics, 104, pp.184-198.
- Deininger, K. and Squire, L. (1996) ‘ A New Data Set Measuring Income Inequality’, World Bank Economic Review 10, 565–591.
- Freedom House. (2006) ‘ Freedom of the Press: A Global Survey of Media Independence’. Freedom House.
- Freedom House. (2007) ‘Methodology, Freedom in the World’ . New York: Available online at http://www.freedomhouse.org/template.cfm?page: 351&ana_page: 333&year: 200
- Galbraith, J. K. and Kum, H. (2005) ‘Estimating the Inequality of Household Incomes: A Statistical Approach to the Creation of a Dense and Consistent Global Data Set’, Review of Income and Wealth 51, 115–143.
- Henisz, Witold J. (2000) ‘The Institutional Environment for Economic Growth’, Economics and Politics, 12: 1, 1-31.

- Kaufmann, D., Kraay, D. and Mastruzzi, M. (2007) ‘Governance Matters IV: Governance Indicators for 1996-2006.’ Washington: World Bank
- Marshall, M. and Marshall, D.R. (2014) ‘Coups d’état events, 1946-2013’, Centre for systemic peace
- Przeworski, A et al. (2013) ‘Political Institutions and Political Events (PIPE) Data Set. Department of Politics, New York University.
- Robinson, P.M., (1988) ‘Root-N-consistent semiparametric regression’. *Econometrica: Journal of the Econometric Society*, pp.931-954.
- Schaffer, M.E., (2010) ‘xtivreg2: Stata module to perform extended IV/2SLS, GMM and AC/HAC, LIML and k-class regression for panel data models’.
- The PRS Group, Inc. (2009). The PRS Group/International Country Risk Guide.
- United Nations Comtrade database: Available online at <http://comtrade.un.org/data/>
- UNU-WIDER. (2008). “World Income Inequality Database, Version 2.0c.” (May).
Urquhart, M. & K. Buckley (eds.). 1965. Historical statistics of Canada. Cambridge: Cambridge University Press and Toronto: Macmillan. US Department of Commerce, US Census Bureau. Internati
- Vanhanen, T. (2000). ‘A new dataset for measuring democracy, 1810-1998.’ *Journal of Peace Research* 37(2): 251-265.
- V-Dem Dataset: Coppedge, Michael, John Gerring, Staffan I. Lindberg, Svend-Erik Skaaning, Jan Teorell, David Altman, Michael Bernhard, M. Steven Fish, Adam Glynn, Allen Hicken, Carl Henrik Knutsen, Kyle L. Marquardt, Kelly McMann, Farhad Miri, Pamela Paxton, Daniel Pemstein, Jeffrey Staton, Eitan Tzelgov, Yi-ting Wang, and

Brigitte Zimmerman. (2015) ‘V-Dem [Country-Year/Country-Date] Dataset v6.’ Varieties of Democracy (V-Dem) Project.

- V-Dem Codebook: Coppedge, Michael, John Gerring, Staffan I. Lindberg, Svend-Erik Skaaning, Jan Teorell, with David Altman, Michael Bernhard, M. Steven Fish, Adam Glynn, Allen Hicken, Carl Henrik Knutsen, Kelly McMann, Pamela Paxton, Daniel Pemstein, Jeffrey Staton, Rachel Sigman, Brigitte Zimmerman, Frida Andersson , Valeriya Mechkova, and Farhad Miri. (2015) ‘V-Dem Codebook v6.’ Varieties of Democracy (V-Dem) Project.
- World Bank (2011). World development indicators (edition: various). ESDS International, University of Manchester.