Essays on the links between Natural Resources, Corruption, Taxation and Economic Growth

A thesis submitted to The University of Manchester for the degree of Doctor of Philosophy in the Faculty of Humanities

2017

Mohsen Veisi
School of Social Sciences
Economics
Contents

List of Tables ................................................................. 6
Abstract ................................................................. 7
Declaration ............................................................. 8
Copyright ............................................................... 9
Acknowledgements ...................................................... 10
Thesis Introduction ..................................................... 12

1 The Resource Curse: A Literature Review 19

1.1 Introduction .......................................................... 19
1.2 The resource curse: economic channels ................. 21
  1.2.1 The Dutch disease .............................................. 21
    1.2.1.1 Some empirical studies on the Dutch disease ...... 23
  1.2.2 Trends in the world commodity prices ................. 24
    1.2.2.1 A declining trend ...................................... 25
    1.2.2.2 A rising trend ......................................... 25
    1.2.2.3 Some empirical evidence ............................... 26
  1.2.3 Volatility ........................................................ 26
  1.2.4 Pro-cyclicality ............................................... 27
1.3 Resource curse: political-economic channels .......... 29
  1.3.1 Institutions .................................................... 30
  1.3.2 Corruption .................................................. 31
  1.3.3 Democracy ................................................... 33
  1.3.4 Conflict and civil war ..................................... 36
1.4 Success stories .................................................. 37
  1.4.1 Norway ......................................................... 37
    1.4.1.1 Economic and social transformation .................. 38
    1.4.1.2 Oil and institutions .................................... 38
    1.4.1.3 The role of politics ..................................... 39
    1.4.1.4 Equality across generations ........................... 41
CONTENTS

1.4.2 Botswana ................................................................. 42
1.4.3 Chile ................................................................. 45
   1.4.3.1 Copper in Chile ................................................. 46
   1.4.3.2 Contracts ...................................................... 47
   1.4.3.3 Fiscal discipline in Chile ................................. 48
1.4.4 Conclusion .......................................................... 50

2 Rich in Resources, Poor at Taxation, Rich in Corruption: A Path to the Resource Curse 54
   2.1 Introduction ......................................................... 54
   2.2 Background ........................................................ 56
      2.2.1 Resource curse ................................................ 57
      2.2.2 Corruption, resource abundance and taxation ............. 57
      2.2.3 Taxation and development ................................... 60
         2.2.3.1 Taxation, state capacity and the economy ............. 61
         2.2.3.2 Taxation as a social contract between citizens and government ...................................................... 63
   2.3 Sample and data .................................................. 64
      2.3.1 Sample .......................................................... 64
      2.3.2 Independent variables ........................................ 65
      2.3.3 Control variables .............................................. 66
   2.4 Estimation methodology ............................................ 71
   2.5 Results ............................................................... 73
   2.6 Robustness .......................................................... 80
      2.6.1 Alternative measures of corruption ........................ 80
      2.6.2 Alternative measure of tax revenues ....................... 85
      2.6.3 Resource-rich economies ................................. 87
      2.6.4 Taxation and other measures of governance ............... 89
   2.7 Implications and conclusion ..................................... 92

3 Oil-to-Cash, Corruption, and the Resource Curse 95
   3.1 Introduction ........................................................ 95
      3.1.1 Resource reliance and the violation of the social contract ...................................................... 95
   3.2 Background ........................................................ 98
      3.2.1 The resource curse ............................................. 98
         3.2.1.1 Economic causes: Dutch disease and volatility .... 99
         3.2.1.2 Political-economic causes: corruption and governance . 99
         3.2.1.3 Taxation, governance and accountability .............. 102
List of Tables

2.1 Summary statistics ................................................. 71
2.2 Independent regressions on taxation and corruption, using CPI measure of corruption ................................................. 74
2.3 Dynamic analysis, using CPI measure of corruption ............ 76
2.4 Dynamic analysis, using WGI measure of corruption .......... 81
2.5 Dynamic analysis, using ICRG measure of corruption .......... 84
2.6 Alternative measure of tax revenues .............................. 86
2.7 Resource-rich economies ........................................... 88
2.8 Other measures of governance ...................................... 91
A.1 Definitions and source of data ..................................... 128
B.1 List of countries used in the the analysis ............................. 129
## List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Natural resource rents and control of corruption</td>
<td>58</td>
</tr>
<tr>
<td>2.2</td>
<td>Natural resource rents and tax revenues</td>
<td>59</td>
</tr>
<tr>
<td>2.3</td>
<td>Tax revenues and corruption control</td>
<td>62</td>
</tr>
<tr>
<td>3.1</td>
<td>Oil and gas revenues in 2011 (% of total government revenue)</td>
<td>97</td>
</tr>
<tr>
<td>3.2</td>
<td>Growth rates under different scenarios</td>
<td>115</td>
</tr>
</tbody>
</table>
Abstract

This thesis studies the poor development performance of resource-rich developing economies, known as the resource curse. In the first chapter we provide a comprehensive literature review of the topic and the channels through which resource abundance can result in the resource curse. Issues of corruption and governance have been emphasised to be the main driver of the resource curse. This has been illustrated by a negative relationship between resource abundance and corruption control in the literature. However, there is a gap in how natural resources facilitate corruption. In the second chapter, using empirical analysis, we study the role of taxation in the relationship between natural resources and corruption. Taxation is usually seen as a social contract between citizens and government – people pay taxes and in return they hold their government accountable for efficient allocation of their taxes. Resource abundance shifts the reliance of government from tax incomes to resource rents. People therefore, have no sustainable mechanism to hold their government responsible for corruption and wrongdoings inside public institutions. Using different econometric methods, Pooled OLS, Fixed Effects and 3SLS, our results show that natural resource revenues crowd out incomes from tax revenues. Meanwhile, taxation has a positive and significant impact on the control of corruption throughout our analysis. The results suggest that resource-rich developing countries should invest in building their tax systems to increase their non-resource tax revenues. This will increase state capacity and demand for accountability in the public sector among citizens and hence decreases corruption. Related to our second chapter, in the third chapter we study a cash transfer programme, known as oil-to-cash, which has gained support as a tool to re-establish taxation and fight corruption. Under such a plan, resource revenues are distributed directly among the public and then each citizen is taxed optimally. Through this, government relies directly and fully on its citizens for its income. Hence, taxation is reinstated and the social contract is revived. Within a general equilibrium model we show how this happens and what the implications are of the oil-to-cash programme for economic growth. Our results clearly show how corruption results in a resource curse. Furthermore, the model explains the variation that is seen in the degree of the resource curse across countries. The study also analyses the practical barriers of the oil-to-cash plan. The study suggests that parallel to (or even prior to) such a plan countries need to invest in building their tax system and increasing their administrative capacities.

Key words: Natural resource curse, Development, Corruption, Taxation, Tax system, State capacity, Resource Rents, Oil-to-Cash, Economic growth

JEL classification: D73, H2, H8, O13, O4, Q32, Q33
Declaration

I declare that no portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.
Copyright

i. The author of this thesis (including any appendices and/or schedules to this thesis) owns certain copyright or related rights in it (the Copyright) and s/he has given The University of Manchester certain rights to use such Copyright, including for administrative purposes

ii. Copies of this thesis, either in full or in extracts and whether in hard or electronic copy, may be made only in accordance with the Copyright, Designs and Patents Act 1988 (as amended) and regulations issued under it or, where appropriate, in accordance with licensing agreements which the University has from time to time. This page must form part of any such copies made

iii. The ownership of certain Copyright, patents, designs, trade marks and other intellectual property (the Intellectual Property) and any reproductions of copyright works in the thesis, for example graphs and tables (Reproductions), which may be described in this thesis, may not be owned by the author and may be owned by third parties. Such Intellectual Property and Reproductions cannot and must not be made available for use without the prior written permission of the owner(s) of the relevant Intellectual Property and/or Reproductions.

iv. Further information on the conditions under which disclosure, publication and commercialization of this thesis, the Copyright and any Intellectual Property and/or Reproductions described in it may take place is available in the University IP Policy (see http://documents.manchester.ac.uk/DocuInfo.aspx?DocID=487), in any relevant Thesis restriction declarations deposited in the University Library, The University Library’s regulations (see http://www.manchester.ac.uk/library/aboutus/regulations) and in The University’s policy on presentation of Theses.
Acknowledgements

During my undergraduate economic studies I developed an interest in the rather classic yet complex question of ‘Why countries perform differently in their development process?’ In search of the answer, I applied for a Master in Economics at the University of Manchester. Towards the end of the Master period, I found myself generously sponsored by the University of Manchester to study a PhD exploring a favourite topic: The adverse impact of natural resources on the development performance of the economy, known as the ‘resource curse’. This thesis is part of my research in the area and hopefully a contribution to this dynamic topic.

Looking back, this has been a long and sometimes bumpy journey. I fully appreciate that many people have helped me in one way or another during this odyssey. I would like to thank each of them in turn. First, I would like to thank staff and colleagues at the economic department for their help and support during my studies here. My supervisors, Prof Keith Blackburn, and Dr Emranul Haque for helping me formulating my thoughts. Staff at the economic department who have kindly welcome me to share my work with them or have made invaluable comments at different occasions; Dr Kyriakos Neanidis, Prof Pierre-Richard Agenor, Prof Diane Coyle, Dr Raffaele Rossi, Dr Matias Cortes, Dr Katsushi Imai, Dr Indranil Dutta, Mr Nicholas Weaver, Dr Alessia Isopi, Dr Alejandro Saporiti, Prof James Banks, Prof Antonio Nicolo, Prof Paul Madden, Dr Omer Edhan Idan, Dr Peter Backus. The friends I have made in Manchester for their help, advice and camaraderie; Laurence Roope, Jinrui Pan, Zesshan Atique, Serena Masino, Krzysztof Brzezinski, Tad Gwiazdowski, Gemal Mekki, Keila Meginnis, Cahal Moran, Atiyeh Yeganloo, Panagiotis Margaris, Adams Adama, Nicola Ruddle, Azzurra Nonni, Necla Acik, Ulrike Flader. I would also like to thank Marie Waite and Ann Cronley at the postgraduate office for all their administrative support during my studies. To this I should add Dr Gonzalo Forgues-Puccio and Prof Diane Coyle for accepting to be my external and internal examiners, respectively, and also for the valuable comments that they made.
Last but not least, I want to thank my extended family here in the UK Ali, Marianne, Rafe, Caroline, Hero, Soma and Lyra and back home in Kurdistan, my mother, father, aunts and uncles, siblings, cousins and nieces for their continuous love and presence. I especially want to thank my brother, Ali, for the tremendous support that he has put behind my education, all the way up since elementary school to this day;

Thank You!

This thesis is dedicated to you.
Thesis Introduction

Natural resource rents have become the main source of income for an ever increasing number of developing countries in the past four decades. This has had a tremendous impact on the development of political, economic and social institutions inside these countries. Paradoxically, in many cases this wealth of resources has had an adverse impact on the whole development process in these economies. Referred to as ‘the resource curse’, this paradoxical phenomenon has become a vibrant research area across the social sciences. This thesis seeks to add to this literature in three separate chapters.

In Chapter 1 we review the potential channels through which natural resources can result in a resource curse. Loosely speaking, we divide these channels into economic and political-economic ones. Economic channels include those due to the Dutch disease, resource-price volatilities and their pro-cyclicality, while political-economic channels include those due to weak institutions, prevalence of corruption, lack of democracy, conflict and civil war.

Following the inflow of resource revenues into an economy the real exchange rate appreciates. The Dutch disease is a term to describe the idea that this exchange rate appreciation weakens the competitiveness of the traded sector and hence the export of the non-resource traded goods. This in turn results in the reallocation of factors of production from the traded sector to the non-traded sector. If the traded sector is the engine of growth, deindustrialisation and despecialisation of the economy is the outcome in the long run. Volatility refers to the wild fluctuation in the flow of resource revenues into the economy. Fluctuation in the resource rents can be the result of the fluctuation in the extraction process but in most cases it is the result of the volatile price of resources in the international market. These fluctuations can easily destabilise the wider economy and undermine its growth. One major issue that can exacerbate the problem of volatilities is that fiscal policies in resource-rich developing economies tend to be strongly pro-cyclical. In
other words, instead of moderating the cycles, policies tend to accentuate them. When the price of natural resources increase (a boom) governments embark on a generous round of public spending, in many cases resulting in budget deficits. Furthermore, they finance the deficits through external debts. When the prices fall (a bust) governments face the difficult task of cutting the deficit and starting the repayment of debts. On top these problems, it is usually hard for the non-resource sector to bounce back in a short period and this deepens the deficit further.

As we noted earlier, volatilities and the Dutch disease are usually known as the economic causes of the resource curse. However, many scholars believe natural resources hit the economy mostly through political-economic channels. In the second half of Chapter 1, we review some of these channels namely those due to institutions, corruption, democracy and civil war. Institutions, the rules of the game in a society, are humanly devised constraints to shape incentives. Many researchers claim that the quality of institutions is the main factor in explaining cross-country differences in the levels of development. There is substantial evidence that the quality of institutions strongly affects how countries manage their natural resource wealth. Countries like Norway, for example, that had established institutions at the time of the discovery of the natural resource have totally avoided the resource curse, while countries like Iran, Venezuela, and Nigeria have experienced the curse. The level of resource curse between developing countries is also different. Explaining these variations in the level of curse among developing countries needs a further look into the quality of their public and political institutions. A major issue inside public institutions in developing countries is corruption. A body of research shows that natural resource bonanzas give way to corruption and rent-seeking activities inside public institutions and through this, undermine economic growth. The often-observed negative relationship between natural resources and corruption control is not clear. In Chapter 2 we take this a step forward, by studying the role of taxation in this relationship.

Previous research also shows that natural resource rents undermine democracy inside political institutions. Developing countries are either ruled by dictatorship or have weak democracies. In many cases, natural resource rents have been exploited to block the democratisation process inside these economies. This is because, the management of natural resources and their sale is under the control of government. Therefore, once in office, the political party or the dictator invests heavily in holding on to power. In many cases this investment takes the form of patronage as government is incapable of providing
public services. As a result of this, favouritism and nepotism become commonplace and politicians buy votes and loyalties in return for public employment. This in turn, paves the way for pervasive corruption and rent-seeking inside public institutions. It should be noted that corruption inside weak democracies tends to be even higher than under dictatorships. This is partly because the size of investment that a dictator needs to make, to hold onto power can be lower than is required by a political party. Furthermore, important factors for economic development like the strong rule of law, free market regulation and high quality public infrastructure could also exist in non-democratic political systems. However, many argue that the inefficiencies observed in weak democracies are part of the transition period to a mature democracy. Also, long term costs involved with living under a dictatorship can be much higher than living under a loose democracy. Because ultimately, there is no guarantee that the transition to democracy, as a goal and as one of the pillars of development, can happen smoothly. Vivid examples of this are Libya, Iraq and Syria where the demand for democracy has resulted in the hefty cost of the full destruction of these economies. Another important point is that in all of these countries, resource rents have been a crucial element in blocking the transition and making it costly.

In the final section of Chapter 1, we also review the successful management of natural resource rents in Norway, Botswana and Chile. Each of these countries have valuable lessons to offer on how to avoid or reverse the resource curse. Other resource-rich economies, depending on their level of development, type of resources, and the structure of their political economies, can benefit from the successful experiences of Norway, Botswana and Chile in their different stages of resource management.

In Chapter 2, we study the role of taxation in the relationship between natural resource rents and corruption. As we explained earlier, many scholars believe that corruption and misgovernance inside public institutions, and not issues like the Dutch disease, are the main reason for the poor development performance of most resource-rich developing economies. Researchers in the past have shown the existence of a negative relationship between natural resource rents and control of corruption. However, there is a gap in the literature on how exactly resource rents facilitates corruption. Chapter 2 provides some empirical research to address the gap. More specifically, we study the role of taxation in the relationship between natural resources and corruption.
The literature on corruption and taxation mainly has focused on the causal relationship running from corruption to taxation. The idea is that corruption in the process of tax collection and tax administration decreases the size of tax revenues. This direction of the relationship is quite straightforward. However, taxation can also have a positive impact on control of corruption. This reverse relationship is not clear but it can be very significant when one considers the breadth and depth of it. Taxation, in fact, can affect the process of social, political and economic development. The positive impact of taxation on development became clear when sources of government income in a number of resource-rich developing economies moved from taxation to resource rents. Despite the sheer size of these resource revenues, the administrative and bureaucratic capacity of these economies has deteriorated. Having this resource wealth within their reach and not having to go through the demanding process of tax collection and administration has effectively made government in resource-rich economies, administratively paralysed. Basically, due to years of public inactivity governments have not developed the necessary muscle for public administration. This has direct implications for government effectiveness, governance and corruption in resource-rich economies.

At the social level, taxation can also affect how state and society interact. In this respect, taxation is usually seen as an implicit social contract between government and citizens. People pay taxes and in return they consider themselves entitled to the right to hold their government accountable for any wrongdoing inside the public sector. The reliance of government on tax revenues is the mechanism that enforces the contract. In other words, if the government violates the contract, citizens can simply punish it by not paying taxes. In the event of resource abundance, however, government reliance shifts from taxes to resource rents. Therefore, by having misgovernance and corruption, a government does not feel obliged to be held accountable and there are no practical mechanisms in place to do so. Another issue is that unlike taxes, citizens do not see or own resource rents at any stage. Some researchers believe that this makes people psychologically distanced from resource revenues as compared with tax revenues. Essentially, this means that citizens see resource rents as other people’s money and do not see themselves entitled to the right of overseeing how they are allocated. These factors together, can decrease demands for accountability and efficiency in the case of allocation of resource revenues in comparison with taxes.
To start our econometric analysis we build up a system of two equations (regressions), one for corruption and one for taxation. We start our analysis by estimating each of these regressions in reduced form. However, due to a two-way causal relationship between taxation and corruption we employ 3SLS for the main part of our analysis. It should also be added that we control for the effect of natural resources in both regressions. This allows us to study the direct and indirect impact of natural resource rents, through taxation, on corruption.

In our analysis, we first review the relationship between natural resource rents and corruption. Our results, in line with the literature, show that natural resource abundance has a negative impact on corruption control. Meanwhile, it is seen that natural resource rents crowd out tax revenues in the economy. We then, add taxation to our corruption equation. Our results show that taxation has a positive and significant impact on corruption control. Controlling for taxation decreases the direct and negative impact of resource rents on control of corruption. In fact in some cases, the negative impact of taxation on corruption control becomes positive and significant. This means that what is seen as the negative impact of natural resources on corruption control, can be related to the absence of taxation. Furthermore, taking the negative and significant impact of resource rents on tax revenues into account means that natural resources indirectly, and through crowding out of taxes, undermines corruption control.

The direct implication of the chapter is for developing countries in general, and resource-rich economies in particular, to invest in building their tax systems and for increasing their tax capacities. Due to the unstable nature of natural resources, i.e. their volatile prices or their finiteness, relying on resource revenues is not fiscally sustainable for resource-reliant economies. Moreover, unlike the popular belief, most of these economies suffer from the lack of sufficient public infrastructure to foster growth. Also, as we discussed, taxation can have a crucial impact on the whole development process of the economy and hence can provide a sustainable way to deal with the resource curse.

As outlined above, in Chapters 1 and 2 we discuss how corruption has become one of the driving forces behind the resource curse. We also discuss how resource rents through crowding out taxation can contribute to an increase in the level of corruption. This is mainly due to the positive social, economic and political impact that the exercise of taxation can bring with itself. Chapter 3 is directly related to our analysis in Chapter 2.
It is an attempt to understand how resource-rich economies can establish or re-establish taxation in their economies and hence benefit from the social, political and economic benefits that taxation brings with itself. In Chapter 3, we study a cash transfer programme, known as oil-to-cash\(^1\), that has been recommended to deal with issues of misgovernance and corruption inside the public sector in resource-reliant economies. Under such a plan, government transfers the resource rents to the public sector in the form of a cash transfer and then taxes each citizen, optimally.

The logic behind the plan is as follows. In an economy that relies on taxes as the sole source of government revenue, taxation forms a social contract between citizen and government. People pay taxes and in return hold their government accountable for the efficient allocation of the tax income. The mechanism that enforces the contract is the fact that government relies on citizens’ taxes for its public expenditure. Resource rents, which are under the control of government, shift the reliance of government from tax revenues to resource revenues. This raises questions about the validity of the contract. This is because resource revenues make government financially independent and there are no practical mechanisms in place to enforce the contract. Furthermore, since resource rents are under the control of government, people have a blurred picture of their size and their allocation. This situation makes people see the rents as other people’s money and hence they do not consider themselves entitled to the right of holding the government accountable for how they are managed. The final outcome has been a weakened system of checks and balances and hence a rise in inefficiencies and corruption inside public institutions. Observing the corrupt government, people usually react by evading their legal taxes whenever they can. The oil-to-cash programme aims at transferring the resource revenues in the form of cash to the citizens. Essentially, this act transfers the ownership of the resource rents to the citizens. Following the implementation of the plan, citizens have their usual income plus the cash transfer rents. Meanwhile, under the plan, government fully relies on the citizens for its public revenue. Basically, government has to knock on the door of each citizen to tax his or her resource transfers, plus other incomes that they might have. Government fully relies on the citizen for its expenses and hence sees itself as accountable for how the taxes are allocated. In return, the citizen pays entirely for the public expenditure and hence they see themselves as entitled to the right of holding the government accountable for how they are spent. More importantly, they have the power to enforce the contract, as government is fully reliant upon them for its revenue. Put simply, the social contract is in

\(^1\)A more general term for this, would be resource-to-cash, which is used interchangeably in this thesis.
place again.

Chapter 3 provides a theoretical framework for the oil-to-cash programme and its implications for growth. The model clearly shows how in the presence of corruption, natural resource rents can result in a curse. Furthermore, it can explain the variation in the degree of the resource curse across economies. In line with Chapter 2, the analysis also shows the importance of taxation for the control of corruption. Whether or not the oil-to-cash programme can achieve its aim, depends on the political and economic capacity of any specific country.

At the end of the chapter we critically review some of the major barriers that oil-to-cash plans face. It is important to understand that the plan is not free of risk and needs to be studied carefully before embarking upon it. Any hasty decision towards the implementation of the plan can have catastrophic consequences for the political, social and economic development of the country. For example, it is very important for countries that are contemplating whether to embark on the oil-to-cash programme, that they have a functional tax system in place beforehand. This is because a tax system makes the flow of resource revenues between taxpayers and government possible. Designing and rebuilding the tax system itself is a very demanding task and needs a long-term plan. The plan needs to be well-studied, clear and depoliticised.
Chapter 1

The Resource Curse: A Literature Review

1.1 Introduction

It did not take long for social scientists to notice that most of the developing countries endowed with natural resources have fallen behind their resource-poor counterparts in terms of economic and political development. Auty (2001) termed this paradoxical phenomenon ‘the resource curse’. At the early stages of natural resource discoveries, there were high expectations that resource rents would act as a big push to put endowed countries on to a higher path of development. Meanwhile, there was a sense pity for those countries lacking these endowments. After decades of extraction of different natural resources most resource-rich developing countries are still underdeveloped. In most cases this wealth has given birth to some new economic, political and social problems, each creating their own hurdles for development. On the other hand, some countries with low levels of natural resources or none at all, have recorded significant economic development. Resource-poor countries such as Singapore, Korea, Taiwan and Hong Kong, known as the Asian Tigers have developed industries that successfully compete in the world market with industries from highly advanced economies in the world market. However, countries such as Chad, Angola, Nigeria and Yemen with relatively high levels of natural resources are among the most poverty-stricken economies in the world.

What happened? How did the resource booms destabilise these economies? Are these countries destined to face the resource curse? Is it possible for a country to avoid or
reverse the resource curse? What can we learn from countries that have successfully managed their resources? This chapter reviews some of the possible answers of these questions. We argue that although commodity prices do not follow clear trends, they are highly volatile. The volatility in prices are translated into fluctuations in the stream of income. These volatilities in the stream of income, in turn, is detrimental to growth. Moreover, volatility in income induces governments to increase their spending during booms and fail to decrease it proportionately during busts. Large budget deficits are always the result of these pro-cyclical fiscal policies. Another widely discussed topic regarding resource-rich countries is the issue of the Dutch disease. It explains a condition where a resource boom reallocates factors of production in a way that results in the deindustrialisation of the non-resource economy.

Corruption is another main concern in countries rich in natural resources. The chapter elaborates the importance of institutions and how their structural weakness can give rise to rent-seeking activities and corruption. Democracy also seems to be lower in countries with high levels of natural resources, especially oil. Although democracy is correlated with factors that are important for growth, it is quite hard to say that democracy affects economic performance. Because factors like the rule of law and property rights, which are higher in democracies, can also exist under other political systems.

The chapter also focuses on successful countries such as Norway, Botswana and Chile. Going through the political economy of these countries, we notice that it is possible to turn a resource boom into a blessing. The study of Norway shows that its industrialisation prior to the discovery of resources was important for its success. That is, political and economic institutions were already strong, when oil was discovered. On the other hand, Botswana and Chile were highly underdeveloped when they discovered their resources: diamonds and copper, respectively. Pre-colonial institutions and good political leadership have paved the way for three decades of sustainable economic growth in Botswana following their resource boom. Unlike Norway and Botswana, Chile experienced some sort of resource curse. However, since the deep political change in 1973, the country has followed strict fiscal discipline. Implementing successful countercyclical fiscal policies has made Chile a role model among resource-rich economies.

Natural resource abundance does not necessarily result in a curse. Analogously, the
windfall gain is like a flood that if managed well (i.e. by having proper dams and a water management system in place), it can bring prosperity and even accelerate economic development for the endowed economies. However, a lack of well-based and dynamic policies (dams and water management systems) to allocate the revenues (the flood) can curb the economic and political development of these countries.

Although the roots of the resource curse are usually interrelated and most of the time they overlap, one can categorise them into economic and political channels. In what follows, we start with the economic reasons behind the resource curse, which covers issues such as the Dutch disease, commodity prices, the volatility and pro-cyclicality. Then, we review political-economic issues such as institutions, corruption and misgovernance inside public institutions, democracy and civil war. Finally, we review the political economy of some successful countries such as, Norway, Chile and Botswana and discuss how these countries avoided the resource curse. Each of these reasons have been discussed in the literature with different degrees of emphasis for different countries.

1.2 The resource curse: economic channels

1.2.1 The Dutch disease

The term Dutch disease refers to reallocation in the structure of production following a positive shock such as the discovery of mineral resources or an increase in the price of exportable goods that are perceived to be permanent (Frankel, 2010). Following a resource boom the exchange rate appreciates and this weakens the ability of the economy to export. In many cases the manufacturing sector as the main part of the traded sector is crowded out, which results in deindustrialisation of the economy in the long run. (Corden and Neary, 1982, Corden, 1984). The term Dutch disease also refers to other forms of expansion that results in a trade surplus or a capital account surplus, usually due to inward investments for developing the resource sector. It is also used for other forms of inflow such as remittances, foreign aid and capital inflow used to stabilise the economy. Although different in nature, they can all result in a currency appreciation.

To understand Dutch disease more clearly, assume an economy that consists of three sectors. The traded sector ( we assume to be manufacturing and agricultural sectors), the
The price of the resources and traded goods are given, as they are determined in the world market. The price of non-traded goods is determined endogenously by equating domestic demand and supply. The price ratio of traded goods over non-traded goods is defined as the real exchange rate. There are two main channels through which a resource boom can result in deindustrialisation and real appreciation of the exchange rate: the spending effect and the resource movement effect.

The spending effect shows its impact when in the wake of a resource boom, domestic income and hence demand for both private and public sector, inflates. The excess supply for traded goods is provided by the world market without affecting their prices, however, the domestic supply does not meet the increase in demand for non-traded goods and this drives up the price of non-traded goods. Subsequently, the relative price of traded goods relative to non-traded goods decreases (a real appreciation). Although domestic welfare goes up, the process reallocates production from the manufacturing traded sector to the non-traded sector. This in turn results in deindustrialisation of the economy in the long run.

The resource movement effect comes about when the newly-booming resource sector takes labour and capital from the other two sectors of the economy. The output of the traded and non-traded sector subsequently decreases and this creates an excess demand for traded goods and non-traded goods. One more time, the extra demand in the traded market is purveyed in the world market while the internal non-traded sector cannot fully respond to the excess demand for non-traded goods. The outcome is an increase in the relative price of non-traded goods compared with the traded goods, therefore a real appreciation.

The resource movement effect might not hold when the non-traded sector is more capital intensive. Consider an economy with a traded, non-traded and a resource sector where factors of production (capital and labour) are mobile between sectors in the long run and the resource sector uses labour only (Corden, 1984). In the event of a resource boom, labour is reallocated from the labour-intensive sector towards the resource sector and hence the production of the capital-intensive, non-resource sector expands relative to that of the labour-intensive non-resource sector. This may accelerate industrialisation
if this force dominates the offsetting force for deindustrialisation caused by the spending effect. However, if the resource sector is demanding in capital, a real exchange rate appreciation is expected. Hence it shares the restricted amount of total capital with the traded, capital intensive sector (Neary and Purvis, 1983). Another scenario is when the income is distributed to the consumers with a lower propensity to consume non-traded goods (Corden, 1984).

It should be noted that one of the major issues in the theoretical models of the Dutch disease is that they assume that the non-traded sector does not contribute to economic growth. This assumption is not met by most countries. One reason for this is because the traded sector and the non-traded sector can be different for different countries. The manufacturing sector, for example, in most sub-Saharan countries is categorised as the non-traded sector (Davies et al., 1994). Therefore what might be grouped in a country as the non-traded sector is possibly part of the traded sector in another country. Torvik (2001) develops a dynamic model to solve this problem. His model shows how both the traded-sector and non-traded sector can contribute to growth. This is in contrast with studies such as Sachs and Warner (1995) and Gylfason et al. (1999) where they assume that the traded-sector is the only source of growth.

1.2.1.1 Some empirical studies on the Dutch disease

Some empirical studies give mixed results on the contraction of the manufacturing sector because of the terms of trade and appreciation of the exchange rate (Sala-i Martin and Subramanian, 2012). However, more recent empirical work seems to support the theoretical analysis of the effects of the Dutch disease. A paper by Harding and Venables (2010) shows that a resource boom induces savings of about 30 per cent, contracts non-resource exports by 35-70 per cent and expands non-resource imports by 0-35 per cent. Furthermore, in a study on the effect of the oil shocks, using detailed disaggregated sectoral data, Ismail (2010) finds that a 10 per cent increase in oil windfalls decrease value added by 3.4 per cent across the manufacturing sector, on average. The paper shows that percentage is lower in countries that restrict capital inflow and also sectors that are more intensive in capital. Also Brahmbhatt et al. (2010) show that countries where their resource sector accounts for more than 30 per cent of their GDP, have a traded sector that is 15 per cent lower than the norm. However, Kuralbayeva and Stefanski (2013) in a cross-section analysis, for a sample of countries and also within the US, show that resource abundance can increase the productivity of the manufacturing sector, although
Chapter 1. Resource curse: A Literature Review

the aggregate productivity of the economy might decline. Their reasoning is that after the resource boom unskilled labour moves from manufacturing to the non-traded sector and therefore makes the traded sector more productive in comparison with resource-poor countries. Caselli and Michaels (2009) in study of oil dependence across municipalities in Brazil show the existence of the Dutch disease. Although the oil discovery does not affect the non-oil GDP, it develops the service sector and contracts the industry to some extent, which is consistent with the Dutch disease theory. Moreover, most of the revenue is allocated to boost public development; 20-25 per cent is allocated to housing and urban development, 15 per cent to education, 10 per cent to health and 5 per cent to welfare. Also, part of the revenue is wasted in corruption.

1.2.2 Trends in the world commodity prices

The natural resources of developing countries are typically exported in the form of primary products, and in most cases there is no control over prices. Unlike industrially developed economies, developing countries are price-takers not just with regard to their exports but also regarding the commodities that they import (Frankel, 2010). To fit in with the price-taking assumption, a country should satisfy three conditions: low monopoly power, low trade barriers and perfect substitutability of goods produced by domestic and foreign producers. Firstly, most developing countries have specialised in the production of primary basic goods rather than the manufacturing or services. Price-taking assumptions are satisfied for primary goods but not for manufactured goods or services, which usually need high quality human and physical capital to produce them. Therefore, the market for the former is more competitive and leaves little room for bargaining over the prices. However, the markets for the latter are less competitive and gives exporting countries some monopolistic power, which allows them to determine prices.

Another major issue with commodities such as natural resources is their price fluctuations. Even the long-term prices of natural resources are argued to be non-constant. Two contradicting theoretical frameworks exist on this issue. The first view is that prices of mineral and agricultural products follow a decreasing trend in the long run, while the rival theory predicts an increasing trend for their prices. We shall explain each of them in turn and compare them with the empirical evidence.

1Maybe this is not correct for some countries like Saudi Arabia that export a significant share of the world’s oil.
1.2.2.1 A declining trend

The Argentinian economist Prebisch (1949) was the first one to point out that the prices of natural resources and agricultural products (relative to the manufactured products and services) undergo a downward trend. The idea was that the income elasticity in the world for a primary product is less than one i.e. one unit increase in income raises the demand for this product by less than one. As Frankel (2010) explains, the simple implication of this is that specializing in natural resources is not a rational choice. Therefore, resource-rich countries were recommended to build and protect their own industries through tariff and non-tariff barriers. This meant that countries should ignore their comparative advantage in the production of natural resources. This protective policy, known as ‘import substitution industrialisation’, was very common among developing countries during the 1950s and 1960s but soon this was replaced by ‘export oriented industrialisation’ after this period.

1.2.2.2 A rising trend

Other doctrines predict an upward trend for non-renewable natural resource prices. Two famous ones are attributed to Malthus (1888) and Hotelling (1931) and we explain each of them in turn.

Malthus predicts that since the aggregate demand (population) increases more rapidly than aggregate supply (agricultural products), the increase in prices due to scarcity is inevitable. Malthusians use this logic for natural resources and say, since the stock of non-renewable resources is constant and the demand for them is on the rise, an increase in prices is unavoidable. One problem with this theory is that it does not take into account the technological progress and the discovery of new resources. The Malthusian prediction for the upturn in the prices of natural resources is not valid because it does not consider technological progress and new discoveries.

Taking technological progress into account, Hotelling (1931) predicts that the price of natural resources will rise in the future. He argues that, if we assume that all the resources have been discovered and there are no extraction cost, the price of resources should grow at a rate equal to the rate of interest. This is known as the ‘Hotelling rule’ and is derived from the fact that a profit maximiser extracts at a rate so that the present value of the rents are equal across periods of extraction. Literally, it says that the owner
of the resource stock wants to maximise the lifetime value of the stock, by choosing the
optimal extraction path. What the owner of a mine extracts today can be deposited in the
banks and earn profit. Undoubtedly, the owner will leave the resources on the ground if
and only if he is sure that the return is not less than the income gained from the interest
rate on the deposits, otherwise he will extract all the resources in the first period.

1.2.2.3 Some empirical evidence

Ambiguities in the exact trend of natural resource prices is seen in empirical analy-
ses as well. The price of minerals, and oil and agricultural products are highly correlated,
hence their price are usually generalised as commodity prices (Frankel, 2010). Frankel
explains that from 1870 to World War I there was a slightly upward trend in these com-
modities prices, this was then followed by a decline during the war, a rise again in the
1970s, a fall until the end of the century and finally an increase until 2010. Depending
on the chosen period for the analysis, different trends are supported. For example, studies
that use a sample after the boom of the 1970s find an upward trend, while studies done
after the price fall of the 1980s find a downward trend.

Although we cannot predict a decisive trend for commodity prices, we can tell for
sure that they are volatile. In what follows, we explain the sources of these volatilities and
how through pro-cyclical fiscal policies they can translate into the economy.

1.2.3 Volatility

One of the intrinsic features of the natural resources income, especially oil and gas,
is their volatility. A strand of the literature holds volatility as one of the main reasons
for the low level of economic growth in the resource-rich countries (Van der Ploeg and
Poelhekke, 2009, Blattman et al., 2007). Humphreys et al. (2007) point out three channels
for volatilities in the income from resources. Firstly, the volatility in the rate of extrac-
tion, then variation in the timing of payments by contractors and buyers and finally the
wild fluctuation in the price of resources. The volatility in the rate of extraction can arise
because of the nature of extraction. Usually in the first years the stock is ample and this
increases the speed of extraction. However, as the stock becomes scarce and hard to ac-
cess, the pace of extraction falls.
Chapter 1. Resource curse: A Literature Review

Volatility can also be due to the fragile and unstable political climate of most resource rich developing countries. Interestingly, if the country is a major producer in the world market, this can affect the stream of income in other resource-producer countries. For example, recent sanctions on Iran’s oil\(^2\) slumped its GDP over night and made both its exchange and gold market quite volatile. The oil embargo on Iran also transmitted the volatility to Iraq and Saudi Arabia as these countries increased their production to fill the sudden shortage in the world market.

Volatility can also be exacerbated by international borrowing. Being endowed with subsoil resources these countries can use this wealth as collateral and borrow against their future revenue, something that is almost impossible for other developing countries. There is a pro-cyclicality problem associated with this. When prices are high the risk of default is low and the value of the collateral (future oil revenues) increases. This accelerator effect in turn decreases the interest paid on the loan and hence exacerbates the effect of the boom. On the other hand, when prices turn down, the value of the collateral decreases and the risk of default goes up. Subsequently, the decelerator effects decrease the interest rate and therefore accentuate the effect of the downturn.

Volatility in government receipts can easily translate into volatilities in expenditures. This increases spending during good times and decreases it during bad times, resulting in boom-bust cycles (Humphreys et al., 2007, Frankel, 2010). Below we explain the problem of pro-cyclicality which is one of the main issues in resource-dependent economies.

1.2.4 Pro-cyclicality

Developing countries in general and countries with natural resources (particularly oil) are usually exposed to strong cyclical fluctuations. Although part of the problem is due to the volatile nature of the commodities, most of it is the result of policies that instead of moderating the cycles, exacerbates them (Frankel, 2010, 2011). Capital flows, Dutch disease, monetary and fiscal policies all tend to be pro-cyclical i.e. they expand during the boom years and contract during recessions and hence accentuate the cycles.

\(^2\)Due to Iran’s nuclear program, western powers have restricted their energy trade with Iran since 2007. They increased this to an oil embargo in 2012 which lasted until 2015.
Based on the inter-temporal theory of optimization, countries smooth their consumption across periods. To do this, they borrow during a downturn and repay the debt during an economic upturn i.e. the capital flows countercyclically. However, this is not what happens in reality and a pro-cyclical movement is evident in the flow of capital (Kaminsky et al., 2005, Reinhart and Reinhart, 2008). Theories relate this to capital market imperfections that exist because of asymmetric information and risk that varies across economies. During the 1975-1981 and the 1990-1997 cycles, capital flows counter-cyclically to finance the deficits. Inversely, in the commodity market boom of 2003-2008 capital flow streams to Asian, Middle Eastern and Latin American countries that already have a current account surplus (Frankel, 2010). One way to explain this relates to developing countries that are exporters of primary, mineral or agricultural goods, especially oil. We discussed that during the boom, the prices of these commodities usually increases and that in turn, increases government spending in these countries.

Another explanation is the pro-cyclical fiscal policy. Governments increase their spending overwhelmingly during booms and finance their deficits from abroad. But during busts they have to decrease their spending and also repay what they have borrowed during the upturn. It is well-established in the literature that pro-cyclicality of fiscal policies is more pronounced in developing countries compared to their industrialised counterparts (Cuddington, 1989, Alesina et al., 2008). During booms credits from borrowing, taxes and royalties increase and subsequently governments cannot resist political pressure and temptation to increase spending. Cuddington (1989) explains that this can be more observed in countries that face a resource discovery and price fluctuations in exporting commodities.

Failure to manage these booms results in internal and external imbalances in these economies. Governments increase their spending during the boom optimistically and sometimes run budget deficits. When the bust starts, spending cuts happen after some delay. This makes it hard for a weakened non-resource sector to bounce back and therefore fiscal deficits becomes even worse. Changes in government spending, because of fluctuations in commodity prices, are also evident in Latin American countries as most of them rely on these commodities (Sinnott, 2009).

Usually, increase in government spending shows itself as a rise in investment project or public sector wage bills (Frankel, 2010). Investing in infrastructure can pay off in
the long-run if they are well-planned. However, as Robinson and Torvik (2005) discuss, one of the common problems for developing countries is the allocation of investment to projects with negative social benefits, so called ‘white elephants’. This happens because politicians cannot give reasonable pledges to their supporters so they go toward these inefficient ways of redistribution. Thus, in contrast to what is thought, the reason for underdevelopment in developing countries is not solely underinvestment, but is also the misallocation of investment monies that results in low levels of economic growth. Increases in public sector wage bills can happen either because of an increase in the number of employees or an increase in the salaries they receive. In both cases, it is politically very hard for governments to reverse the cycle when prices of commodities goes down.

1.3 Resource curse: political-economic channels

In recent years there has been a shift from economic to political and political-economic reasons to explain the resource curse (Sala-i Martin and Subramanian, 2012, Sandbu, 2006, Moss, 2010, Ross, 2012). This strand of literature argues that economic problems related to resource abundance are exaggerated and issues of corruption and governance inside public institutions are the driving forces behind the curse. Meanwhile, scholars such as Ross (2012) and Collier and Hoeffler (2005) have also related natural resources to political instability and civil war. As we said earlier, economic and non-economic issues are usually interrelated and one should not underestimate misgovernance and corruption in igniting political unrest in resource-rich economies. A vivid example of this is the political uprisings across the Middle East and North Africa that started in 2010. Although the demonstrations descended into civil wars in many cases, they initially began as protests against pervasive corruption inside governing institutions.

There are variations on the impact of different political and political-economic channels on the resource curse. Various studies have looked into the quality of institutions, corruption, democracy level and civil war as some of the main drivers of the curse. In what follows we take a closer look at the role of each of these factors.

---

3 Another reason for choosing white elephants is the fact that they provide opportunities for public bureaucrats and politicians to engage in corruption.
1.3.1 Institutions

Institutions are defined as ‘the rules of the game in a society’. They are humanly devised constraints to shape incentives (North, 1990). In other words, institutions organise social, economic and political interaction in a society (Acemoglu et al., 2000, 2002b, 2005). Through different channels weak institutions can result in poor governance and hence derail countries from their development path. One theory which is used to explain the resource curse, is that a natural resource bonanza lowers the quality of these institutions and hence hampers growth. Sala-i Martin and Subramanian (2012) suggest that natural resources, rather than Dutch disease, hits economic growth by weakening the institutions inside the economy. Contrary to this, Sachs and Warner (1995) show that institution quality does not have a significant effect on growth. However, by creating an interaction term for institutions and natural resources, it can be seen that natural resources boost aggregate income in countries with producer-friendly institutions while they push aggregate income down in countries with grabber-friendly institutions (Mehlum et al., 2006b).

Also in a theoretical model Mehlum et al. (2006a) show that if institutions are production-friendly, the profits of entrepreneurs in the economy are higher than that of rent seekers. This creates incentives for individuals to follow the entrepreneurship route and become active in the production sector. However, if institutions are grabber-friendly, activities such as crime and corruption pay off and the number of rent seekers relative to entrepreneurs, increases in the economy. Hence, in the event of a natural resource boom, individuals choose rent-seeking activity rather than productive activities. In their studies, they also define a threshold for institution quality above which resource abundance does not result in a curse. Because, countries above the threshold have enough high quality and well-established institutions to utilise the income and hence conquer the curse.

Also, Acemoglu et al. (2000, 2002b) argue that being industrialised is not the reason for the efficient management of natural resources in some developed countries. They argue that developed countries, in the first place, are industrialised because they had high quality institutions. Norway, Canada, Australia, United States and New Zealand are all examples of countries that had high quality institutions in place at the time of their resource discoveries. On the other hand, countries such as Angola, Nigeria, Sierra Leone, the Democratic Republic of Congo and Venezuela did not have developed institutions in
place at the time of discovery. Even in a successful developing country like Botswana, institutions have played a key role in the management of its resources (Acemoglu et al., 2002a).

In another study Boschini et al. (2007) challenge the negative ideas about the existence of natural resources, and hold the quality of institutions responsible for what is known as ‘the resource curse’. In their empirical analysis they show that a country like Sierra Leone had the potential to perform like Botswana, if it had high quality institutions. Bulte et al. (2005) suggest trade openness and improving the quality of institutions as ways to overcome the resource curse. In fact these were among the policies that Chile, a successful country in terms of resource management, adopted to manage its resources after the military coup of 1973 (Fuentes et al., 2010).

Natural resources can also block the development of political and economic institutions. Isham et al. (2005) explain that the quality of institutions decrease when governments use their natural resource income to pay for their inefficiencies. They use the income to suppress opposition groups, avoid accountability and slow down modernization, each of which downplays the quality of their institutions. Furthermore, in Chapter 3 we show that the relative success of some resource-rich economies is not due to lower levels of corruption inside their public institutions. Instead, this can be due to the large proportion of natural resource revenues that makes it possible for them to mask their underperformance in the management of natural resources.

In the following section, we shed light on corruption as a major issue inside public institutions in resource-rich developing economies.

1.3.2 Corruption

Corruption is the abuse of public office for private gains (Tanzi, 1998). In the beginning scholars held a different perspective on the exact impact of corruption on the economy. One school of thought saw corruption as way of circumventing some of the cumbersome elements of bureaucracy inside public institutions (Leff, 1964, Huntington, 1968, Lui, 1985). This view is now strongly challenged by a body of empirical and theoretical research, which shows that corruption damages the whole development process (Gupta and Abed, 2002, Blackburn et al., 2011, Rose-Ackerman, 1978). Among others
Mauro (1995, 1996) shows that high levels of corruption curbs private investment and through that hampers economic growth. Corruption can also result in the misallocation of talent towards rent-seeking activities (Murphy et al., 1988, Robinson et al., 2006).

The adverse impact of corruption is seen to be more pronounced in resource-dependent economies. Khan (1994) and Shaxson (2007) in a study on Nigeria and The Gulf of Guinea, respectively, show how oil booms elicited high levels of corruption in these countries. Also in another study Arezki and Brückner (2011) argue that although oil rents increase civil liberties for citizens, they result in a surge in the level of corruption. In a panel study and using different estimations, Aslaksen (2007) shows that oil and minerals are associated with higher levels of corruption. On the other hand, Alexeev and Conrad (2009) question the negative impact of natural resources on corruption and other governance indicators. Related to this, Busse and Gröning (2013) show that exports of natural resources increases corruption robustly, while it has a variant impact on other indicators of governance. Among others, in a case study on Sao Tome and Principe, Vicente (2010) confirms that oil revenues have given way to corruption inside public services. In their study on Nigeria, Sala-i Martin and Subramanian (2012) discuss that the effect of Dutch disease has been exaggerated and that widespread corruption in the form of granting incumbency and positions to cronies and friends, is the driving force behind economic failure in this country. There are many channels that relate natural resources to corruption and some of these channels might countervail each other. Such a situation makes tailoring the right policy to deal with corruption quite difficult. Therefore, different channels need to be identified and studied independently. In Chapters 2 and 3 we study the role of taxation in this relationship.

In recent years scholars have tried to explain misgovernance and corruption inside public institutions through the dynamic of public finance in resource-rich developing economies. Developing countries in general collect a lower share of tax compared with developed economies (Besley and Persson, 2014). This gap is much wider if developing countries are endowed with natural resources. This is because natural resource revenues provide governments with an alternative source for their public expenditure in these countries. The crowding out of taxation by resource revenues has a profound impact on how state and society interact in these countries (Moore et al., 2007, Moss, 2010, Sandbu, 2006, Knack, 2009). Taxation normally constitutes a social contract between citizens and government. In a tax-reliant state, governments collect taxes from citizens and in return it
accepts to be held accountable for how it allocates those tax revenues. The other side of
the coin is that citizens pay taxes and in return they hold the government accountable for
how tax incomes are spent. The reliance of government on tax revenues is the mechanism
that enforces the contract. The replacement of tax revenues with natural resource rents
makes government financially independent and gives it the full discretionary power over
the management of resources. In turn, this paves the way for corruption and misgovern
in the management process. Furthermore, since the government in the majority of cases
owns the revenues, there are no financial mechanisms to hold it accountable. On the other
hand, since the bulk of government revenues is not paid by the public, citizens see the
revenues as other people’s money. This means that they do not see themselves entitled to
the right of overseeing how these revenues are allocated. In the majority of cases, they
react by not paying their legal taxes whenever possible. The outcome of this has been the
further crowding out of taxation and tax systems in resource-dependent economies. As
we will explain in Chapter 2, the absence of taxation can decelerate the whole develop-
ment process and hence increase corruption level further.

The impact of taxation is much broader than the social contract that is outlined
above. Taxation also plays a critical role in developing the administrative and bureaucratic
capacity of a state (Jensen, 2011) as one of the determinants of development (Fukuyama,
2014). Furthermore, taxation can also alleviate part of the adverse impact of volatilities
and Dutch disease, which were discussed above as to be the two other drivers of the re-
source curse. The lower volatility in tax revenues compared to resource rents can decrease
fluctuations in government spending and hence bring stability to the whole economy.
Also, a government that relies on tax revenues for its income has a financial incentive to
support a business environment thereby raising more tax revenues. This can pave the way
for diversifying the economy away from natural resources, basically a sustainable way to
fight the Dutch disease.

1.3.3 Democracy

Democracy is a political system where people can choose and replace their governm-
net in free and fair elections (Diamond and Morlino, 2005). The system should guarantee
political rights, civil rights, human rights and rule of law for its citizens. Revenues from
natural resources can be employed to block the development of democracy and democratic institutions inside a country. Studies show that authoritarian regimes last longer in oil-rich countries (Smith, 2007, 2004). Jensen and Wantchekon (2004), Rose-Ackerman (1978) and Ross (2004a,b) find a positive relation between authoritarian regimes and economic dependence on oil and mineral resources. Resource wealth also makes it possible for dictators to buy off political rivals and therefore slow down the path toward democracy (Acemoglu et al., 2004). Ross (2012) explains why following the recent uprisings in the Middle East and North Africa, the so-called ‘Arab Spring’, it was easy for the protesters in the oil-poor countries such as Tunisia and Egypt to overthrow their rulers. At the same time, oil-rich states, like Libya, Bahrain, Algeria and Saudi Arabia could resist much longer. Huntington (1993) explains that until the 1970s, oil producers are as democratic or undemocratic as other nations. But after this period, most of the undemocratic counties converted to a democratic system, except petroleum-rich countries in the Middle East. This pattern follows not just in the Middle East, but also in all parts of the developing world, namely Africa and Russia.

At the other extreme, many scholars question a clear relationship between oil and democracy. Karl (1997) explains that a previously authoritarian country like Venezuela transitions to democracy after an oil boom and whilst at the peak of its income generation. Most countries in Central Asia are oil poor, though none of them have a democracy. Doing a time-series analysis for Kazakhstan, the oil-rich country among them, Haber and Menaldo (2011) find a non-significant relationship between democracy and the share of oil and minerals in the economy. This is in contrast to most results in cross-section and panel studies.

Frankel (2010) explains that a negative relationship between oil and democracy does not necessarily mean that oil hinders economic performance. He explains that although variables such as the rule of law, trade openness, equality of opportunity and political stability that contributes to growth are higher in democracies, each of them can exist under other political systems as well. For example, countries such as Chile, Singapore and Taiwan started their crucial economic development when they were undemocratic. Also, some believe that the reason behind China’s economic success compared to Russia is that in 1990 the Chinese political leader Deng Xiaoping embarked on economic reforms, whereas Michail Gorbachev initiated political reforms (Frankel, 2010). The relationship between democracy and growth in empirical studies is varied. Controlling for income,
Chapter 1. Resource curse: A Literature Review

Regional fixed effects and time varying common shocks and other covariates Barro (1996) finds that rather than democracy, factors such as the rule of law, free markets, education and small government size, are the real drivers of economic growth. Furthermore, after defining different channels for the impact of democracy on growth, Tavares and Wacziarg (2001) show that the overall impact of democracy on growth is negative.

In the previous section we outlined the negative impact of corruption on growth. Taking this into account, one channel for the impact of democracy on growth is through corruption. Bhattacharyya and Hodler (2010) in a panel study for 91 countries between 1980 and 2004 find that natural resource booms, boost corruption in countries that have a history of dictatorships for more than 60 per cent of the time since 1956. Also, a recent study on sub-Saharan African countries show that the adverse impact of natural resources on corruption is much higher in less democratic economies (Arezki and Gylfason, 2013). Other studies find a non-linear relationship between democracy and corruption. Montinola and Jackman (2002) show that the level of corruption in weak democracies is higher than when under a dictatorship. Collier and Hoeffler (2009) explain that weak democracy in developing countries can pave the way for poor checks and balances and therefore can hinder economic growth. Furthermore, it matters whether democracy is organised under presidential and parliamentary systems. Andersen and Aslaksen (2008) find that the resource curse is higher in presidential democracies than parliamentary systems. They show that presidential systems are less representative and less accountable and hence provide more loopholes for rent-seeking activities, while parliamentary systems are shown to be more successful in managing natural resources.

On the other hand, some scholars discuss that the direction of causality is, in fact, from economic growth to democracy not the other way around (Helliwell, 1994, Khan, 2012). Zakaria (1997) disputes the importance of democracy in developing countries. He discusses that the Western system of one-person-one-vote should not be the first concern in developing countries. He discusses that instead of democracy these countries should stress more on other fundamental issues such as the rule of law, human rights, minority rights, economic freedom and freedom of expression.
1.3.4 Conflict and civil war

Civil war is probably the fastest and most devastating way to turn natural resources from a blessing into a curse (Ross, 2012). In contrast to incomes from other types of production, which makes civil war less probable, resource rents tend to increase the likelihood of civil conflict (Collier and Hoeffler, 2004, Fearon and Laitin, 2003). When the share of natural resources, especially oil, in GDP increases the country is more susceptible to civil conflict. The probability of civil war in a country where natural resources account for a quarter of GDP, is calculated to be 23 per cent. This number is only 0.5 per cent in a country with no natural resources (Collier and Hoeffler, 2004). Among natural resources, point-source resources like oil or gas are more likely to create a climate where civil conflict is more likely to occur (Isham et al., 2005, Lujala, 2010, Ross, 2004a).

Against this background in a recent study on 29 Sub-Saharan African economies Arezki and Gylfason (2013) find that natural resource rents decrease conflict. They relate this to the distribution of natural resources towards citizens, as an attempt to quell uprisings. However, one can discuss that these kinds of populist policies are not sustainable and that they may pave the way for large-scale political unrest in the future.

Oil also can trigger separatist movements inside a country, especially in regions that are rich in oil. Because under an independent state the share of oil each person would receive would be higher (Ross, 2012). This situation is more pronounced if the oil-rich region is different from the rest of country, in terms of ethnicity, culture and religion. A recent example of this is oil-rich, Christian South Sudan that became independent from oil-poor, Muslim North Sudan in 2011. Ross (2012) also tries to relate the Kurdish separatist movements in Iran and Iraq to the fact that these Kurdish areas are rich in oil. This is partly true, however, this theory might not solely explain the Kurdish question across the Middle East. Clashes between Kurds and central government have also been high in the oil-poor Kurdish region of Turkey. As Murshed (2002) maintains that it is important to understand whether civil conflict is the result of grievance due to social discrimination, or greed induced by massive rents. Also in another study Caselli and Coleman (2013) argue that conflict over a natural resource bonanza is higher in heterogeneous societies. They explain that coalitions that are created based on colour and ethnicity are usually stronger and it is less likely that their members would defect to the winning side in the face of a defeat in an election. Therefore, they would offer staunch resistance and this could result in violence. However, in homogeneous societies losers of an election can more readily
join the dominant coalition and hence avoid serious conflict.

Most analyses on the impact of natural resources on internal conflicts are cross sectional. Cross-country analyses, however, cannot control for many unexplained factors across different economies. Within-country studies can control for this issue to a large degree. Analysing different kinds of violence from 1988 to 2005 for 900 municipalities of Colombia, suggested that an increase in the price of a capital-intensive commodity, raised returns on capital and decreased wages which therefore encouraged conflict. This might explain the positive relationship between oil and conflict as oil extraction is heavily capital intensive. On the other hand, increases in the price of labour-intensive commodities increases the wages of labour and therefore lowers the propensity for violence (Dal Bó and Dal Bó, 2011). Also Angrist and Kugler (2008) find that cocoa production in rural areas increases employment among teenagers, however, it gives rise to violence between them.

1.4 Success stories

In the above analyses we discussed different channels through which natural resources can result in the resource curse. The severity of each of these channels varies and this explains variations in the degree of resource curse across time and countries. The majority of resource-rich economies have done badly in terms of their resource rents management. However, a small number of economies have been able to avoid the curse completely and some have managed to reverse the curse after a while. Norway, Botswana and Chile are among these countries. In respective case studies Mehlum et al. (2012), Acemoglu et al. (2002a) and Fuentes et al. (2010) study the reasons behind the successful management of natural resources in each of these countries. In what follows, we provide a short summary of their analyses. These country case studies give us a clear picture of how the juxtaposition of different economic, political, historical and social factors can influence the management of resource revenues.

1.4.1 Norway

Following Saudi Arabia and Russia, Norway is the third largest oil exporter in the world. This wealth has not created a barrier to economic performance. In fact it has boosted performance in a way that out-performs most other developed countries. From
1900 to the 1980s Norway’s per capita income was far lower than its neighbours, including Denmark and Sweden, while now it is among the countries with the highest levels of GDP per capita in the world. What are the reasons behind this? During the 1960s oil was discovered in Norway and oil extraction started in 1973. Comparing the political and economic structure in place before and after the oil discovery shows that the windfall wealth has become a blessing for this Scandinavian country. Following Mehlum et al. (2012), we describe the various political and economic factors that have protected Norway from the resource curse.

1.4.1.1 Economic and social transformation

One thing that separates Norway from other countries is that it had well-established industries when oil was discovered. This was in contrast with most resource-rich countries. Between the 1970s and 1990s manufacturing production decreased in Norway from 30 per cent to 20 per cent of GDP. This was partly because of the increasing role of Asian economies in manufacturing production, and the rest was due to the new oil income, which caused a decline in the traditional exports such as fish, timber and metal. Meanwhile, the oil wealth accelerated the production of services, which in turn increased employment in this sector. Interestingly, owing to the increase in the female participation in the labour market, from 40 to about 80 per cent, this did not affect employment in other sectors. The broad subsidization of higher education in the 1960s and similarly with day care nurseries later on, were the driving forces behind female involvement in production in the 1970s.

1.4.1.2 Oil and institutions

As previously mentioned when Norway discovered oil, it was already industrialised. This was the case in many other resource-rich developed economies, such as the US, Canada, Australia, Finland and Sweden. However, many scholars do not see industrialisation per se behind the successful management of natural resources in developed

---

4It should be noted that during this period UK and a bit earlier in the 1950s Netherlands had experienced a resource bonanza in the form of oil and gas, respectively. Although not at the scale of resource-rich developing countries, both countries have fared badly compared to Norway in the management of their resource windfalls. In fact the term Dutch Disease has its root in the weakening role of non-resource industrial sectors due to the expansion of the resource(gas) sector in the Dutch economy during this period.
economies. Acemoglu et al. (2002b) discuss this view and explain that these countries industrialised because they had high quality institutions. Therefore, in the first place well-organised institutions were the reason that Norway developed and industrialised. Later on, when oil was discovered in the 1960s, these institutions were already established and were robust enough to manage the boom. As we discussed in the literature, a natural resource boom can have different outcomes, depending on the quality of the institutions. As Mehlum et al. (2006a) explain if institutions are grabber-friendly they pave the way for rent-seeking activities and corruption, whereas producer-friendly institutions induce growth and transparency. Not surprisingly, they call their theory ‘the curse of institutions’ and they support it with an empirical study (Mehlum et al., 2006b).

We explained earlier that oil and mineral resources, compared to other resources, are more likely to result in corruption as one of the main drivers of the resource curse. To test this Mehlum et al. (2006b) replace resource abundance with oil and minerals in their regression, something that is more compatible with Norway. The results show that oil and minerals play a double role, that is when institutions are good they have a stronger positive effect and a stronger negative effect when institutions are bad. Considering this for Norway, oil has accelerated economic growth more than any other resources could have done.

Another important factor is the process of oil extraction in Norway. Most of the oil resources are located offshore, which needs high-tech equipment to extract. In the first phase of extraction in 1973 Norway relied on companies from abroad, but it soon developed its own industry, which is now the world leader for offshore extraction. This provides Norway with a channel to export its human and physical capital, to extract resources in other resource-rich countries. In fact, many scholars see this as the main factor explaining why Norway has not experienced Dutch disease, a very common issue for resource-abundant countries.

1.4.1.3 The role of politics

In sharp contrast with most resource-rich countries, Norway discovered oil when they already had an established democracy and a highly efficient bureaucracy running the country. This was a blessing in its own way since there are studies that show oil can undermine the transition to democracy through different channels (Ross, 2012). On top of this, Norway has a parliamentary political system, which is believed to be more resilient to the resource curse than other sorts of democratic government such as the presidential
system (Andersen and Aslaksen, 2008). It encompasses broad geographical, regional and class inclusion within the parliament and hence this creates a high degree of representation for the management of resources. This has created a tradition of enforcing policies that are in the national interest of the country and are free from partisan influences.

In 1970 the parliament laid down the foundation of oil management by prioritising certain policies; the so called ‘Ten Commandments. The commandments also known as ‘oil commandments’ are listed below.

1. All offshore activities should be under national control.
2. The exploitation of the oil reserves should be in a way to make Norway independent of external sources in the provision of internal demands for oil.
3. The oil sector should support industrial activity and other businesses.
4. In the development of oil industry, the protection of the existing commercial activity, environment and nature should be considered.
5. Flaring of the Norwegian gas must be avoided and allowed only during test periods.
6. As a rule, oil should be processed in Norway, unless under exceptional circumstances.
7. The state should get involved and contribute to the creation of a powerful oil industry with national and international ambitions.
8. A state owned company that stands for Norwegian interests and cooperates with private companies should be created.
9. An activity plan, that satisfies the unique socio-political factors of the region, should be developed for the area north of 62nd parallel.

It is interesting to know that since 1970 the cabinet experienced 15 changes, 13 of which were under socialist governments. Despite these volatile political changes, economic policies were quite stable and all the incumbent governments respected the commandments. Knowing that oil incomes are significantly volatile, the Norwegian governments followed countercyclical fiscal policies. When the price of oil fluctuates it easily translates this
volatility into the economy and therefore hampers growth. To smooth boom-bust cycles in the economy, governments have followed expansionary fiscal policies during bad times and contractionary fiscal policies during good times. Another important factor is the high degree of informal supervision that exists within Norwegian oil companies. Norway has strong union movements and employer associations that are present in all large companies. They impose severe checks and balances on all state powers and companies’ management. These actions have decreased mismanagement to a low level, and have left little room for corruption.

1.4.1.4 Equality across generations

Another important factor that Norway has focused on is adopting policies in a way that would maximise the utility of current and future generations. In terms of income distribution between current generations some three main theories are available. The first one is to distribute the revenue in cash terms between all citizens, something that was never exercised in Norway. The second and third ways are through increases in public spending and cuts in taxes, respectively. When given the option between the second and the third, the majority of people usually vote for increases in public spending rather than decreases in taxes. There is a theoretical base for this choice. In all countries the median income is below the mean, that is the income distribution tail becomes very thin when the income increases. However, it is the median voter who always determines the result of the election and they always vote for increases in public spending rather than for tax reduction. It is because tax deductions allocate revenues to the rich, while an expansion in the welfare spending distributes it in favour of the poor.

The theory is in accordance with what happened in Norway. After the oil discovery, the welfare state, in the form of increases in government consumption or transfers to households, inflated. Education, health and public administration, respectively, accounts for the greater proportion of government spending. Also pensions, unemployment benefits, disability pensions and sickness compensation take different forms of transfers to households. On the other hand, Norway did not subsidise gasoline prices, which is a very common method of resource distribution (i.e. tax deduction) in resource-rich countries.

Oil is predicted to be exhausted in Norway within the next 50 years and governments will need to distribute this wealth fairly across current and future generations. To transfer it across periods, Norwegian decision makers consider oil as a national wealth and extract
it in a sustainable way. One way of making this happen was the creation of the Norwegian Petroleum Fund in 1990. The rationale for establishing the fund was that the return on it is higher than the return of leaving the oil under the ground. The total value of the fund in 2008 was 400 billion US dollars, which makes it the largest sovereign wealth in the world. In 2001 they also introduced a guideline, known as ‘the decision rule’, to determine a stable flow of the fund into the government budget. The rule was set at 4 per cent in the beginning that was calculated to be the long-run return on the fund. At the moment, the fund is integrated into budget systems and is managed in a way that ensures transparency in the oil sector. It is always under public scrutiny and decisions about it are made by independent economists.

1.4.2 Botswana

Resource-rich Botswana is a landlocked small country in southern Africa, of which up to 70 per cent of its land mass is covered by the Kalahari Desert. To the south, it shares borders with South Africa, to the west with Namibia, to the southeast with Zimbabwe and on a single point with Zambia. It achieved its independence from Great Britain in 1966 and since then has had the highest economic growth rate in Africa. What makes the study of Botswana interesting and important is that Botswana is probably the only country in Africa and one of the few in the world that has turned its resources, mainly diamonds, into wealth and prosperity for the country.

It is a widely shared view that adopting good policies are behind the high and steady economic growth in Botswana. The developing world is generally bad at adopting good policies as these policies generate less rent for corrupt politicians (Acemoglu et al., 2002a). Therefore, what is good economics is usually bad politics in developing countries, especially when countries are resource-rich. Over the following paragraphs we explain the reasons behind the unusual presence of good economics and good politics in Botswana.

Authors such as Alesina and Rodrik (1991) see high rates of equality and less government intervention, respectively, as the main reason behind this success. However, Acemoglu et al. (2002a) challenge these views and explain that both inequality and government intervention have been quite high in Botswana. They continue that the high quality of institutions underlie the good economic performance in Botswana. Institutions
provide property rights for the broader society. This ensures that every individual that has a chance to invest feels secure enough to do so. We already explained the importance of good institutions for satisfactory economic and political performance. However, the question is how does Botswana have such high quality institutions? To answer this, we need to know some facts about the political economy of Botswana and how it has developed:

- Botswana is a very resource-rich country.
- The pre-colonial structure of institutions in Botswana are structured in such a way that it engages everyone in the political process of decision-making and therefore this restricts the concentration of power.
- Great Britain colonised Botswana for a short period and therefore it was not able to change the structure of pre-colonial institutions.
- After independence in 1966, the politicians postponed the indigenisation policy until the Botswana people were qualified enough to take on new responsibilities.
- The Botswana Democratic Party (BDP) as the first party to take on governance after independence inherited these well-structured institutions. Having these and responsible leaders, with their sensible policies, produced the best outcome.

To understand how these political factors generated good institutions we have to consider the various aspects that induced political actors in Botswana:

1. **Economic interest**: After independence the well-enforced property rights were in the interest of cattle owners who are the most powerful political elites in the country and this made them even more powerful.

2. **Political losers**: Usually when powerful actors feel threatened by political change they block reforms in the political institutions. Due to the democratic pre-colonial structure of these institutions this did not happen in Botswana.

3. **Constraints**: the new institutions put effective constraints on the power of political leaders and therefore made them accountable before their elites.

The country had all these in place when the revenue from diamonds started to flow during the 1970s and hence it was hard for political elites to expropriate the income. In other words, the juxtaposition of these factors made Botswana ready to manage its resources
successfully. To illustrate this argument further we can compare Botswana with some other countries such as Somalia, Lesotho, Ghana and the Ivory Coast. Each of these countries share several similarities with Botswana, although they have followed a very different development path.

**Somalia:**

Of all countries in Africa, Somalia is not only a state but also a nation (Clapham, 1998). In contrast to other countries, the Republic was born because all the people share the same identity, language, culture, religion and origin. Like Botswana, the colonial period had little or no effect on the political institutions, however, as the pre-colonial institutions for these countries were different, they reached contrasting outcomes. Botswana had the inter-tribe cooperation that shared decision-making across disparate groups and hence created this homogeneous society that we observe today. To the contrary, in Somalia there were no constraints on political elites and fights over controlling state apparatus put clans against each other, even though they were sharing the same cultural values and descended from the same origin. Therefore, what generated different outcomes in these two countries was the interaction between limited colonial rule and pre-colonial institutions, not the transitory effect of colonialism itself.

**Lesotho:**

Geographically, Lesotho is located within South Africa, but culturally and ethnically they are very similar to Botswana. However, the fact that they were located in another area and surrounded by different people shaped their institutions in a completely different way. Lesotho was on a continuous war path with various South African tribes, mainly Boers, but also the British colonialists. These wars increased the dominance of the main elites, decreased the participation of people and therefore resulted in a centralization of power. Unlike Botswana, these situations paved the way for political leaders to remove the pre-colonial constraints in their way and completely control power. This was more apparent when Chief Lebua Jonatan took power during a military coup when he lost the election in 1970.
Chapter 1. Resource curse: A Literature Review

Ghana and Ivory Coast:

From the beginning and just after independence, the struggle for power was present in Ghana. Kwama Nkruma and his Convention People’s Party (CPP), which was one of the anti-colonial coalitions before independence, banned all rival parties and declared there to be one country with one party. Later on, in common with many dictatorships, all the economic decisions were designed to centralise power, a policy that Botswana completely refrained from. Also, as we discussed, in Botswana most of the economic policies were in the interest of cattle owners who were the main support behind the political elites. However, in Ghana political leaders had little or no interest in productive activity such as agricultural exports (Bates, 2005). On the other hand, for the Ivory Coast the economic interests of political leaders created incentives for rulers to support farmers and the agricultural sector in a better way (Widner, 1994). However, the rent from this sector was never enough to warrant pervasive development in this country. Therefore, similar to Ghana they took cautious steps towards development projects, and always saw them as a source that could fuel opposition groups and hence present a threat to their political power (Cohen, 1973).

Botswana, a role model:

The discussion about Botswana outlines the fact that the juxtaposition of history and institutional structures helped politicians adopt such beneficial policies. However, this should not give the impression that such policies are impossible to follow in other countries. Undoubtedly, following these simple rules can present a way to prevent civil war, and can provide them with the stability necessary for building a successful economy. For example, since independence they have created a National Development Plan (NDP) that governments should follow, which is updated periodically. They include information on revenues, expenditures and growth projections for the whole economy. Based on this information, they prioritise certain policies, and the ways they should be executed, for set periods. The last NDP, known as NDP10, was updated in 2007.

1.4.3 Chile

It is never too late for a country to embark on a programme of implementing good policies, and Chile is a prominent example of this. If Botswana started with a stable
economic and political foundation, Chile’s history, like most developing, resource-rich countries is full of political and economic turmoil. Copper is the main mineral resource in Chile and it plays a key role in the political economy of this country. About three decades ago, a radical political change occurred in Chile. This revolutionised the economic management of the country for years to come. In the following section we will try to explain the role of copper in the Chilean economy, then we go on to explain the political economy and also the fiscal discipline which has been the centrepiece of Chile’s success.

1.4.3.1 Copper in Chile

After World War II, as with most of the world, the Chilean economy became more inward oriented and efforts toward liberalization failed. Government intervention reached its peak with the nationalization of most copper mines during the presidency of Salvador Allende, 1971-1973. Under his socialist reforms; prices, exchange rates and interest rates were controlled, barriers on trade and financial flows increased, most of the firms were nationalised and the budget deficit grew continuously (Fuentes et al., 2010).

In 1973, Pinochet took control during a military coup. This was followed by structural economic changes, whereby fiscal discipline was the centrepiece. Three factors contributed to the coup happening (Fuentes et al., 2010). The socialist government of 1971-1973 showed a weak performance and experienced some distortion (Edwards and Edwards, 2000). After the coup, an alternative economic plan, prepared by some liberal economists known as the Chicago Boys, was in place. The military power in charge of the coup enforced the recommended economic policies by these economists. The important elements of the reform are listed as follow (Fanelli, 2007):

- Secure property rights
- A subsidiary role for the government
- Orthodox management of monetary and exchange rate policies
- Fiscal consolidation
- A decrease in public discretion and enacting strong impersonal rules whenever possible
- Opening the economy to the world
• Poverty reduction as the main goal of social policies, using a means test and expenditure targeting

• Institutionalising policies in a way that would not be easy to abolish

One of the main barriers in the way of long-term investment for mineral resources in developing countries is the lack of property rights. Financial and trade openness was an important factor in attracting Foreign Direct Investment (FDI) and restricting interventionist public policies. However, there was no rule to secure the continuity of these policies. To ensure this, the political powers constitutionalised the cornerstones of the reforms. In 1980, a constitutional code to define the new political structure was passed during a referendum. The constitution, per se, was to guarantee the continuity of economic policies when the country returns to a democracy. To practice this, General Pinochet remained in power for another 8 years. After 1989 and when the country returned to democracy, the economic condition of the country was on track and the elected government saw no reason to change the system. Besides, the unsuccessful experience of neighbouring Argentina had showed that economic stability is a key factor behind political stability and hence democracy in the country.

This was a general overview of the Chilean political economy. In what follows we will discuss the flow of the resource revenues in the Chilean economy and the fiscal policies that managed these revenues.

1.4.3.2 Contracts

The first stage of any natural resource management programme is the exploration and extraction of resources. A huge amount of capital is needed for this stage and this has made Foreign Direct Investment (FDI) the only realistic way to finance it. Normally, there is always a trade-off between the fairness of the project contracts and the number and value of the contracts that are signed. One reason for this is also the unstable political environment of resource-rich economies. Investing in extraction projects requires a long-run investment and international companies need to account for the interruptions and risks due to political instability. The military coup established a new law, known as the ‘Decree law’, to enhance property rights for attracting FDI. This was followed by another code in the early 1980s, which brought about the FDI boom in the 1990s, during the first democratic government.
At the beginning of the 1990s, a new debate started in Chile, raising the issue that the benefits foreign investors get from contracts is much higher than what the state receives. Following this, the government enacted a law in 2002 to prevent any loopholes in the legislation to circumvent tax collection. Furthermore, in 2005 another law introduced a tax on mining activity, and came into play from the beginning of 2006. The law basically changed the tax base from profit to sales. This can have a negative effect on long-run investments. To mediate its impact on the flow of FDI, tax rates vary according to the level of sales. Meanwhile, investments greater than 50 million US dollars were protected from any variations in the law and they were guaranteed not to be affected by any taxes or any modification in their amounts.

There are still debates about the amount governments receive in revenue from the copper industry. There are two main streams of income from copper. One is the state owned company, CODELCO, and the other one is revenue from taxes on mining activities. Tilton (2010) concludes that the amount of copper in the world is abundant and there is no reason to think that it would become scarce at least in the near future. This means that the value added to the price of copper is related to the amount of capital and labour that are used to extract it. There are some rents still available for geologists to continue their exploration of new mines. If there are any further taxes required, governments should collect them through income tax. However, what seems important is the efficiency of the tax collection system. Because, in the first phases of exploration no income tax is deductible from the mines. Also incomes that are allocated to finance more projects are excluded from taxation. These policies have left rooms an loopholes for tax evasion and need to be addressed.

1.4.3.3 Fiscal discipline in Chile

After World War II and until 1970, all attempts to balance the fiscal budget of Chile failed. During this period, copper accounts for 75 per cent of total exports and 30 per cent of tax revenues. The socialist government of 1971-1973 increased its role in production and this resulted in a large budget deficit, which was financed by inflation tax. When the military coup took power the fiscal deficit was around 12 per cent (as a percentage of GDP), the financial sector was almost non-existent, there was hyperinflation and the State Owned Enterprises, SOEs, were making losses (Fuentes et al., 2010). In 1975, the government enacted the State Financial Administration Law and a new fiscal institutionalism was established. The law empowered the Ministry of Finance and its Budget Office, to
Frankel (2011) lists a set of rules that govern fiscal policy in Chile. The first rule is for government to set a budget target. Basically, the government had a plan to close the deficit and set it at zero. In the beginning, the target was a deficit of 1 per cent of GDP. There were three main reasons for the deficit. First, the government needed to recapitalise the Central Bank and bail out the private banking system. Second, it had to finance pension-related and other forms of liabilities. Third, the government had to service the external debt. The economy was on a new recovery path and hence the deficit target decreased to 0.5 per cent in 2007. In 2009 the government financed its total debt and the deficit target was set to zero.

The new socialist governments adhered to fiscal discipline more than before, as they knew that a stable, healthy economy is essential for democracy to become mature in Chile. According to a poll in 2008, Michele Bachelet had a weak record, especially in terms of economic performance (Fuentes et al., 2010). The reason for this was the boom in the price of copper and the rising resistance from the government to increase public spending. One year later and during the economic downturn they increased public spending from what they had saved during the boom and hence they moderated the downturn. In the same year they scored the highest popularity rating, from among all governments, since democracy had returned to Chile. The government had implemented a successful countercyclical fiscal policy. This successful record helped Michele Bachelet to be re-elected as president of Chile in 2014, retaking office from her predecessor in 2010.

A problem that makes reaching a balanced budget difficult is that the economy can be subjected to unexpected shocks. Therefore, what has been reasonable ex ante may not produce results any more. For this reason, Frankel (2011) explains that instead of a zero or surplus budget balance, the target should be a number set for structural budgets that allows for some cyclical flexibility. However, one problem with a structural budget balance is that politicians can blame sudden, low economic growth rates for the budget deficit. As there is no way of estimating an unbiased growth rate, they can easily justify their claim by saying that the deficit is not their responsibility. To control for this, the Chilean structural balance regime allows for a deficit only when output falls lower than its long-run trend. Also, when the price of copper falls below its medium term (10 years) equilibrium. Besides this, there are two panels of experts, with members from universities,
the mining sector, research centres and financial institutions. Their job is to control for the output gap and also to determine the medium term price of copper. Undoubtedly, managing precise fiscal policy is at the heart of Chile’s success and it can be used as a role model not only for countries rich in natural resources, but also for other developing and developed countries.

1.4.4 Conclusion

This chapter reviews some of the possible channels through which natural resources affect macroeconomic performance. This encompasses a range of economic and political issues such as Dutch disease, volatility, institutions, corruption, democracy and civil war. Also, we investigate the reasons behind the economic success of three resource-abundant countries, namely Norway, Botswana and Chile.

Returning to the questions that we propose at the beginning, it is now possible to say why countries, rich in natural resources fall behind their resource-poor counterparts. A resource bonanza changes the dynamic of an economy in a way that if not manage well, can turn the natural resource wealth into a curse. Resource abundance can reallocate factors of production in a way that results in deindustrialisation and real, exchange rate depreciation, in the long run. A resource bonanza in an economy reallocates the resources from the traded sector towards the non-traded sector. If the traded sector is the source of growth, through knowledge spillovers, this can curb economic growth.

Another problem is that natural resources can create volatilities in the economy. There are reasons for higher levels of volatility in resource-rich countries, compared to their resource-poor counterparts; firstly, fluctuations in the rate of extraction, secondly, volatility in the price of resources in world markets and finally, variations in the timing of payments by buyers and contractors. These fluctuations can easily translate into economies and vary government spending over time. Also, we have argued that although commodity prices do not follow a specific trend, they are highly volatile, especially in the case of oil. This is one of the side effects of natural resources, since higher levels of volatility can hamper economic growth. A resource bonanza also induces pro-cyclical fiscal policies. During booms, the income of these countries increases, this encourages governments to increase their spending overwhelmingly. During busts they have to decrease their spending, which is always slow and happens with delays. The final outcome
is large budget deficits in these countries.

More importantly, natural resource booms can realign governance and the structure of the political economy. The study shows that the quality of institutions plays a key role in the management of natural resources. A natural resource boom creates fertile land for corruption and rent-seeking activities. Countries with grabber-friendly institutions give rise to rent-seeking activities, whereas those with production-friendly institutions control the wealth and leave less room for corruption. Resource bonanzas also alter the direction of accountability between governments and people. In a resource-poor economy under the motto of ‘no taxation without representation’ governments are pressurised to account for any political or economic wrongdoing. However, having access to resource incomes makes governments independent from tax incomes in resource-rich countries. The crowding out of taxation and the tax system damages the mechanism for accountability and hence paves the way for corruption. More importantly, the absence of taxation destroys the bureaucratic capacity of government which is essential for the efficient administration of the economy. Also, this uneven distribution of resources can end in a power struggle and civil war, for resource-rich countries. This can also trigger separatist movements within diverse countries, especially when resources are located in areas where people have ethnic, religious and cultural differences with the rest of the population.

Looking into the experiences of successful countries in managing natural resources suggests some policy implications. High quality institutions and not industrialisation alone, was the reason that Norway managed its oil boom. In fact, being industrialised is not the main reason behind the success of a handful of developed countries in managing their resources. These countries in the first place industrialised because they had strong institutions. Also, after the boom, Norwegians invested heavily in order to be a leading player with oil extraction, around the world. This made the oil sector a source of knowledge, which spilled over to other sectors, in the form of human capital. They also created a code book, known as ‘The Ten Commandments’, which outlined policies that must be followed in the management of their oil. For a fair distribution between current generations, governments increase public spending, especially on education and health, rather than cut taxes. They have also created a Petroleum Fund to distribute this wealth across generations. The idea is that the return on the Fund is higher than leaving the oil under the ground. All these are supported by a political system which ensures broad, geographical and class inclusion within the parliament. Norway also has other non-governmental
institutions and labour unions that scrutinise all policies and leave no room for corruption.

Strong, democratic and pre-colonial institutions are the main reasons that make Botswana different from other African countries. The combination of these and the adoption of the right policies by responsible leaders have created a stable environment that is hard to find in other resource-rich developing countries. After independence, the well enforced property rights were in favour of cattle owners who were the strongest political elites in the country. Therefore, the political change did not create a class of disgruntled political losers. Also, the new institutions were designed in a way that made politicians accountable before the political elites. Having this stability, Botswana was completely prepared when income from diamond extraction started to flow in the 1970s. Besides, since independence, Botswana developed National Development Plans (NDPs), which outline policies for certain periods and governments have to follow them. These plans are updated based on the feedback from previous ones and also current economic conditions. Furthermore, Botswana is one of the few countries that has implemented the suggested policies by international institutions like the World Bank and the International Monetary Fund.

The experience of Chile suggests interesting implications. If Botswana and Norway had stable political economies, Chile like most developing, resource-rich countries experienced the resource curse. The main reason for the successful management of natural resources in Chile was the existence of an economic plan, following the military coup of 1973. More importantly the implementation of the was strongly supported by the military dictatorship. Following the coup, the government embarked on liberal economic policies. The government needed capital to finance the extraction, so they opened up the economy to attract FDI. To persuade investors, this was simply not enough, thus they enforced property rights. Most of the copper mines were privatised and fiscal consolidations were practised. When the country returned to a democracy, most of these policies were both constitutional and institutionalised. The economy was on track and, the incumbent governments saw no need to change it. They continued with new policies to attract more FDIs, and exercised fiscal discipline more seriously, which have continued up to now.

---

5One should also consider that the military coup abolished democracy, which many scholars see it essential for the development of the economy. However, as we explained earlier democracy per se does not necessarily result in economic development. This is because many other determinants of economic performance like strong property rights and rule of law can also exist in other political systems (Frankel, 2010, Barro, 1996, Khan, 2012). This partly explains the coexistence of successful economic performance and dictatorship in Chile during 1973-1989 period.
Usually, the governments specify a number for their budget deficit. In the beginning, it was 1% of GDP, then they decreased it to .05 in 2007 and finally to zero in 2009. The government now follows a structural budget regime, since economic shocks make it hard to follow a target. To control for any wrongdoing by governments, budget deficits are allowed, only when output falls below its long-run trend and the copper price is below its medium term (10 years) equilibrium. Panels of experts, with members from universities, the mining sector, research centres and financial institutions control for this information.

To sum up, unlike four decades ago we know a great deal about the dynamic of the resource curse. Studying the failure of the majority of resource-rich developing economies shows how natural resource bonanza can derail the whole process of economic and political development through different channels. Meanwhile there are a handful number of countries that have successfully avoided or reversed the curse. Resource-rich economies can exploit these positive and negative experiences to tailor right policies in their development plans.
Chapter 2

Rich in Resources, Poor at Taxation, Rich in Corruption: A Path to the Resource Curse

2.1 Introduction

The discovery and large-scale extraction of natural resources such as oil and gas is a milestone in the history of the 20th century. On the one hand it has provided an exceptional input for the acceleration of technological progress and economic growth around the world. On the other hand, due to their scarcity, resources have become a source of significant rents for countries that are endowed with them. In the beginning, this rent was expected to provide the means for a big push towards higher levels of development in resource-rich economies. However, it did not take long to realise that resource bonanzas would give birth to a range of new and challenging issues, which could undermine the whole process of development in most of these countries. Generally, experience with regards to the management of bonanzas is diverse. In countries like Norway, Australia and Canada that were already developed and had established institutions in place, resource revenues were exploited efficiently and this has accelerated the process of development for them. However, this was not the case for the majority of other endowed economies. Countries such as Iran, Iraq, Nigeria, Chile, Venezuela and Malaysia were underdeveloped at the time of the discovery.1 Most of these countries did not have strong economic

---

1It should be noted that developing countries themselves, have responded differently to resource abundance, however, there is a clear disparity between developed and developing countries.
Chapter 2. Rich in resource, poor at taxation, rich in Corruption

and political institutions at the time and the flow of resource revenues has complicated the development process of their institutions further.

The poor development performance of resource-rich developing countries is known as the resource curse (Auty, 2001). Corruption is widely seen as one of the main drivers of the curse (Sala-i Martin and Subramanian, 2012, Sandbu, 2006, Moss, 2010). The literature has already shown that natural resources are strongly associated with corruption and rent-seeking activities (Busse and Gröning, 2013). However, there is still a gap in how natural resources pave the way for corruption and rent-seeking activities. This chapter is an effort to fill this gap.

This chapter is an empirical attempt on analyse the role of taxation in the link between corruption control and natural resources. We start our analysis by studying the impact of natural resources on control of corruption in the absence of taxation in our model. Our results confirm the negative and significant impact of resource rents on corruption control. However, when we control for the impact of taxation in our model the effect of natural resources decreases and in some cases the coefficient on natural resource rents looses its significance. We also develop an extra regression to check whether there is an indirect impact of natural resources, through taxation, on control of corruption. The Fixed-Effect analysis does not show a clear link between natural resource rents and income from taxation. However, the Pooled OLS results show that natural resource rents crowd out income from tax revenues. From these two independent regressions, one can say that natural resource rents indirectly and through crowding out tax revenues undermine the control of corruption. One major issue with this analysis is the two-way causal relationship between taxation and corruption. We control for this through a 3SLS dynamic system.2

The 3SLS analysis strongly supports the positive impact of taxation on control of corruption. We also observe a decrease in the direct and negative impact of natural resources on control of corruption, once we control for the impact of tax revenues. In fact, in some of our robust analyses the direct and negative impact of natural resources on corruption control loses its significance and in a number of regressions it becomes positive

2It should be mentioned that in our analysis the existence of ‘corruption’ and lack of ‘corruption control’, are used interchangeably. Although, these two concepts might be different conceptually, this study does not delve into this difference and they are treated identically.
and significant. However, the dynamic analysis shows that natural resources indirectly and through crowding out of taxation can decrease corruption control.

The chapter is an empirical contribution to how natural resource rents and corruption might be related. Like many earlier studies our analysis disputes the idea that natural resources per se are bad for the development of the economy. In particular, we shed light on the negative link between natural resources and control of corruption, which has been raised in the literature. Our analysis shows that affecting taxation is a strong channel through which natural resource abundance can influence corruption control. Therefore, one implication of this chapter is for developing countries in general, especially resource-rich developing ones\textsuperscript{3}, to invest in building their tax systems and improving their tax capacities. Due to its positive impact on the capacities of the state and how state and society interact, taxation plays a crucial role by increasing the quality of governance and control of corruption. Our finding is in line with the growing literature on the importance of taxation for sustainable political and economic development.

The chapter continues as follows. Section 2 provides a background along with the relevant literature review on the issues of the resource curse, corruption, taxation and their interrelationship. Section 3 explains the data set and the variables in the model. In section 4 we present the econometric methodology. Section 5 outlines our findings and draws out the analyses. In section 6, we check the robustness of our results using other data sets and by operating under different scenarios. Section 6 offers some concluding remarks.

\subsection{2.2 Background}

This study is essentially related and contributes to three different issues: resource curse, corruption and the importance of taxation for development. In this section, we review the literature for each of these topics. This sets the ground for our main research question: the role of taxation in the relationship between natural resources and corruption.

\textsuperscript{3}An advantage of resource-rich developing countries is that unlike their resource-poor counterparts they have the possibility to exploit their resource rents towards this aim.
Chapter 2. Rich in resource, poor at taxation, rich in Corruption

2.2.1 Resource curse

Generally, the adverse impact of natural resource abundance on development is known as the resource curse. There is a wealth of literature on how this paradox of plenty might happen i.e. a resources bonanza that is expected to improve the performance of the economy might actually impede it.\footnote{Van der Ploeg (2011) and Frankel (2010) offer a broad review of the literature on how the resource curse might follow a resource bonanza.} There are economic and political-economic reasons for this. Natural resources can damage the ability of the economy to export non-resource traded goods through exchange rate appreciation – known as the Dutch disease. Natural resources are also known for their price volatilities. These volatilities can easily translate into the economy and damage its growth (Van der Ploeg and Poelhekke, 2009, Blattman et al., 2007). Volatilities and Dutch disease are known as the economic causes of the curse. In recent years, however, there has been a shift from economic to political and political-economic causes to explain the resource curse (Sala-i Martin and Subramanian, 2012, Sandbu, 2006, Moss, 2010). This strand of literature argues that the economic effects are exaggerated and issues of corruption and misgovernance inside public institutions are the driving forces behind the curse.\footnote{Some studies like Ross (2012) and Collier and Hoeffler (2005) relate natural resources with political instability and civil war. However, one should not underestimate misgovernance and corruption in igniting political unrest in resource-rich economies.}

2.2.2 Corruption, resource abundance and taxation

Corruption, as defined by Tanzi (1998), is the abuse of public office for private gain. At the beginning, scholars had a vague understanding of the impact of corruption on the economy. Many researchers saw corruption as a way to speed up the economy, which they discuss to be held back by the cumbersome nature of modern bureaucracy (Leff, 1964, Huntington, 1968, Lui, 1985). This positive stance towards corruption was soon challenged by a series of new research. Now, there is a rich body of literature on how corruption can derail the whole process of social, political and economic development (Gupta and Abed, 2002, Blackburn et al., 2011, Rose-Ackerman, 1978). In line with this, many organisations such as Transparency International, the International Monetary Fund and the World Bank have made fighting corruption the forefront of their programmes.

Corruption tends to be higher in resource-rich developing economies. Many argue...
that natural resource rents have paved the way for corruption and rent-seeking activities inside the public sector in these economies. Scholars in recent years have studied the existence of a relationship between natural resources and corruption. While most of the studies show that resource abundance increases the prevalence of corruption, shown by the negative relationship between natural resource rents and control of corruption in Figure 2.1. Some dispute the existence of a clear relationship between natural resources and corruption. In a panel study and by using different estimations, Aslaksen (2007) shows that oil and minerals are associated with higher levels of corruption. Also, Busse and Gröning (2013) show that the export of natural resources increases corruption robustly, while it has a variant impact on other indicators of governance. Among others, in a case study on Sao Tome and Principe, Vicente (2010) confirms that oil revenues have given way to corruption inside public services. On the other hand, Alexeev and Conrad (2009) question the negative impact of natural resources on corruption control and other governance indicators. This ambiguity in the relationship is due to different channels that natural resources relate to corruption. This situation has also made tailoring the right policy to deal with corruption, very difficult. Therefore, different channels that relate natural resources to corruption should be identified and studied independently. This study is a contribution to this argument. In our analysis we discuss the impact of taxation on corruption. Furthermore, we relate natural resources to issues of taxation and analyse

![Figure 2.1: Natural resource rents and control of corruption](image)

**Note:** The figure is based on the simple mean of the variables for their covered periods, detailed in the data section. List of countries, 86, is provided in the first column of Table (B.1) in Appendix B.
Chapter 2. Rich in resource, poor at taxation, rich in Corruption

Figure 2.2: Natural resource rents and tax revenues

Note: The figure is based on the simple mean of the variables for their covered periods, detailed in the data section. List of countries, 86, is provided in the first column of Table (B.1) in Appendix B.

the implication of this relationship for corruption. Put together, we study the role of taxation in the relationship between natural resources and corruption.

Many studies show that natural resource rents have crowded out incomes from taxation (Thomas and Trevino, 2013, Ossowski and Gonzáles-Castillo, 2012, Crivelli and Gupta, 2014). In Figure 2.2, this has been depicted as the negative relationship between natural resource rents and tax revenues. The decrease in tax incomes has been either a policy choice of governments or the natural outcome of a resource bonanza in resource-rich economies. In the 1970s, the prices of most natural resources, especially oil, rocketed. This provided governments with an alternative source of income, instead of taxation, in a number of countries. As a direct result of this and also as a specific policy to promote private sector activity and growth, most of these countries lowered their tax rates (Cottareli, 2012).

Also in terms of administration, there was an economic justification for valuing resource rents over tax revenues. Designing and administrating tax systems is a very difficult and costly task for governments, whereas obtaining resource rents is simple and involves almost no cost. This also discouraged most resource-rich economies from building and developing their tax systems. This absence or lack of taxation over past decades has detached state and society in most resource-dependant countries. Many scholars argue
that this detachment is the source of misgovernance and corruption inside public institutions in these economies (Moss, 2010, Sandbu, 2006, Knack, 2009).

Now the question is ‘How could taxation play such a key role in controlling corruption and tackling misgovernance?’ In what follows we answer this question and explain why taxation should be at the heart of any development programme, not only in resource-dependent economies but also in resource-poor developing ones.

2.2.3 Taxation and development

The literature on corruption and taxation, as it stands, has generally focused on the causality from corruption to taxation. This is the case in both theoretical and empirical studies. In theoretical models corruption happens due to a collusion between public bureaucrats, responsible for tax collection, and citizens (Blackburn et al., 2006, 2010). In return for bribes, bureaucrats agree to under-report or misreport the tax liabilities of citizens. The outcome of this is a decrease in the total tax revenues that governments expect to collect. Also, empirical studies covering different regions and groups of countries, supports the negative impact of corruption on incomes from tax revenues (Ghura, 1998, Ajaz and Ahmad, 2010, Imam and Jacobs, 2014, Crivelli and Gupta, 2014).

However, there are strong arguments to suggest that the relationship between taxation and corruption can also go the other way around. In other words, taxation can influence corruption as well. Taxation can have a wide impact on the development of the economy, state and society and the way that these three can interact (Moore et al., 2007, Brautigam et al., 2008, OECD, 2013). Meanwhile, there are strong arguments supporting the idea that economic (Blackburn et al., 2006, Khan, 2012) and political development (Fukuyama, 2014) contributes to the control of corruption. Putting these arguments together means that taxation can be conducive to the control of corruption, the positive link between tax revenues and control of corruption has been depicted in Figure 2.3. In what follows, we will briefly outline channels through which taxation might affect the whole process of political, social and economic development. Also, how each of these could lead to the control of corruption.
2.2.3.1 Taxation, state capacity and the economy

Prior to the abundance of resource rents, scholars and policy makers were not very aware of the impact that taxation could have on the behaviour of government and the development of the economy (Moore et al., 2007). In economics textbooks the relationship between government and taxation is summarised as $G = T$. The technical implication of the equation is that government expenditure is equal to taxes. However, the technical implication is an abstract concept and the social and political implications of it are much deeper. This became noticeable when in the 1970s the source of income for a group of resource-rich economies shifted from taxation to natural resources. In other words, the equation changed to $G = R$, $R$ standing for resource rents. Although the size of resource revenues in many resource-rich countries has been beyond their previous tax revenues, their economic performance has been quite poor. Over time scholars have noticed that taxation is more than just a source of revenue. The process of taxation improves the administrative, fiscal and institutional capacities of government (Jensen, 2011). In fact, taxation was one of the main reasons behind the efficient bureaucracy that developed in Europe (Brautigam et al., 2008). Financing expensive wars urged countries to raise higher taxes and modernise their revenue mobilisation systems in order to administer the process. On the other hand, collecting resource revenues involves almost no effort and hence blocks the development of such bureaucracies. In other words, there is no natural force pushing governments to increase their administrative and state capacity. This did not go completely unseen by scholars from resource-rich developing countries. In one of the first studies on Iran Mahdavy (1970) highlights that reliance on natural resources and not taxes can have a detrimental impact on the bureaucratic and organisational development of the country.

Building a tax system, designing and collecting taxes are practical steps for governments to improve their administrative and bureaucratic capacities in resource-dependent countries. This characteristic can then diffuse into other public institutions. Taxation is also a source of information for government to understand the strengths and weaknesses of the economy. Reasons for investing in a tax system are beyond just improving state

---

6It should be added that modern Europe was able to sustain taxation beyond the war period and develop it to an advanced level. This was mainly due to economic development and the rise of the middle class in the 20th century. Thus, the increase in the middle class demand for the public services, and meanwhile their readiness to pay for these services, were the reasons for the sustainable development of taxation and tax systems in Europe.
capacity. Resources are finite and their prices are extremely volatile. In other words, relying on resource revenues is not fiscally sustainable in the long run for these economies. Hence, investing in tax systems and revenue mobilisation are necessities and not policy choices for resource-dependent economies.

Taxation can also reverse some of the adverse economic outcomes of a resource bonanza. As we explained earlier, an intrinsic feature of resource revenues is their price volatility. These volatilities create fluctuation in the stream of incomes and are a source of pro-cyclical fiscal policies\(^7\). During booms, governments increase their public spending, whereas they have to decrease it during bust periods. Due to political pressure, politicians do not dare to decrease unproductive spending. Instead, public infrastructure spending programmes that are crucial for growth are the first victims of these boom-bust cycles. In a study Bhattacharyya and Collier (2013) show that natural resource rents are associated with a decrease in the stock of public capital. Undoubtedly, corruption (Robinson and Torvik, 2005) and inefficiencies (Dabla-Norris et al., 2012) in public investment explains part of this issue. However, one should not underestimate the impact of pro-cyclical fiscal

\(^7\)Some countries such as Chile (Frankel, 2011) and Norway have been successful in smoothing the fluctuation by running counter-cyclical fiscal policies. However, such policies are politically difficult to run, not just in resource-rich economies but even in advanced economies.
policies in holding back public projects and hence decreasing the stock of capital. Having taxation in place protects the economy to a large degree from these fluctuations and provides a stable source of income for public spending. Furthermore, when a government relies on taxes, it has the incentive to support and create new businesses in order to generate more tax revenues. In this respect, taxation stimulates policies for diversifying the economy and hence is a force in the fight against the so-called Dutch disease.

2.2.3.2 Taxation as a social contract between citizens and government

The reliance of government on resource revenues instead of taxes also changes how state and society interact (Sala-i Martin and Subramanian, 2012, Sandbu, 2006, Moss, 2010). This has crucial implications for issues of governance and corruption in resource-rich developing countries. Taxation normally constitutes a social contract between citizens and government: citizens pay taxes as a duty and in return they are entitled to oversee how these monies are spent. On the other hand, government is entitled to the right to tax in return for being held accountable for how it spends the tax revenues. In this setting, if the government reneges on the contract the citizens will not continue to pay their taxes and that is the mechanism that enforces the social contract. Resource rents put a bold question to the validity or even existence of this contract. On the one hand, government owns the resource revenues, which means government does not see itself obliged to be accountable for how it manages its fiscal income. Even if in theory there is the idea that natural resources are a national wealth and government has the duty to be responsive to its citizens for how it is allocated, in practice government owns the resource revenues and hence there is no mechanism to enforce this contract. On the other hand, these citizens do not pay taxes and hence they do not see themselves entitled to the right to hold government accountable for any wrong doing inside the public sector. Even if in theory, government revenue is a form of national wealth, in practice citizens do not pay towards it directly and hence they see it as other people’s money. The fall of the social contract detaches state and society to a large degree and therefore gives rise to corruption and rent-seeking activities inside the public sector. This chapter can also be seen as an empirical test for the validity of this argument.

---

8These scholars support the direct distribution of natural resources to citizens as a sustainable solution to issues of corruption in resource-rich developing economies. This is the subject of the Chapter 3 in the thesis.

9Reasons for justifying the existence of a state and how, in the first place, government and citizens started such a contract can be found in Hobbes (1900), Locke and Laslett (1988) or Rousseau et al. (2002).
In what follows, we put data from different sources together to study the role of taxation in the relationship between natural resources and corruption. We first start our analysis by running independent regressions for corruption and taxation using Pooled OLS and Fixed-Effect estimations. However, as we discussed there is a two-way causal relationship between taxation and corruption. To control for this, we estimate our regressions in a system of equations using 3SLS estimations. The econometric setting allows us to test some of the claims that are raised in the foregoing analysis. First, we review the impact of natural resources on corruption, which has been studied in the literature. Then, we test the robustness of the results to the presence of taxation as an explanatory variable in the corruption equation. We also discussed that natural resources is claimed to crowd out government incomes from tax revenues. Setting up a regression for taxation we also study the impact of natural resource rents on taxation. Following on from this discussion, the 3SLS estimation also makes it possible to check whether natural resources indirectly, and through their impact on tax revenues, can influence corruption.

2.3 Sample and data

In this section we provide details of our sample and different measures of our variables and their source.

2.3.1 Sample

The study investigates the role of taxation in the relationship between natural resources and corruption. The panel data for this study is unbalanced and it includes 73 developing countries for the 1996-2014 period.\textsuperscript{10} Our choice of the period is restricted by the availability of the data. Our dataset brings in data from a variety of different sources including; the World Bank, the IMF, the World Governance Indicator, Transparency International and Freedom House. In the following section we explain each variable in the study, in detail. A descriptive study of the variable is also provided in Table (2.1).

\textsuperscript{10}It should be mentioned that for different measures of corruption both the number of countries and period changes. Detailed information about countries included in the analysis is provide in the Appendix B.1.
2.3.2 Independent variables

- Corruption control

In the foregoing analysis we explained the importance of corruption control for economic development. Also, we explained how corruption is related to taxation and natural resource rents. Our data on corruption are from multiple sources. For our benchmark analysis we use Corruption Perception Index (CPI) from Transparency International, which has been used extensively in the literature. The data covers period 1995-2014 and we have standardised the scores between 0 (highly corrupt) to 10 (least corrupt). However, since we are using just the developing countries in our sample, the corruption score is in the range of 0 to 6 only. The World Governance Indicator (WGI) also provides data on different aspects of governance. The data covers the 1996-2014 period and includes indices on voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law and control of corruption. The WGI data on corruption varies in the range $[-2.5, 2.5]$. Similar to the CPI index, the score varies in the ascending manner and from very corrupt, $-2.5$ to least corrupt, 2.5. We also use the International Country Risk Guide (ICRG) measure of corruption. Our data from ICRG covers the 1990-2013 period. The corruption score ranges from 0 to 6 where a higher score means less corruption.

- Tax revenues

The role of taxation and its relation with development and resource abundance is outlined in the previous section. In this study, taxation is measured as the total tax revenues as a percentage of GDP. The source of our tax data is a dataset on government revenue which has been put together by the International Centre for Taxation and Development in Sussex University (Prichard et al., 2014). The key characteristic of the data is the distinction that it makes between resource and non-resource taxes. This is of great importance for this study as we want to make sure that the tax data is not contaminated by the resource revenues.

---

11 For a small number of countries the data for the year 1990 has also been included.
12 One issue in the literature of corruption is that within country variation is captured quite weakly (Treisman, 2000, Bhattacharyya and Hodler, 2010). That is most of the analysis is driven by cross country variations in the score of corruption. Since 2012 Transparency international has modified its methodology to capture this changes over time within countries. However, it is a bit early to observe this within-country changes in the data yet and as we discuss in the following pages the analysis are mainly driven by cross country variations.
• Other variables

Apart from corruption we also check the impact of taxation on other governance indicators. They include, voice and accountability, regulatory quality, rule of law and government effectiveness. The source of data for these variables is the World Governance Indicator (WGI), and the World Bank. WGI defines each of these variables as follows. Voice and accountability captures perceptions of the extent to which a country’s citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Regulatory quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressure, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies.’

2.3.3 Control variables

• Resource rents

As we discussed, natural resource rents have been related to corruption in the literature (Busse and Gröning, 2013, Aslaksen, 2007). This study analyses the role of taxation in this relationship. Resource rents are measured as a percentage of total natural resource revenues to GDP. Data on these total natural resources is from the World Bank, which include oil rents, coal rents, natural gas rents, mineral rents, and forest rents.

• Population

Population is the total number of residents of a country regardless of their legal status or citizenship. The data is from the World Bank which uses a midyear estimate from different sources. In this study, we use a logarithm of the population to control for the size of countries, which is believed to influence the prevalence of corruption. The literature on the exact impact of country size on corruption is not clear (Knack and Azfar, 2003, Busse and Gröning, 2013). On the one hand, larger countries
have lower numbers of public officials per capita (Fisman and Gatti, 2002). This means that there are long queues for public services and hence citizens are more tempted to pay bribes to jump the queue. On the other hand, a larger country can benefit from economies of scale in setting up its political and administrative structures which are critical for controlling corruption (Srinivasan, 1986). Nonetheless, the economies of scale create huge rents that governments can use for corruption purposes to maintain power. Also, In a study Rock and Bonnett (2004) discuss that detrimental impact of corruption in small developing countries is much higher, compared to its impact in larger developing economies. On this basis, they suggest that international organisations should take the fight against corruption in small developing economies more seriously.

• **Ln GDP per capita**

A recent strand of studies discusses the point that corruption is an intrinsic feature of underdevelopment and as a country’s level of development increases, corruption declines. One might discuss that corruption is also high in developed countries such as Italy and Spain (Treisman, 2000). Yet, it is much higher in underdeveloped countries. One of the issues in the study of corruption and development is the direction of dependence between these variables. Blackburn et al. (2006) in a theoretical model, show that there is a two-way relationship between development and corruption. However, Khan (2012) discusses that the direction of dependence from economic development to control of corruption, and other governance indicators, is much stronger. Economic development is also expected to be positively related to share of the tax revenues in GDP (Besley and Persson, 2014). This relationship is clear while comparing developed and developing economies. However, this might get weakened in a sample of developing economies, especially if some are endowed with other sources of revenue such as resource rents.

• **Press freedom**

The idea behind the freedom of the press is that it can increase the probability of detection of corrupt bureaucrats and through that, it decreases opportunities for corruption. The academic analysis of the exact impact of press freedom on corruption is mixed. Some studies stress the positive role of media and press freedom in controlling corruption (Stapenhurst, 2000, Freille et al., 2007), while others question its impact (Graber, 1986, Pharr and Putnam, 2000). The data on press freedom is from Freedom House. It measures media independence and the freedom of print,
broadcast or digital media around the world.

- **Democracy**

  Political development, which involves democracy is essential for economic development. Partly, this is due to the impact that democracy has on control of corruption (Drury et al., 2006, Rose-Ackerman, 1978) and other indicators of governance. Unlike dictatorship, a democratic system enjoys multi-party competition. This creates a self-correcting mechanism where a corrupt government is voted out from office. For this reason, many scholars relate democratic systems with lower levels of corruption (Rose-Ackerman, 1978). It should be mentioned that the positive impact of democracy on corruption is not linear across economies. In fact, weak democracies have wage levels lower than in many dictatorships in control of corruption (Montinola and Jackman, 2002). This is more clear in cases where dictatorships enjoy a strong state compared to weak democracies (Fukuyama, 2014).

In our analysis, democracy is the simple average of political rights and civil liberties, taken from Freedom House. The scores range from 1, for dictatorship, to 7, for strong democracies. Political rights include free elections, active opposition parties and minorities’ participation in power, while civil rights contain the rule of law, free economic activity and freedom of speech and expression.

- **Agricultural value added**

  Data on agricultural value added as a percentage of GDP is from the World Bank. It includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. The agricultural sector is known as the hard-to-tax sector in the literature (Bird, 1983). This is because agriculture is usually scattered geographically and in many developing countries, is prevalent among small-scale farmers. This makes it difficult for governments to design and administer an agricultural tax. Therefore, the agricultural value added, is expected to be negatively associated with total tax revenues.

- **Inflation**

  Inflation is the annual rate of price change in the whole economy. We use the GDP deflator measure of inflation from the World Bank, which is the ratio of GDP in current local currency over GDP in constant local currency. Inflation is usually regarded as a type of tax and is expected to be related to income from other types
of tax revenues (Crivelli and Gupta, 2014, Pessino and Fenochietto, 2010). For this reason we include it as an explanatory variable in the taxation equation.

- **Trade openness**
  The source of the data trade openness is The World Bank. We measure trade openness as the sum of non-resource exports plus imports, as a percentage of GDP. Trade openness can increase or decrease total tax revenues (Baunsgaard and Keen, 2010). On the one hand, economic openness can increase income from trade tax and hence total tax revenues. However, trade openness can be the result of trade liberalisation, which decreases total tax revenues through reducing tariffs and taxes on trade (Rodrik, 1996).

- **Debt**
  Here, stands for external debt stocks, public and publicly guaranteed, as a percentage of GDP.\(^\text{13}\) The source of the data is the World Bank and it ‘comprises long-term external obligations of public debtors, including the national government, political subdivisions (or an agency of either), and autonomous public bodies, and external obligations of private debtors that are guaranteed for repayment by a public entity’. An increase in public debt might put pressure on governments to finance it by increasing tax revenues (Crivelli and Gupta, 2014).

- **Aid**
  The aid per capita is from the World Bank, which is defined as follows. ‘Net official development assistance (ODA) per capita consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients; and is calculated by dividing net ODA received by the midyear population estimate. It includes loans with a grant element of at least 25 per cent (calculated at a rate of discount of 10 per cent).’ Foreign aid, through its adverse impact on the quality of governance and institutions, can deteriorate the quality of tax administration and revenue mobilisation in a country (Bräutigam and Knack, 2004). However, foreign aid can be specifically earmarked by donors for improving the quality of tax administration and revenue mobilisation in which case they can have a positive impact.

\(^{13}\)The data is in current US dollars which has been divided by the current GDP to calculate the value.
on tax revenues. This is because recipients of foreign aid do not have full autonomy over how the aid should be allocated and in many cases they need to follow the guideline of the donors (Collier, 2006). Previous studies on tax revenues have found both negative (Benedek et al., 2014) and in some cases positive impact on tax revenues (Baunsgaard and Keen, 2010).

• Legal system

Some studies have raised the issue that common law is more successful than other types of legal systems such as civil or other legal systems in control of corruption (Treisman, 2000). The idea is that common law developed in England and was mainly to protect parliament and the property rights of citizens from government. However, civil law was developed in continental Europe as part of the general state-building process and was mainly to protect the apparatus of the state. It is expected that the former system, where its base is the protection of citizens is more successful in holding government accountable and for controlling corruption. In this study, we create a dummy variable to control for the impact of the legal system on corruption control. The Central Intelligence Agency’s fact book library categorises the legal system of countries under common law, civil law and a mixture of civil and common laws. We exploit this categorisation to generate dummy variables for common law and civil law, we use the mixed law as a base in our regression.

• Fractionalisation

Many studies have discussed that ethnic or religious fractionalisation can be the source of internal political instability, especially in resource-rich economies (Hodler, 2006, Ross, 2012). Political instability, in turn, gives ways for corruption to flourish. Internal political instability can also damage revenue mobilisation by weakening the state capacity and its relationship with its citizens. For this reason, we control for the effect of fractionalisation both on taxation and control of corruption. The data has been provided by the UCLA Anderson School of Management (UCLAAnderson School of Management, 2016). We take the simple average of ethnicity, religion and language as a proxy for fractionalisation. The variable therefore, can also be seen as a control for social and cultural factors.

• Past Wars

One important political and historical factor in the development of modern tax systems and fiscal capacities of states is war (Tilly, 2012, Hintze, 1906). To finance
Chapter 2. Rich in resource, poor at taxation, rich in Corruption

their wars countries needed to develop their bureaucratic and organisational capacity to design, implement and collect taxes. To control for this, we use a number of interstate wars that countries have been involved in since 1840. The source of the data is the Correlate of War (COW) project.

Table 2.1: Summary statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min.</th>
<th>Max.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corruption control (ICRG)</td>
<td>2.339</td>
<td>0.88</td>
<td>0</td>
<td>5</td>
<td>1424</td>
</tr>
<tr>
<td>Corruption control (CPI)</td>
<td>3.055</td>
<td>0.984</td>
<td>0</td>
<td>6.5</td>
<td>1246</td>
</tr>
<tr>
<td>Corruption control(WGI)</td>
<td>-0.534</td>
<td>0.517</td>
<td>-1.82</td>
<td>1.27</td>
<td>1430</td>
</tr>
<tr>
<td>Resource rents (% of GDP)</td>
<td>10.075</td>
<td>13.273</td>
<td>0</td>
<td>89.22</td>
<td>2125</td>
</tr>
<tr>
<td>Democracy</td>
<td>3.877</td>
<td>1.591</td>
<td>1</td>
<td>7</td>
<td>2186</td>
</tr>
<tr>
<td>Press freedom</td>
<td>44.848</td>
<td>18.926</td>
<td>4</td>
<td>100</td>
<td>1938</td>
</tr>
<tr>
<td>Debt (% of GDP)</td>
<td>49.011</td>
<td>63.789</td>
<td>0.103</td>
<td>862.33</td>
<td>2170</td>
</tr>
<tr>
<td>Agriculture (% of GDP)</td>
<td>21.172</td>
<td>12.76</td>
<td>2.032</td>
<td>65.973</td>
<td>2063</td>
</tr>
<tr>
<td>Fractionalisation</td>
<td>0.476</td>
<td>0.193</td>
<td>0.008</td>
<td>0.84</td>
<td>2150</td>
</tr>
<tr>
<td>Number of past wars</td>
<td>1.18</td>
<td>2.232</td>
<td>0</td>
<td>12</td>
<td>2225</td>
</tr>
<tr>
<td>Net openness</td>
<td>55.017</td>
<td>30.779</td>
<td>8.228</td>
<td>180.949</td>
<td>1482</td>
</tr>
<tr>
<td>Overseas development aids(per capita)</td>
<td>59.732</td>
<td>82.78</td>
<td>-39.265</td>
<td>898.440</td>
<td>2160</td>
</tr>
<tr>
<td>Tax (% of GDP)</td>
<td>14.581</td>
<td>6.814</td>
<td>0.55</td>
<td>62.829</td>
<td>1866</td>
</tr>
<tr>
<td>Total Revenue (% of GDP)</td>
<td>19.503</td>
<td>8.512</td>
<td>0.579</td>
<td>68.248</td>
<td>1881</td>
</tr>
<tr>
<td>Tax (% of total revenue)</td>
<td>76.791</td>
<td>17.852</td>
<td>9.195</td>
<td>100</td>
<td>1820</td>
</tr>
<tr>
<td>ln GDP per capita</td>
<td>7.055</td>
<td>3.913</td>
<td>9.090</td>
<td>2177</td>
<td></td>
</tr>
<tr>
<td>Ln population</td>
<td>15.88</td>
<td>1.933</td>
<td>11.151</td>
<td>21.034</td>
<td>2250</td>
</tr>
<tr>
<td>Inflation</td>
<td>60.819</td>
<td>478.527</td>
<td>-27.049</td>
<td>15444.384</td>
<td>2180</td>
</tr>
<tr>
<td>Common law</td>
<td>0.112</td>
<td>0.316</td>
<td>0</td>
<td>1</td>
<td>2225</td>
</tr>
<tr>
<td>Civil law</td>
<td>0.472</td>
<td>0.499</td>
<td>0</td>
<td>1</td>
<td>2225</td>
</tr>
<tr>
<td>Voice and accountability</td>
<td>-0.46</td>
<td>0.714</td>
<td>-2.22</td>
<td>1.11</td>
<td>1438</td>
</tr>
<tr>
<td>Rule of law</td>
<td>-0.555</td>
<td>0.58</td>
<td>-2.23</td>
<td>1.083</td>
<td>1432</td>
</tr>
<tr>
<td>Government effectiveness</td>
<td>-0.479</td>
<td>0.566</td>
<td>-2.031</td>
<td>1.247</td>
<td>1425</td>
</tr>
<tr>
<td>Regulation quality</td>
<td>-0.445</td>
<td>0.623</td>
<td>-2.26</td>
<td>1</td>
<td>1424</td>
</tr>
</tbody>
</table>

• Other variables

In our corruption equation we also control for regional effect. To define different regions we follow the World Bank categorisation. Also, in some our regression we control for year fixed effects.

2.4 Estimation methodology

As we discussed, this chapter studies the role of taxation in the relationship between natural resources and corruption. In other words, we check whether natural resources through crowding out taxation, undermines control of corruption or not. We do this by
employing an empirical specification that estimates two equations, one for corruption control and one for taxation. We first estimate these equations in reduced form and independent of each other using Pooled OLS and Fixed Effect. However, as we explained earlier there is a two-way causal and simultaneous relationship between taxation and corruption. Therefore, a more reliable case would be to determine the indirect impact of natural resources on corruption in a system. Moreover, natural resources also have a simultaneous impact on these two variables. This means that the impact of these variables are jointly determined in an equilibrium mechanism (Green, 2007, Wooldridge, 2015). Due to the cross correlations between the two equations we use 3SLS for our analysis. This method essentially combines 2SLS with Seemingly Unrelated Regressions (SUR) models (Green, 2007). One way to deal with the simultaneous equation model is through the instrumental variable mechanism. In this study for example, Equation (2.2) can be seen as an instrument for the endogenous variable in the Equation (2.1), i.e. taxation. In this regard, the estimation is similar to 2SLS, with a difference being that we have corruption in our second regression as well. Furthermore, since the two equations share some explanatory variables, the error terms are also likely to be cross-correlated with each other. The SUR elements of 3SLS models control for these cross-correlations between equations.

Wooldridge (2015) emphasises that in simultaneous equations models each equation should have a ceteris paribus interpretation. This is the case in this study as taxation and corruption have been studied separately in the literature. In line with the literature on taxation (Crivelli and Gupta, 2014, Besley and Persson, 2014) and corruption (Treisman, 2000, Busse and Gröning, 2013) we set up our regressions as

\[
\text{cor}_{it} = \alpha_0 + \alpha_1 \text{tax}_{it} + \alpha_2 \text{nat}_{it} + \sum_{k=1}^{m} \theta_k X_{k,it} + \epsilon_{it}, \tag{2.1}
\]

\[
\text{tax}_{it} = \beta_0 + \beta_1 \text{cor}_{it} + \beta_2 \text{nat}_{it} + \sum_{l=1}^{n} \lambda_l Z_{l,it} + \nu_{it}, \tag{2.2}
\]

where the indexes \(i\) and \(t\) refer to country and time, respectively; \(\text{cor}_{it}\) denotes corruption; \(\text{tax}_{it}\) represents tax revenues as a percentage of GDP; \(\text{nat}_{it}\) is total natural resources as a percentage of GDP. Variables \(\{X_{k,it}\}_{k=1}^{m}\) and \(\{Z_{k,it}\}_{k=1}^{n}\) include all the common variables that are used in the literature on corruption (Busse and Gröning, 2013, Treisman, 2000) and taxation (Crivelli and Gupta, 2014), respectively. \(\epsilon_{it}\) and \(\nu_{it}\) are the error terms.

In Equation (2.1) control variables for corruption, \(\{X_{k,it}\}_{k=1}^{m}\), include democracy,
press freedom, development level, population size, ethnic and religious fractionalisation, legal systems and regional dummies. In Equation (2.2) control variables for taxation, \( \{Z_{k, it}\}_{k=1}^{m} \), include GDP per capita as a proxy for the development level, share of agriculture in the economy, foreign aid, trade openness, public debt, inflation, historical, cultural and political factors such as war and fractionalisation.

In this study the coefficients of interest are \( \alpha_1, \alpha_2, \beta_1 \) and \( \beta_2 \) as they determine how corruption, natural resources and taxation interact with each other. From our earlier analysis we test the following hypotheses:

- Taxation has a positive impact on control of corruption.
- Natural resource rents crowd out taxation.
- Natural resources directly undermines control of corruption.
- Natural resources indirectly and through taxation undermine corruption control.
- Corruption control positively affects taxation.

### 2.5 Results

We start our analysis by estimating Equations (2.1) and (2.2) separately using Pooled OLS and Fixed Effect. We then estimate the equations in a single system using 3SLS. As we explained, we want to investigate the role that taxation plays in the relation between natural resources and corruption. The findings are presented in Tables (2.2) and (2.3).

In Table (2.3) we estimate Equations (2.1) and (2.2) using Pooled OLS and Fixed-Effect estimator. As a benchmark, we estimate the impact of natural resources on corruption in the absence of tax revenues in our model. The results are presented in Columns (1) and (4). In line with the bulk of the literature (Busse and Gröning, 2013, Aslaksen, 2007), our results support the negative impact of natural resources on control of corruption, although only the OLS estimates are significant. The Pooled OLS coefficient, in Column (1), is \(-0.012\) and is significant at 1% level. This means that for each additional percentage point of GDP in natural resources, there is a reduction in the corruption control score of 0.12 percentage points. The Fixed-Effect results, in Column (4), is also negative (\(-0.006\)
Table 2.2: Independent regressions on taxation and corruption, using CPI measure of corruption

<table>
<thead>
<tr>
<th>Variables</th>
<th>OLS</th>
<th></th>
<th></th>
<th>FE</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corruption control (1)</td>
<td>Corruption control (2)</td>
<td>Tax revenue (3)</td>
<td>Corruption control (4)</td>
<td>Corruption control (5)</td>
<td>Tax revenue (6)</td>
<td>Corruption control (7)</td>
</tr>
<tr>
<td>Resource rents</td>
<td>-.012 (.002)***</td>
<td>-.009 (.002)***</td>
<td>-.090 (.011)***</td>
<td>-.006 (.005)</td>
<td>-.005 (.005)</td>
<td>.025 (.052)</td>
<td>-.0008 (.004)</td>
</tr>
<tr>
<td>Tax revenue</td>
<td>.027 (.005)***</td>
<td></td>
<td></td>
<td></td>
<td>.027 (.013)***</td>
<td>.022 (.012)*</td>
<td></td>
</tr>
<tr>
<td>Corruption control</td>
<td></td>
<td>-.013 (.209)***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ln population</td>
<td>-.075 (.022)***</td>
<td>-.036 (.023)</td>
<td>-.040 (.057)</td>
<td>.036 (.001)***</td>
<td>-.001 (.005)***</td>
<td>.026 (.004)</td>
<td></td>
</tr>
<tr>
<td>Ln GDP per capita</td>
<td>.536 (.031)***</td>
<td>.500 (.033)***</td>
<td>-.180 (.477)***</td>
<td>-.021 (.005)**</td>
<td>.005 (.005)</td>
<td>.003 (.004)</td>
<td></td>
</tr>
<tr>
<td>Press freedom</td>
<td>-.007 (.003)***</td>
<td>-.003 (.003)</td>
<td>-.005 (.005)</td>
<td>.003 (.0003)</td>
<td>.001 (.005)***</td>
<td>.057 (.041)</td>
<td></td>
</tr>
<tr>
<td>Democracy</td>
<td>.213 (.031)***</td>
<td>.177 (.030)***</td>
<td></td>
<td></td>
<td>-.051 (.051)</td>
<td>-.073 (.054)</td>
<td></td>
</tr>
<tr>
<td>Agriculture share</td>
<td>-.233 (.041)***</td>
<td></td>
<td>-.183 (.177)</td>
<td>-.021 (.005)**</td>
<td>-.008 (.010)</td>
<td>-.003 (.016)</td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td></td>
<td>-.043 (.010)**</td>
<td>-.021 (.005)**</td>
<td></td>
<td>-.0004 (.005)</td>
<td>-.001 (.006)</td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td></td>
<td></td>
<td>-.021 (.005)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt</td>
<td>.046 (.098)</td>
<td>.065 (.101)</td>
<td></td>
<td></td>
<td>.015 (.003)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aid</td>
<td>.059 (.090)</td>
<td>.032 (.096)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common law</td>
<td>-.325 (.178)*</td>
<td>-.263 (.169)</td>
<td>.154 (.847)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil Law</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fractionsation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past wars</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mena</td>
<td>.950 (.131)***</td>
<td>.978 (.162)**</td>
<td></td>
<td></td>
<td>.097 (.001)***</td>
<td>.001 (.004)</td>
<td></td>
</tr>
<tr>
<td>E.Asia</td>
<td>.533 (.096)**</td>
<td>.545 (.100)**</td>
<td></td>
<td></td>
<td>.030 (.020)</td>
<td>.029 (.018)</td>
<td></td>
</tr>
<tr>
<td>Lat-Crb America</td>
<td>-.177 (.065)***</td>
<td>-.083 (.068)</td>
<td></td>
<td></td>
<td>-.006 (.010)</td>
<td>-.003 (.016)</td>
<td></td>
</tr>
<tr>
<td>Sub.S-Africa</td>
<td>.849 (.099)***</td>
<td>.826 (.104)***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.Africa</td>
<td>.741 (.234)**</td>
<td>.601 (.253)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-.316 (.331)</td>
<td>-.189 (.334)***</td>
<td>24.844 (3.997)***</td>
<td>-.8.387 (5.510)</td>
<td>-.6.372 (5.592)</td>
<td>-.6.462 (7.871)</td>
<td>-.5.29 (11.762)</td>
</tr>
<tr>
<td>Year fixed effects</td>
<td>.3616 (.331)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observation / Country</td>
<td>1098 / 86</td>
<td>976 / 83</td>
<td>833 / 73</td>
<td>1098 / 85</td>
<td>976 / 83</td>
<td>833 / 73</td>
<td>976 / 83</td>
</tr>
<tr>
<td>F-Statistic</td>
<td>63.18</td>
<td>65.83</td>
<td>52.41</td>
<td>6.26</td>
<td>5.60</td>
<td>13.76</td>
<td>12.32</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.47</td>
<td>.67</td>
<td>.34</td>
<td>.07</td>
<td>.14</td>
<td>.17</td>
<td>.38</td>
</tr>
</tbody>
</table>

Notes: robust standard errors in brackets. *p < 0.10, **p < 0.05, ***p < 0.01.
In the second stage, and as part of our contribution in this study, we add taxation to our corruption model. The results are shown in Columns (2) and (5). In both Pooled OLS and Fixed-Effect estimates the impact of taxation on control of corruption is positive and significant. This means that an increase in the size of tax revenues contributes to control of corruption. Meanwhile, adding taxation to the model has different impacts on the effect of natural resources on corruption. The Pooled OLS estimate shows that even in the presence of taxation natural resources affect control of corruption significantly, however, its impact has decreased from $-0.012$ to $-0.009$ in size. The Fixed Effect results, Column (5), also show that the impact of natural resources has decreased and remains insignificant.

In our earlier analysis we discuss that natural resources can also crowd out incomes from taxation. If taxation plays a significant role in control of corruption, this means that natural resources indirectly and through taxation affect control of corruption as well. As part of this study we also want to test this claim. For this, we estimate a regression for taxation separately, Equation (2.2). The results under Pooled OLS and Fixed Effects are outlined in Columns (3) and (6), respectively. The Pooled OLS coefficient for the relationship between tax revenues and natural resources is, $-0.09$, and significant at 1% level. This means that for each additional percentage point of GDP in resource revenues, there is a reduction in domestic non-resource tax revenues of about 0.09 percentage points of GDP. However, the Fixed-Effect estimates show that the impact of natural resources on tax revenues is positive, although not significant. The positive sign means that larger resource rents, increase income from tax revenues, however, our estimate is not significant and based on the t-value we cannot reject the hypothesis that resource rents crowd out incomes from tax revenues. In the last two columns of Table 3, Columns (7) and (8), we also control for the year fixed effects. As seen in Column (7) this does not change the impact of tax revenues on corruption. Another important point is the impact of controlling corruption on tax revenues. We can clearly see that control of corruption has

\footnote{Generally the Fixed-effect results shows the importance of taxation in the control of corruption. However, they do not show any impact of natural resource revenues on the control of corruption and crowding out of taxation.}

\footnote{As we explained in the data section, one of the main issues with most of the revenue data sets is that they do not separate resource-taxes from total tax revenues. The current data set has tried to deal with this issue whenever possible, however, this issue is not totally resolved \cite{Prichard et al., 2014}. If not dealt with correctly, this can either underestimate the size of the crowding out effect or in the extreme case it can create a positive relationship between resource rents and incomes from tax revenues.}
### Table 2.3: Dynamic analysis, using CPI measure of corruption

<table>
<thead>
<tr>
<th>Variables</th>
<th>Corruption control (1)</th>
<th>Tax revenues (2)</th>
<th>Corruption control (3)</th>
<th>Tax revenues (4)</th>
<th>Corruption control (5)</th>
<th>Tax revenues (6)</th>
<th>Corruption control (7)</th>
<th>Tax revenues (8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource rents</td>
<td>-0.014 (.002)***</td>
<td>-0.069 (.017)***</td>
<td>-0.005 (.003)***</td>
<td>-0.064 (.017)***</td>
<td>-0.002 (.003)</td>
<td>-0.079 (.018)***</td>
<td>-0.002 (.003)</td>
<td>-0.066 (.020)***</td>
</tr>
<tr>
<td>Tax revenues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corruption</td>
<td>-0.068 (.017)***</td>
<td>2.392 (.456)***</td>
<td>-0.035 (.016)***</td>
<td>2.487 (.452)***</td>
<td>-0.079 (.011)***</td>
<td>2.011 (.448)***</td>
<td>-0.041 (.015)***</td>
<td>3.620 (.951)***</td>
</tr>
<tr>
<td>Ln population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ln GDP per capita</td>
<td>0.600 (.033)***</td>
<td>-2.274 (.382)***</td>
<td>0.501 (.033)***</td>
<td>-1.794 (.037)***</td>
<td>0.507 (.033)***</td>
<td>-1.704 (.398)***</td>
<td>0.547 (.034)***</td>
<td>-3.116 (.668)***</td>
</tr>
<tr>
<td>Press freedom</td>
<td>-0.003 (.003)</td>
<td></td>
<td>-0.001 (.003)</td>
<td></td>
<td>-0.004 (.003)</td>
<td></td>
<td>-0.002 (.002)</td>
<td></td>
</tr>
<tr>
<td>Democracy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture share</td>
<td>-0.247 (.031)***</td>
<td></td>
<td>-0.186 (.029)***</td>
<td></td>
<td>-0.199 (.031)***</td>
<td></td>
<td>-0.185 (.027)***</td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>0.037 (.014)***</td>
<td></td>
<td>0.023 (.112)</td>
<td></td>
<td>0.189 (.166)</td>
<td></td>
<td>-0.003 (.011)</td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>0.041 (.006)***</td>
<td></td>
<td>0.042 (.006)</td>
<td></td>
<td>0.042 (.006)***</td>
<td></td>
<td>0.042 (.009)</td>
<td></td>
</tr>
<tr>
<td>Debt</td>
<td>-0.022 (.007)***</td>
<td></td>
<td>-0.016 (.006)***</td>
<td></td>
<td>-0.016 (.008)</td>
<td></td>
<td>-0.011 (.006)***</td>
<td></td>
</tr>
<tr>
<td>Aid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common law</td>
<td>0.195 (.106)***</td>
<td></td>
<td>0.159 (.096)</td>
<td></td>
<td>0.166 (.095)</td>
<td></td>
<td>0.199 (.082)***</td>
<td></td>
</tr>
<tr>
<td>Civil law</td>
<td>0.092 (.080)</td>
<td></td>
<td>0.078 (.071)</td>
<td></td>
<td>0.098 (.071)</td>
<td></td>
<td>0.037 (.061)</td>
<td></td>
</tr>
<tr>
<td>Fractionalisation</td>
<td>-0.423 (.173)***</td>
<td></td>
<td>-0.286 (1.071)</td>
<td></td>
<td>-0.168 (1.74)</td>
<td></td>
<td>-0.181 (1.73)</td>
<td></td>
</tr>
<tr>
<td>Past wars</td>
<td>-0.170 (.072)***</td>
<td></td>
<td>-0.291 (1.067)***</td>
<td></td>
<td>-0.234 (.066)***</td>
<td></td>
<td>-0.010 (1.086)</td>
<td></td>
</tr>
<tr>
<td>Mena</td>
<td>0.925 (.144)***</td>
<td></td>
<td>0.807 (1.30)</td>
<td></td>
<td>0.879 (1.13)***</td>
<td></td>
<td>0.970 (1.837)***</td>
<td></td>
</tr>
<tr>
<td>E.Asia</td>
<td>0.440 (.098)***</td>
<td></td>
<td>0.350 (.096)</td>
<td></td>
<td>0.461 (1.01)***</td>
<td></td>
<td>0.830 (.106)***</td>
<td></td>
</tr>
<tr>
<td>Lat-Crb America</td>
<td>-0.255 (.079)***</td>
<td></td>
<td>-0.069 (0.85)</td>
<td></td>
<td>-0.013 (.089)</td>
<td></td>
<td>0.187 (0.999)***</td>
<td></td>
</tr>
<tr>
<td>Subs Africa</td>
<td>0.968 (.112)***</td>
<td></td>
<td>0.897 (.106)</td>
<td></td>
<td>0.998 (.110)***</td>
<td></td>
<td>1.181 (.110)***</td>
<td></td>
</tr>
<tr>
<td>S.Asia</td>
<td>0.476 (.151)***</td>
<td></td>
<td>0.539 (.149)</td>
<td></td>
<td>0.696 (1.158)***</td>
<td></td>
<td>1.005 (1.164)***</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-0.714 (.401)***</td>
<td></td>
<td>-1.746 (.426)***</td>
<td></td>
<td>2.037 (.277)***</td>
<td></td>
<td>-2.140 (.471)***</td>
<td></td>
</tr>
<tr>
<td>Year fixed effects</td>
<td>NO</td>
<td></td>
<td>NO</td>
<td></td>
<td>YES</td>
<td></td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>

Notes: robust standard errors in brackets. *p < 0 : 10, **p < 0 : 05, ***p < 0 : 01.
a positive impact on tax revenues in both OLS and Fixed-Effects estimates. This confirms a two-way causal relationship between taxation and corruption that needs to be dealt with.

To this point, one of the main issues with our analysis is that corruption and taxation effect each other simultaneously. To deal with this form of endogeneity we estimate Equations (2.1) and (2.2) in a single system, using 3SLS. The equilibrium results of the system are outlined in Table 3. First, we estimate the system, Columns (1) and (2), in the absence of tax revenues in the corruption equation. The equilibrium outcome in Column (1), shows that the coefficient between resource rents and corruption control is $-0.014$ and is significant at 1% level. This coefficient is quite close to our Pooled OLS estimate in Table 1, $-0.012$ and also to what Busse and Gröning (2013) find in their analysis, $-0.015$. Meanwhile, Column (2) shows that in equilibrium the coefficient between natural resource rents on tax revenues is $-0.069$, which is significant at 1% level. In the absence of taxation our analysis, in line with the bulk of the literature, confirms the negative impact of natural resource rents on control of corruption. Also, it shows that natural resource abundance crowds out a government’s income from taxation.

In the second stage, Columns (3) and (4), we add taxation to the system. The coefficient between tax revenues and corruption is $-0.068$, which is significant at 1% level. This means that a 10 percentage point increase in the share of tax revenues in GDP, improves control of corruption by .69 points. This might look trivial, however, its impact is huge once one considers the range of the corruption score, which is between 0 and 6.5. In reality, the CPI score of corruption is between 0 and 10. However, this study focuses on the developing countries where the highest score of corruption control is 6.5 among them, see Table 2.1. To clarify, Sudan has the lowest score of corruption control in our sample, 1.68. Adding this amount, .68, to its score improves its position by almost 20 countries in the sample, ahead of countries like Indonesia, 2.32, Azerbaijan, 2.18, and Pakistan, 2.34. The direct impact of natural resources on corruption is smaller, $-0.005$, and is significant only at 10%. Furthermore, one can see that generally the coefficient on tax revenues seems to be much higher than that of natural resource rents. As we explained in the literature review, this is due to the broader impact of taxation on state capacity, society and governance. We will test the impact of taxation on some of the governance indicators in the robustness section. In the system, natural resources can also indirectly, through tax revenues, affect corruption. As we see in Column (4) the coefficient between natural resource rents and

---

16In reality, the CPI score of corruption is between 0 and 10. However, this study focuses on the developing countries where the highest score of corruption control is 6.5 among them, see Table 2.1.
tax revenues is \(-0.064\) and is significant at 1% level. This value is quite small, however, its impact on corruption is not negligible. This means that one standard deviation increase in natural resources (13.27) contributes to control of corruption by 0.058 points. When we translate this to our sample, this increases the ranking position of countries by 2 - 3 places on average. It should be mentioned that Crivelli and Gupta (2014) find a far larger coefficient between tax revenues and natural resource rents. In their studies, a 10 percentage point increase in resource rents, crowds out income from non-resource tax revenues by 3 per cent. In this case, one can expect that the crowding out effect of resource rents on tax revenues would have a much larger impact on control of corruption.

In Columns (5) and (6) we control for a time-series trend in the system of equations. The impact of tax revenues is robust to the time fixed effects. Furthermore, its size has increased from 0.068 to 0.080. Likewise, the indirect impact of natural resource rents on taxation is significant and its size has increased from \(-0.064\) to \(-0.079\). However, the direct impact of natural resources on control of corruption loses its significance and its size decreases from \(-0.005\) to \(-0.002\). This clearly supports the idea that what is seen as the negative impact of natural resources on control of corruption can be clearly linked to the absence of taxation.

In the last two columns, Columns (7) and (8), we control for the regional fixed effects in the taxation equation as well. The impact of natural resources on corruption is small and not significant. Meanwhile, the direct and indirect impact of taxation are significant and robust to regional fixed effects. It should also be mentioned that control of corruption has a positive and significant impact on tax revenues in all of our regressions.

Each of our equations involves some control variables. We start with control variables in the corruption Equation, (2.1). Overall population, a proxy for country size, has a negative and significant impact on corruption control in our analysis. This negative relationship is stronger when we estimate corruption control in a system, i.e. using the 3SLS method. This justifies the idea that smaller political units (countries) are more efficient in their control of corruption. Consistent with the literature, control of corruption

\[17\] Usually, in the literature on resource curse (Gylfason, 2001, Mehlum et al., 2006b) and corruption (Treisman, 2000, Bhattacharyya and Hodler, 2010) the analyses are not robust to controlling for country fixed effects. That is, most of the analyses are driven by cross-country variations. This is the case in this study as well, although we have not reported the results. Controlling for the country fixed effects, we noticed that the whole system loses its relevance.
is positively associated with level of economic development, approximated by \( \ln \text{GDP per capita} \), and political development, approximated by democracy. The positive impact of democracy on control of corruption is stronger under OLS and 3SLS. The impact of press freedom on corruption control is not clear. While the OLS and Fixed Effect outcomes are positive, the 3SLS results are negative. However, the impact of press freedom is very trivial and non-significant in almost all regressions. As we said, to control for the legal systems, we have created dummy variables based on each country’s legal system. Three types of legal systems are defined, common law, civil law and mixed law, which is the base group. While common law has a positive and, in some regressions, significant impact on control of corruption, the effect of civil law is positive but not significant. Ethnic, religious and language fractionalisation overall, has a negative impact on corruption control. As we discussed, this is because these fractionalities increase the probability of political instabilities inside countries. Controlling for other explanatory variables the regional effect on corruption is positive and significant, with the exception of Latin America and the Caribbean where it is negatively related to the control of corruption.

Turning to Equation (2.2) the impact of control variables on the taxation equation are as follows. The impact of economic development, \( \ln \text{GDP per capita} \), on tax revenues is mixed. The OLS and 3SLS show that the coefficient between \( \ln \text{GDP per capita} \) and tax revenues is negative, whereas the Fixed Effect impact of economic development is positive. As we explained earlier, the positive impact of \( \ln \text{GDP per capita} \) on tax revenue is expected, while comparing the developed and developing world. However, this relationship can become negative in a sample of developing countries, especially when the increase in the GDP per capita is largely due to the sale of natural resources rather than inclusive development. As expected, a larger agricultural share is negatively associated with the amount of tax that is collected in the economy. Inflation seems to not have a clear impact on tax revenues. The results show that economic openness increases the tax income of government. This is because economic openness increases the trade size and hence the tax that is levied on it. Also, the analysis shows that external debt stocks as a percentage of GDP and tax revenues are negatively related. Normally, an increase in the stock of debt should pressurise governments to increase taxes to finance the debt. The negative sign can be related to the fact that most developing countries are in debt because they do not have the capacity to mobilise tax revenues. In most cases, governments need to borrow because they cannot raise revenue through taxes. Furthermore, the old debts in many cases are financed by new debts or non-tax revenues. As we explained earlier, there
are two conflicting views on the impact of foreign aid on tax revenues. One view is that foreign aid, like resource rents, crowds out taxation and delays the development of the tax system (Bräutigam and Knack, 2004). However, foreign aid unlike resource rents, can be earmarked by donors to be used towards the development of the tax system (Collier, 2006). Our results seem to be in line with the latter argument as the impact of foreign aid on tax revenues is overall, positive. We have also used fractionalisation and a number of interstate past wars as a proxy for internal and external political instabilities. While fractionalisation has a negative and insignificant impact on tax revenues, the overall impact of the interstate war on tax mobilisation is positive and significant.

### 2.6 Robustness

In this section we examine the sensitivity of our results to various modifications. First, we rerun the regressions under a different measures of corruption. We also check for the robustness of the analysis using an alternative measure of tax revenues. Then, we check our analysis for a sub sample of resource-rich developing economies in our sample. At the end, we study the impact of taxation on other measures of governance.

#### 2.6.1 Alternative measures of corruption

We started our benchmark analysis using the Corruption Perception Index (CPI), provided by Transparency International. In this section, we check the robustness of our results using World Governance Indicators (WGI) and International Country Risk Guide (ICRG) measures of corruption. Our results are summarised in Tables 2.4 and 2.5.

As before, a first regression in each table estimates the system in the absence of taxation. Both WGI and ICRG coefficients, −.007 and −.005, show that in the absence of taxation natural resources have a negative and significant impact on corruption. However, the estimates are much smaller than what CPI scores of corruption show, -.014. To make it clear, one standard deviation, 13.273, an increase in the share of the natural resources in GDP improves the CPI’s corruption score of a country by 5 to 6 places in our sample.

---

18Due to the dynamic nature of the regressions we only calculate the 3SLS robustness checks for our previous analysis. However, it should be mentioned that 3SLS and fixed effects results under WGI and ICRG measures of corruption are similar to analysis under CPI data in Table 2.2
Table 2.4: Dynamic analysis, using WGI measure of corruption

<table>
<thead>
<tr>
<th>Variables</th>
<th>Corruption control (1)</th>
<th>Tax revenues (2)</th>
<th>Corruption control (3)</th>
<th>Tax revenues (4)</th>
<th>Corruption control (5)</th>
<th>Tax revenues (6)</th>
<th>Corruption control (7)</th>
<th>Tax revenues (8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource rents</td>
<td>-.007 (.001)***</td>
<td>-.055 (.018)***</td>
<td>-.004 (.001)***</td>
<td>-.053 (.018)***</td>
<td>-.003 (.005)*</td>
<td>-.060 (.018)***</td>
<td>-.002 (.001)</td>
<td>-.066 (.019)***</td>
</tr>
<tr>
<td>Tax revenues</td>
<td>-.000 (.005)**</td>
<td></td>
<td>-.023 (.005)**</td>
<td></td>
<td>-.027 (.005)**</td>
<td></td>
<td>-.027 (.005)**</td>
<td></td>
</tr>
<tr>
<td>Corruption control</td>
<td>4.222 (.810)***</td>
<td></td>
<td>4.331 (.805)***</td>
<td></td>
<td>4.387 (.783)***</td>
<td></td>
<td>5.115 (1.053)***</td>
<td></td>
</tr>
<tr>
<td>Ln population</td>
<td>-.040 (.008)***</td>
<td>-.030 (.008)***</td>
<td>-.030 (.008)***</td>
<td>-.030 (.008)***</td>
<td>-.029 (.008)***</td>
<td>-.221 (.017)***</td>
<td>-.207 (.017)***</td>
<td>-.207 (.017)***</td>
</tr>
<tr>
<td>Ln GDP per capita</td>
<td>.243 (.017)***</td>
<td>.033 (.001)***</td>
<td>.003 (.001)</td>
<td>-.006 (.006)***</td>
<td>.001 (.002)</td>
<td>-.006 (.006)***</td>
<td>.001 (.001)</td>
<td>-.113 (.033)***</td>
</tr>
<tr>
<td>Press freedom</td>
<td>-.003 (.002)</td>
<td>.003 (.001)***</td>
<td>.003 (.001)</td>
<td>-.006 (.006)***</td>
<td>.001 (.002)</td>
<td>-.006 (.006)***</td>
<td>.001 (.001)</td>
<td>-.113 (.033)***</td>
</tr>
<tr>
<td>Democracy</td>
<td>.088 (.018)***</td>
<td>.070 (.018)***</td>
<td>.084 (.017)***</td>
<td></td>
<td>.084 (.017)***</td>
<td></td>
<td>.084 (.017)***</td>
<td></td>
</tr>
<tr>
<td>Agriculture share</td>
<td>-.230 (.030)***</td>
<td>-.206 (.028)***</td>
<td>-.204 (.028)***</td>
<td>-.204 (.028)***</td>
<td>-.194 (.026)***</td>
<td>-.194 (.026)***</td>
<td>-.194 (.026)***</td>
<td>-.194 (.026)***</td>
</tr>
<tr>
<td>Inflation</td>
<td>.017 (.015)***</td>
<td>.013 (.014)</td>
<td>.016 (.014)</td>
<td>-.006 (.006)***</td>
<td>-.011 (.013)</td>
<td>-.011 (.013)</td>
<td>-.011 (.013)</td>
<td>-.011 (.013)</td>
</tr>
<tr>
<td>Openness</td>
<td>.062 (.006)***</td>
<td>.059 (.006)***</td>
<td>.056 (.006)***</td>
<td></td>
<td>.060 (.006)***</td>
<td></td>
<td>.060 (.006)***</td>
<td></td>
</tr>
<tr>
<td>Debt</td>
<td>-.016 (.006)***</td>
<td>-.014 (.006)***</td>
<td>-.006 (.006)***</td>
<td></td>
<td>-.011 (.007)***</td>
<td></td>
<td>-.011 (.007)***</td>
<td>-.011 (.007)***</td>
</tr>
<tr>
<td>Aid</td>
<td>.010 (.003)***</td>
<td>.010 (.002)***</td>
<td>.009 (.003)***</td>
<td></td>
<td>.010 (.003)***</td>
<td></td>
<td>.010 (.003)***</td>
<td></td>
</tr>
<tr>
<td>Common law</td>
<td>.145 (.053)***</td>
<td>.135 (.050)***</td>
<td>.152 (.050)***</td>
<td></td>
<td>.168 (.047)***</td>
<td></td>
<td>.168 (.047)***</td>
<td></td>
</tr>
<tr>
<td>Civil law</td>
<td>.095 (.040)**</td>
<td>.093 (.037)***</td>
<td>.099 (.033)***</td>
<td></td>
<td>.080 (.035)</td>
<td></td>
<td>.080 (.035)</td>
<td></td>
</tr>
<tr>
<td>Fractionalisation</td>
<td>-.043 (.088)***</td>
<td>-.325 (.089)***</td>
<td>-.308 (.089)***</td>
<td>-.308 (.089)***</td>
<td>-.317 (.175)***</td>
<td>-.317 (.175)***</td>
<td>-.317 (.175)***</td>
<td>-.149 (.123)</td>
</tr>
<tr>
<td>Past wars</td>
<td>.124 (.1038)</td>
<td>.1330 (1.035)</td>
<td>.152 (.1126)</td>
<td>-.250 (.071)***</td>
<td>.145 (1.072)</td>
<td></td>
<td>.335 (.072)***</td>
<td></td>
</tr>
<tr>
<td>Mena</td>
<td>.410 (.075)***</td>
<td>.389 (.070)***</td>
<td>.398 (.070)***</td>
<td></td>
<td>.437 (.073)***</td>
<td></td>
<td>.437 (.073)***</td>
<td></td>
</tr>
<tr>
<td>E.Asia</td>
<td>.217 (.0511)**</td>
<td>.186 (.050)</td>
<td>.210 (.051)***</td>
<td></td>
<td>.365 (.053)***</td>
<td></td>
<td>.365 (.053)***</td>
<td></td>
</tr>
<tr>
<td>Lat-Crab America</td>
<td>-.107 (.043)***</td>
<td>-.049 (.046)</td>
<td>-.039 (.046)</td>
<td></td>
<td>-.060 (.050)</td>
<td></td>
<td>-.060 (.050)</td>
<td></td>
</tr>
<tr>
<td>SubS.Africa</td>
<td>.521 (.075)***</td>
<td>.498 (.055)</td>
<td>.521 (.056)***</td>
<td></td>
<td>-.594 (.056)***</td>
<td></td>
<td>-.594 (.056)***</td>
<td></td>
</tr>
<tr>
<td>S.Asia</td>
<td>.329 (.077)***</td>
<td>.352 (.078)***</td>
<td>.383 (.080)***</td>
<td></td>
<td>.543 (.083)***</td>
<td></td>
<td>.543 (.083)***</td>
<td></td>
</tr>
<tr>
<td>Year fixed effects</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td></td>
<td>YES</td>
<td></td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Observation</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
<td></td>
<td>850/76</td>
<td></td>
<td>850/76</td>
<td></td>
</tr>
<tr>
<td>Chi2</td>
<td>832.13</td>
<td>547.11</td>
<td>889.77</td>
<td></td>
<td>521.24</td>
<td></td>
<td>927.16</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>.49</td>
<td>.36</td>
<td>.48</td>
<td></td>
<td>.48</td>
<td></td>
<td>.37</td>
<td></td>
</tr>
</tbody>
</table>

Notes: robust standard errors in brackets, *p < 0.10, **p < 0.05, ***p < 0.01.
Chapter 2. Rich in resource, poor at taxation, rich in Corruption

This standard deviation improves the WGI score, on average, by 3 positions in the sample, whereas it improves the ICRG scores only by 1 or 2 positions on average. For example, Sudan has the lowest control of corruption scores in the CPI and ICRG samples, 1.68 and 1.25 respectively. One standard deviation increase in the share of resource rents in GDP generates new scores of 1.866 and 1.317 for them respectively. In the CPI sample, the new score of 1.86 put Sudan ahead of Haiti, 1.79, Turkmenistan, 1.80, Chad, 1.83, Bangladesh, 1.85. In the ICRG sample, the new score of 1.317 does not change the position of Sudan in the sample, as this number is still smaller than the corruption scores for Gabon 1.32 and Haiti 1.40 that have the lowest scores after Sudan in the ICRG sample. In the WGI sample, Haiti has the lowest score in the sample, –1.33. One standard deviation increase in the share of resource rents in GDP can change its score to –1.238. This score improves its ranking by 3 places and puts it ahead of Angola, –1.31, Sudan, –1.26, and Turkmenistan, –1.25. The regression in the absence of taxation for different measures of corruption, the first two columns of Tables 2.3, 2.4 and 2.5, shows that natural resources has a negative and significant impact on control of corruption. Our analysis in the previous paragraphs shows that the negative impact of resource rents is more pronounced in CPI and WGI measures of corruption, compared to the ICRG measure. It should also be mentioned that under all three scenarios there is a trade off between natural resource rents and incomes from tax revenues, the second columns in each of the tables.

As before, in the second stage we add taxation to the corruption equation, which is one of the contributions of this study. In line with the results under the CPI measure of corruption, controlling for taxation decreases the impact of natural resources on corruption in both cases. On the other hand, the impact of natural resources on control of corruption for ICRG data is not significant any more. Meanwhile, taxation has a positive and significant impact on corruption for both WGI and ICRG data, .023 and .009. As it is seen, the coefficient on taxation for the ICRG is quite small, .009, compared to that of CPI .068 or WGI .023. At the third stage we also include the year fixed effects in our equations to control for trends or cyclical fluctuations in the data, Columns (5) and (6). For the WGI data, the coefficient between natural resources and control of corruption is significant at 10% level. On the other, this coefficient becomes positive and significant at 1% level for the ICRG data. This means that controlling for taxation and year fixed effects, the direct impact of natural resources on corruption becomes positive. This means that natural resources per se is not bad for control of corruption. In other words, if one control for the negative impact of the absence of taxation in the economy, natural resources can
have
### Table 2.5: Dynamic analysis, using ICRG measure of corruption

<table>
<thead>
<tr>
<th>Variables</th>
<th>3SLS Corruption control (1)</th>
<th>3SLS Tax revenues (2)</th>
<th>3SLS Corruption control (3)</th>
<th>3SLS Tax revenues (4)</th>
<th>3SLS Corruption control (5)</th>
<th>3SLS Tax revenues (6)</th>
<th>3SLS Corruption control (7)</th>
<th>3SLS Tax revenues (8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource rents</td>
<td>-.005 (.003) *</td>
<td>-.091 (.015) **</td>
<td>-.004 (.003)</td>
<td>-.091 (.015) **</td>
<td>.012 (.003) ***</td>
<td>-.097 (.015) ***</td>
<td>.012 (.003) ***</td>
<td>-.105 (.014) ***</td>
</tr>
<tr>
<td>Tax revenues</td>
<td>.936 (.475) *</td>
<td></td>
<td>.009 (.014) ***</td>
<td></td>
<td>.093 (.015) ***</td>
<td></td>
<td>.088 (.015) ***</td>
<td></td>
</tr>
<tr>
<td>Corruption control</td>
<td>.015 (.093) **</td>
<td></td>
<td>-.097 (.019) **</td>
<td></td>
<td>.012 (.003) ***</td>
<td></td>
<td>.048 (.018) **</td>
<td></td>
</tr>
<tr>
<td>Ln population</td>
<td>.018 (.088) **</td>
<td></td>
<td>.008 (.039)</td>
<td></td>
<td>.009 (.003) **</td>
<td></td>
<td>.003 (.036)</td>
<td></td>
</tr>
<tr>
<td>Ln GDP per capita</td>
<td>.032 (.026) **</td>
<td></td>
<td>.026 (.003) ***</td>
<td></td>
<td>.015 (.002) **</td>
<td></td>
<td>-.18 (.002) **</td>
<td></td>
</tr>
<tr>
<td>Press freedom</td>
<td>.026 (.003)</td>
<td></td>
<td>.026 (.003) ***</td>
<td></td>
<td>.015 (.002) **</td>
<td></td>
<td>-.18 (.002) **</td>
<td></td>
</tr>
<tr>
<td>Democracy</td>
<td>-.104 (.036) ***</td>
<td></td>
<td>-.108 (.038) **</td>
<td></td>
<td>.069 (.032)</td>
<td></td>
<td>.057 (.028) **</td>
<td></td>
</tr>
<tr>
<td>Agriculture share</td>
<td>-.121 (.024) ***</td>
<td></td>
<td>-.122 (.024) **</td>
<td></td>
<td>-.122 (.024) **</td>
<td></td>
<td>-.122 (.024) **</td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>.003 (.001) **</td>
<td></td>
<td>.003 (.001) **</td>
<td></td>
<td>.003 (.001) **</td>
<td></td>
<td>.003 (.001) **</td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>.043 (.005) **</td>
<td></td>
<td>.043 (.005) **</td>
<td></td>
<td>.031 (.005) **</td>
<td></td>
<td>.031 (.005) **</td>
<td></td>
</tr>
<tr>
<td>Debt</td>
<td>-.020 (.005) **</td>
<td></td>
<td>-.019 (.005) **</td>
<td></td>
<td>-.004 (.005) **</td>
<td></td>
<td>-.004 (.005) **</td>
<td></td>
</tr>
<tr>
<td>Aid</td>
<td>.018 (.003) ***</td>
<td></td>
<td>.017 (.003) ***</td>
<td></td>
<td>.012 (.003) **</td>
<td></td>
<td>.004 (.003)</td>
<td></td>
</tr>
<tr>
<td>Common law</td>
<td>.243 (.136) *</td>
<td></td>
<td>.236 (.136) *</td>
<td></td>
<td>.246 (.109) **</td>
<td></td>
<td>.225 (.093) **</td>
<td></td>
</tr>
<tr>
<td>Civil law</td>
<td>.302 (.089) **</td>
<td></td>
<td>.301 (.089) **</td>
<td></td>
<td>.325 (.072) **</td>
<td></td>
<td>.231 (.063) **</td>
<td></td>
</tr>
<tr>
<td>Fractionalisation</td>
<td>-.520 (.213) ***</td>
<td></td>
<td>-.526 (.212) **</td>
<td></td>
<td>-.347 (.184) **</td>
<td></td>
<td>-.533 (.191) **</td>
<td></td>
</tr>
<tr>
<td>Past wars</td>
<td>.269 (.057) **</td>
<td></td>
<td>.216 (.853)</td>
<td></td>
<td>.211 (.853)</td>
<td></td>
<td>.255 (.052) **</td>
<td></td>
</tr>
<tr>
<td>Mena</td>
<td>.587 (.155) ***</td>
<td></td>
<td>.389 (.070) **</td>
<td></td>
<td>.656 (.127) **</td>
<td></td>
<td>.594 (.134) **</td>
<td></td>
</tr>
<tr>
<td>E.Asia</td>
<td>.165 (.112)</td>
<td></td>
<td>.171 (.127)</td>
<td></td>
<td>.164 (.116) **</td>
<td></td>
<td>.622 (.122) **</td>
<td></td>
</tr>
<tr>
<td>Lat-Ctr America</td>
<td>-.068 (.086)</td>
<td></td>
<td>-.043 (.117)</td>
<td></td>
<td>.034 (.105)</td>
<td></td>
<td>-.802 (.514) **</td>
<td></td>
</tr>
<tr>
<td>Sub.S.Africa</td>
<td>.306 (.129) **</td>
<td></td>
<td>.327 (.142) **</td>
<td></td>
<td>.546 (.127) **</td>
<td></td>
<td>.45 (.104) **</td>
<td></td>
</tr>
<tr>
<td>S.Asia</td>
<td>-.079 (.184)</td>
<td></td>
<td>-.040 (.217)</td>
<td></td>
<td>.226 (.193)</td>
<td></td>
<td>-.645 (.204) **</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>.646 (.478) **</td>
<td>.10.530 (2.49) ***</td>
<td>.586 (482)</td>
<td>.10.525 (2.49) ***</td>
<td>.173 (.463)</td>
<td>.6555 (2.805) **</td>
<td>-.131 (.456) **</td>
<td>12.766 (2.634) **</td>
</tr>
<tr>
<td>Year fixed effects</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Notes: robust standard errors in brackets. *p < 0.10, **p < 0.05, ***p < 0.01.
Chapter 2. Rich in resource, poor at taxation, rich in Corruption

...a positive impact on control of corruption. Another important change after controlling for the year fixed effects is the increase in the coefficient between taxation and corruption, from .009 to .093. This means that, controlling for cyclical fluctuations and trends in the can highlights the importance of taxation even more. Very similarly, at the final stage where we control for the regional fixed effects in the taxation regression, Equation (2.2), the coefficient between natural resources and control of corruption stays trivial and non-significant for CPI and WGI data, whereas the coefficient for the ICRG data remains positive and significant.

Moreover, as we discussed earlier, our system of equations also controls for the indirect impact of natural resources on corruption. All of our regressions under different data sets confirm the trade-off between natural resource rents and incomes from tax revenues. This is shown as the negative coefficients between natural resources and tax revenues on the first rows of the even columns of the tables. In the last regression, where we control for year and regional fixed effects, Column (8), the coefficient is $-0.066$ under both CPI and WGI measures of corruption and they are both significant at 1% levels. Column (8) of Table 2.5 shows that the coefficient under ICRG is larger, $-0.105$, and significant at 1% level. Taking into account the significant impact of tax revenues in the corruption regression, Equation (2.1), this means that natural resource rents also indirectly and through taxation, affect control of corruption. In other words, an increase in the size of resource rents crowds out taxation significantly and this undermines control of corruption. As we explained in our earlier analysis, one standard deviation increase in natural resource rents (13.273) boosts corruption control by around .058 points. This can improve the ranking of countries in control of corruption by 2-3 places in the table. Based on our last regression, Column (8), this number is .023 and .123 for WGI and ICRG data sets, each of which can improve the position of a country by 1-2, and 3-4 places respectively.\footnote{It should be mentioned that the coefficients between natural resource rents and tax revenues in our results are smaller than .3, which Crivelli and Gupta (2014) find in their study.}

\subsection{2.6.2 Alternative measure of tax revenues}

In the foregoing analysis, we measure tax revenues as shares of GDP. An alternative way is to measure these variables as shares of total government revenue. Government revenues include resource revenues, non-resource-tax revenues and other sources of government income, which itself includes internal and external grants. The results of our
### Table 2.6: Alternative measure of tax revenues

<table>
<thead>
<tr>
<th>Variables</th>
<th>3SLS</th>
<th>3SLS</th>
<th>3SLS</th>
<th>3SLS</th>
<th>3SLS</th>
<th>3SLS</th>
<th>3SLS</th>
<th>3SLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource rents</td>
<td>-.014 (.002)**</td>
<td>-.830 (.045)**</td>
<td>.033 (.010)**</td>
<td>-.803 (.044)**</td>
<td>.039 (.012)**</td>
<td>-.846 (.044)**</td>
<td>.029 (.012)**</td>
<td>-.791 (.056)**</td>
</tr>
<tr>
<td>Tax revenues</td>
<td>.029 (.010)**</td>
<td>.052 (.010)**</td>
<td>.056 (.012)**</td>
<td>.2878 (.448)**</td>
<td>-.055 (.017)**</td>
<td>.789 (2.645)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corruption control</td>
<td>3.758 (1.162)**</td>
<td>-.060 (.018)**</td>
<td>4.000 (1.123)**</td>
<td>-.080 (.020)**</td>
<td>-.158 (.074)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ln GDP per capita</td>
<td>.604 (.033)**</td>
<td>-.9571 (.970)**</td>
<td>.915 (.081)**</td>
<td>-.1794 (.0373)**</td>
<td>.967 (.097)**</td>
<td>-.9122 (.964)**</td>
<td>.929 (.096)**</td>
<td>-.13573 (.1973)**</td>
</tr>
<tr>
<td>Press freedom</td>
<td>-.003 (.003)</td>
<td>-.002 (.003)</td>
<td>-.006 (.003)**</td>
<td>-.004 (.002)</td>
<td>-.119 (.036)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Democracy</td>
<td>.140 (.036)**</td>
<td>-.263 (.001)**</td>
<td>-.134 (.01)**</td>
<td>-.148 (.075)**</td>
<td>-.158 (.074)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture share</td>
<td>.052 (.043)</td>
<td>.019 (.032)</td>
<td>.025 (.034)</td>
<td>.031 (.020)</td>
<td>.031 (.020)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>.012 (.016)</td>
<td>.039 (.014)**</td>
<td>.036 (.014)**</td>
<td>.031 (.020)</td>
<td>.031 (.020)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>-.044 (.019)**</td>
<td>-.023 (.015)</td>
<td>-.017 (.017)</td>
<td>-.017 (.013)</td>
<td>-.017 (.013)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt</td>
<td>.022 (.008)**</td>
<td>.018 (.006)**</td>
<td>.018 (.007)**</td>
<td>.010 (.008)</td>
<td>.010 (.008)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common law</td>
<td>.191 (.108)*</td>
<td>.017 (.131)</td>
<td>.123 (.087)</td>
<td>.003 (.073)</td>
<td>.003 (.073)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil law</td>
<td>.081 (.082)</td>
<td>.082 (.078)</td>
<td>.082 (.078)</td>
<td>.082 (.078)</td>
<td>.082 (.078)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fractionalisation</td>
<td>-.439 (.178)**</td>
<td>1.917 (2.757)</td>
<td>-203 (.216)</td>
<td>2.311 (2.742)</td>
<td>-.246 (.220)</td>
<td>3.134 (2.689)</td>
<td>-.371 (.225)</td>
<td>4.848 (3.272)</td>
</tr>
<tr>
<td>Past wars</td>
<td>.446 (.198)**</td>
<td>.646 (.172)**</td>
<td>.646 (.172)**</td>
<td>.646 (.172)**</td>
<td>.646 (.172)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mena</td>
<td>.932 (.151)**</td>
<td>.847 (.148)**</td>
<td>.968 (.163)**</td>
<td>.947 (.1178)**</td>
<td>.947 (.1178)**</td>
<td>-.6980 (2.806)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.Asia</td>
<td>.547 (.103)**</td>
<td>.454 (.112)**</td>
<td>.589 (.128)**</td>
<td>.731 (.140)**</td>
<td>.731 (.140)**</td>
<td>-.875 (1.767)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lat-Am. America</td>
<td>-.192 (.083)**</td>
<td>-.017 (.097)</td>
<td>.026 (.111)</td>
<td>-.088 (1.127)**</td>
<td>-.088 (1.127)**</td>
<td>-.2640 (1.562)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>1.016 (.114)**</td>
<td>.917 (.121)**</td>
<td>1.071 (.137)**</td>
<td>1.117 (.139)**</td>
<td>1.117 (.139)**</td>
<td>-.9004 (3.367)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. Asia</td>
<td>.527 (.155)**</td>
<td>.708 (.255)**</td>
<td>.946 (.286)**</td>
<td>1.098 (.290)**</td>
<td>1.098 (.290)**</td>
<td>-.15014 (2.808)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year fixed effects</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Observation</td>
<td>799/73</td>
<td>799/73</td>
<td>799/73</td>
<td>799/73</td>
<td>799/73</td>
<td>799/73</td>
<td>799/73</td>
<td>799/73</td>
</tr>
<tr>
<td>Chi2</td>
<td>801.07</td>
<td>695.25</td>
<td>642.31</td>
<td>709.84</td>
<td>666.72</td>
<td>761.86</td>
<td>697</td>
<td>812.24</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.49</td>
<td>.45</td>
<td>.45</td>
<td>.44</td>
<td>.46</td>
<td>.26</td>
<td>.43</td>
<td>.43</td>
</tr>
</tbody>
</table>

Notes: robust standard errors in brackets.\*p < 0.10, \**p < 0.05, \***p < 0.01. Tax revenues are measured as the share of taxes in government revenues. Also, we have used the CPI measure of corruption.
The use of the alternative measures of tax incomes, highlights the importance of taxation in the control of corruption even stronger than our earlier analysis in Table 2.3. A major change is seen in the direct impact of natural resources on corruption when we control for the role of tax revenues in our model. As can be seen in Column (1) of Table 2.6 the direct impact of natural resources on corruption control is negative and significant, \(-0.014\), at 1% level. However, once we control for tax revenues, as a share of government revenues, the impact of taxation becomes positive and significant at 1% level. This essentially means that natural resources is not bad for corruption. In fact, what is seen as the negative impact of natural resources is due to an absence of taxation. Therefore, the direct impact of natural resources on corruption is positive.

As seen in our earlier analysis, the indirect impact of natural resources on corruption control is negative. Regression results from the new measure of tax revenues in Table 2.6 shows that natural resource rents crowd out incomes from tax revenues significantly. Combining this with the significant and positive impact of tax revenues on corruption control means that the indirect impact of natural resources on control of corruption is negative and significant.

### 2.6.3 Resource-rich economies

Up to this point we have seen that taxation plays a positive role in control of corruption. Meanwhile, the analysis supports the idea that tax revenues and taxation are usually crowded by other source revenues like natural resources. The trade-off between taxation and natural resources has already been shown in resource-dependent regions and countries (Thomas and Trevino, 2013, Ossowski and Gonzáles-Castillo, 2012, Crivelli and Gupta, 2014). Our sample also allows us to test whether our analysis holds for a sub-sample of resource-rich economies. The average level of natural resource rents in our sample is around 10% of GDP. We define this as a threshold and redraw the analysis.

---

20One reason that we do not include natural resource rents as the share of government is that in many cases natural resource rents and tax revenues are the only source of government revenue and hence perfect co-linearity is present between them. However, it should be mentioned that we also ran the regressions in Table 2.6 under natural resource rents as a percentage of GDP and our results are very similar.
Table 2.7: Resource-rich economies

<table>
<thead>
<tr>
<th>Variables</th>
<th>Corruption control (1)</th>
<th>Tax revenues (2)</th>
<th>Corruption control (3)</th>
<th>Tax revenues (4)</th>
<th>Corruption control (5)</th>
<th>Tax revenues (6)</th>
<th>Corruption control (7)</th>
<th>Tax revenues (8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource rents</td>
<td>-.014 (.004)**</td>
<td>-.091 (.021)**</td>
<td>-.001 (.005)</td>
<td>-.063 (.021)**</td>
<td>.0002 (.005)</td>
<td>-.045 (.020)**</td>
<td>-.001 (.005)</td>
<td>-.047 (.022)**</td>
</tr>
<tr>
<td>Tax revenues</td>
<td>.112 (.021)**</td>
<td>.134 (.026)**</td>
<td>.108 (.025)**</td>
<td>.1625 (.548)**</td>
<td>-.049 (.045)</td>
<td>.3689 (.569)**</td>
<td>.309 (.045)</td>
<td>.3689 (.569)**</td>
</tr>
<tr>
<td>Corruption control</td>
<td>.597 (.573)**</td>
<td>1.300 (.566)**</td>
<td>1.625 (.548)**</td>
<td>-.049 (.045)</td>
<td>-.049 (.045)</td>
<td>.3689 (.569)**</td>
<td>.309 (.045)</td>
<td>.3689 (.569)**</td>
</tr>
<tr>
<td>Ln population</td>
<td>-.054 (.051)**</td>
<td>-.035 (.016)**</td>
<td>-.43 (.055)</td>
<td>-.1501 (.551)**</td>
<td>-.2062 (.536)**</td>
<td>-.3116 (.668)**</td>
<td>-.2062 (.536)**</td>
<td>-.3116 (.668)**</td>
</tr>
<tr>
<td>Ln GDP per capita</td>
<td>.298 (.071)**</td>
<td>-.1857 (.572)**</td>
<td>1.625 (.548)**</td>
<td>-.1501 (.551)**</td>
<td>-.2062 (.536)**</td>
<td>-.3116 (.668)**</td>
<td>-.2062 (.536)**</td>
<td>-.3116 (.668)**</td>
</tr>
<tr>
<td>Press freedom</td>
<td>-.008 (.005)*</td>
<td>.005 (.005)</td>
<td>-.006 (.004)</td>
<td>-.006 (.004)</td>
<td>.134 (.005)</td>
<td>-.166 (.051)**</td>
<td>.134 (.005)</td>
<td>-.166 (.051)**</td>
</tr>
<tr>
<td>Democracy</td>
<td>.233 (.051)**</td>
<td>.176 (.056)**</td>
<td>-.1.133 (.037)**</td>
<td>-.1.397 (.037)**</td>
<td>-.1.397 (.037)**</td>
<td>-.1.397 (.037)**</td>
<td>-.1.397 (.037)**</td>
<td>-.1.397 (.037)**</td>
</tr>
<tr>
<td>Agriculture share</td>
<td>-.203 (.040)**</td>
<td>-.1.43 (.039)**</td>
<td>-.1.133 (.037)**</td>
<td>-.1.397 (.037)**</td>
<td>-.1.397 (.037)**</td>
<td>-.1.397 (.037)**</td>
<td>-.1.397 (.037)**</td>
<td>-.1.397 (.037)**</td>
</tr>
<tr>
<td>Inflation</td>
<td>.090 (.024)**</td>
<td>.030 (.023)</td>
<td>.024 (.022)</td>
<td>.008 (.017)</td>
<td>.024 (.022)</td>
<td>.008 (.017)</td>
<td>.024 (.022)</td>
<td>.008 (.017)</td>
</tr>
<tr>
<td>Openness</td>
<td>-.003 (.010)</td>
<td>.020 (.010)**</td>
<td>.017 (.009)**</td>
<td>.017 (.010)*</td>
<td>.017 (.010)*</td>
<td>.017 (.010)*</td>
<td>.017 (.010)*</td>
<td>.017 (.010)*</td>
</tr>
<tr>
<td>Debt</td>
<td>-.022 (.009)**</td>
<td>-.022 (.009)**</td>
<td>-.006 (.011)</td>
<td>.006 (.009)*</td>
<td>.021 (.007)**</td>
<td>-.021 (.007)**</td>
<td>.021 (.007)**</td>
<td>-.021 (.007)**</td>
</tr>
<tr>
<td>Aid</td>
<td>.021 (.010)**</td>
<td>.013 (.009)</td>
<td>.006 (.008)**</td>
<td>.021 (.007)**</td>
<td>.006 (.008)**</td>
<td>.021 (.007)**</td>
<td>.006 (.008)**</td>
<td>.021 (.007)**</td>
</tr>
<tr>
<td>Common law</td>
<td>-.904 (.623)</td>
<td>-.822 (.630)</td>
<td>-.822 (.630)</td>
<td>-.822 (.630)</td>
<td>-.822 (.630)</td>
<td>-.822 (.630)</td>
<td>-.822 (.630)</td>
<td>-.822 (.630)</td>
</tr>
<tr>
<td>Civil law</td>
<td>-.318 (.157)**</td>
<td>-.348 (.159)**</td>
<td>-.348 (.159)**</td>
<td>-.348 (.159)**</td>
<td>-.348 (.159)**</td>
<td>-.348 (.159)**</td>
<td>-.348 (.159)**</td>
<td>-.348 (.159)**</td>
</tr>
<tr>
<td>Past wars</td>
<td>-.003 (.147)</td>
<td>-.003 (.147)</td>
<td>-.003 (.147)</td>
<td>-.003 (.147)</td>
<td>-.003 (.147)</td>
<td>-.003 (.147)</td>
<td>-.003 (.147)</td>
<td>-.003 (.147)</td>
</tr>
<tr>
<td>Mena</td>
<td>1.432 (.624)**</td>
<td>1.250 (.620)**</td>
<td>1.397 (.616)**</td>
<td>1.220 (.673)*</td>
<td>1.220 (.673)*</td>
<td>1.220 (.673)*</td>
<td>1.220 (.673)*</td>
<td>1.220 (.673)*</td>
</tr>
<tr>
<td>Lat-Crb America</td>
<td>.025 (.202)</td>
<td>.212 (.211)</td>
<td>.174 (.212)</td>
<td>.288 (.217)</td>
<td>.288 (.217)</td>
<td>.288 (.217)</td>
<td>.288 (.217)</td>
<td>.288 (.217)</td>
</tr>
<tr>
<td>Year fixed effects</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Chi^2: 280.61 132.86 266.70 127.19 288.84 170.69 298.06 334.06
R^2: .54 .37 .46 .35 .41 .38 .51 .39

Notes: robust standard errors in brackets, *p < 0 : 10, **p < 0 : 05, ***p < 0 : 01. The analysis includes countries that their share of natural resources in GDP is over 10 per cent. Also we have used the CPI measure of corruption control.
for all the observations above this value. Results are outlined in Table 2.7.

Comparing Table 2.7 with the benchmark results in Table 2.3 shows that the role of taxation is more pronounced when the share of natural resources in GDP is high. The coefficient between taxation and control of corruption has increased by more than 40% on average, from around .073 in Table 2.3 to around .118 in Table 2.7. This is understandable. The positive impact of taxation on corruption is expected to be concave, i.e. it increases with a decreasing rate. Most of the observations in Table 2.7 come from countries that are rich in resources. The share of tax revenues in GDP of these countries is usually low, which means that an extra unit of tax revenue has a larger positive impact on corruption control.

The direct impact of natural resource rents on control of corruption is significant only in the absence of taxation. Columns (1) of Table 2.7 shows that the coefficient between resource rents and corruption control is −.014 and significant at 1% level. This result is identical to the benchmark estimate in Table 2.3. In our benchmark sample, when we control for taxation in the system, this value decreases to −.005 but remains significant at 10% level. However, controlling for taxation in the resource-rich sample makes the coefficient trivial, −.001, and insignificant. As with the benchmark results in Table 2.3, the direct impact of natural resource rents on corruption is insignificant once we control for the year fixed effects and regional fixed effects in the taxation equation.

The first rows of Columns (2), (4), (6) and (8) show the trade off between natural resource rents and tax revenues. All of the analysis shows that resource rents crowds out tax revenues significantly in resource-rich economies. Combining this with the significant and strong impact of taxation on control of corruption, means that the indirect and negative impact of resource revenues on corruption control is even stronger in resource-rich economies.

### 2.6.4 Taxation and other measures of governance

In the forgoing analysis we analysed how taxation positively affects control of corruption. We also showed how natural resource abundance can undermine this role. However, as the proponents of taxation for development discuss, the impact of taxation is much broader. Taxation is claimed to affect state and society, and how they interact. As
we explained earlier, taxation can affect the capacity of government to rule and regulate, government effectiveness in organising policies and its accountability in the face of failures in delivering them.

The World Governance indicator of the World Bank has measured the different dimensions of governance since 1996. Table 2.8 shows how taxation and some of these indicators are related. They include; voice and accountability, regulatory quality, rule of law and government effectiveness. As with corruption, since there is a two-way causal relationship between these variables and taxation, we use 3SLS regression for our analysis.

Section A of Table 2.8 shows the impact of natural resource rents on different governance indicators in the absence of taxation. In all cases, natural resource rents have a negative impact on each indicator; voice and accountability, regulatory quality, rule of law and government effectiveness respectively. Furthermore, with the exception of regulatory quality, in all other cases there is a significant trade-off between natural resource rents and income from tax revenues. In section B of the analysis we control for taxation in our corruption equation. Results are different. In the case of voice and accountability, the negative and significant impact of natural resource rents is robust to the presence of taxation. Furthermore, taxation seems not to have a clear impact on accountability. In all other cases taxation has a positive and significant impact on governance indicators. Also, in the presence of taxation the significance of natural resource rents remain as section A, however, the sizes of the coefficients decrease. As with section A for all indicators, except regulatory law, the negative relationship between resource rents and tax revenues remains significance. Meanwhile, in cases of rule of law and government effectiveness, taxation has a positive and significant impact on these indicators. This means that natural resource rents also have indirect and negative impact, through taxation, on these two indicators. In sections C and D we control for the year fixed effects and regional fixed effects. The only change is that the direct impact of natural resource rents on government effectiveness loses its significance.

The analysis in Table 2.8 shows that taxation has a positive impact on regulatory quality, rule of law and government effectiveness and not on voice and accountability. One way to explain this result is that the positive impact of taxation on development is highly likely to be through increasing state capacity rather than how state and society interact. However, one should also be aware that accountability that WGI is measuring
### Table 2.8: Other measures of governance

<table>
<thead>
<tr>
<th>Section</th>
<th>Variables</th>
<th>3LLS</th>
<th>3LLS</th>
<th>3LLS</th>
<th>3LLS</th>
<th>3LLS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Accountability</td>
<td>Tax revenues</td>
<td>Regulatory quality</td>
<td>Tax revenues</td>
<td>Rule of law</td>
<td>Tax revenues</td>
</tr>
<tr>
<td>A</td>
<td>Resource rents</td>
<td>$-0.003 (0.001)$***</td>
<td>$-0.077 (0.018)$**</td>
<td>$-0.100 (0.022)$**</td>
<td>$-0.050 (0.002)$</td>
<td>$-0.063 (0.018)$**</td>
</tr>
<tr>
<td></td>
<td>Rule of law Effectiveness</td>
<td>2.923 (4.101)**</td>
<td>.302 (0.866)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regulation Accountability</td>
<td>1.120 (3.424)***</td>
<td>4.770 (1.008)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Region</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Year</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Constant</td>
<td>$-2.551 (0.991)$***</td>
<td>$24.147 (2.489)$***</td>
<td>$-5.136 (1.860)$***</td>
<td>$31.999 (3.756)$***</td>
<td>$-2.588 (1.877)$***</td>
</tr>
<tr>
<td></td>
<td>Observation</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
</tr>
<tr>
<td></td>
<td>R²</td>
<td>.93</td>
<td>.57</td>
<td>25</td>
<td>.60</td>
<td>.34</td>
</tr>
<tr>
<td>B</td>
<td>Resource rents</td>
<td>$-0.001 (0.002)$***</td>
<td>$-0.078 (0.018)$**</td>
<td>$-0.033 (0.022)$**</td>
<td>$-0.003 (0.002)$</td>
<td>$-0.033 (0.017)$**</td>
</tr>
<tr>
<td></td>
<td>Rule of Law Effectiveness</td>
<td>3.017 (0.606)***</td>
<td>.388 (0.985)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regulation Accountability</td>
<td>1.128 (3.424)***</td>
<td>4.786 (1.007)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Region</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Year</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Constant</td>
<td>$-2.538 (0.996)$***</td>
<td>$23.971 (2.489)$***</td>
<td>$-5.302 (2.090)$***</td>
<td>$29.999 (3.754)$***</td>
<td>$-2.679 (1.993)$***</td>
</tr>
<tr>
<td></td>
<td>Observation</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
</tr>
<tr>
<td></td>
<td>R²</td>
<td>.93</td>
<td>.57</td>
<td>25</td>
<td>.60</td>
<td>.34</td>
</tr>
<tr>
<td>C</td>
<td>Resource rents</td>
<td>$-0.002 (0.002)$***</td>
<td>$-0.084 (0.016)$**</td>
<td>$-0.039 (0.022)$**</td>
<td>$-0.003 (0.002)$</td>
<td>$-0.032 (0.017)$**</td>
</tr>
<tr>
<td></td>
<td>Rule of Law Effectiveness</td>
<td>3.217 (0.999)***</td>
<td>.592 (0.955)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regulation Accountability</td>
<td>1.178 (3.424)***</td>
<td>5.094 (0.995)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Region</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Year</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Constant</td>
<td>$-2.525 (0.998)$***</td>
<td>$23.234 (3.032)$***</td>
<td>$-3.303 (2.060)$***</td>
<td>$29.392 (3.715)$***</td>
<td>$-2.914 (2.042)$***</td>
</tr>
<tr>
<td></td>
<td>Observation</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
</tr>
<tr>
<td></td>
<td>R²</td>
<td>.93</td>
<td>.57</td>
<td>25</td>
<td>.60</td>
<td>.34</td>
</tr>
<tr>
<td>D</td>
<td>Resource rents</td>
<td>$-0.002 (0.002)$***</td>
<td>$-0.089 (0.016)$**</td>
<td>$-0.006 (0.022)$**</td>
<td>$-0.088 (0.021)$</td>
<td>$-0.003 (0.001)$</td>
</tr>
<tr>
<td></td>
<td>Rule of Law Effectiveness</td>
<td>3.000 (0.701)***</td>
<td>.296 (1.146)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regulation Accountability</td>
<td>1.556 (4.342)***</td>
<td>2.205 (0.956)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Region</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Year</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Observation</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
<td>850/76</td>
</tr>
<tr>
<td></td>
<td>R²</td>
<td>.94</td>
<td>.54</td>
<td>.54</td>
<td>.54</td>
<td>.32</td>
</tr>
</tbody>
</table>

Notes: section A (system in the absence of taxation) section B (system in the presence of tax—tion) section C (system with year fixed effects) section D (system with regional fixed effects in the taxation regression, Equation (2.2)). Robust standard errors in brackets. *p < 0.10, **p < 0.05, ***p < 0.01.
might be different from, or too general for, what the proponents of taxation and development have in mind. Voice and accountability that is measured by the WGI: "captures perceptions of the extent to which a country’s citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media". However, what the proponents of taxation discuss is mostly related to holding government accountable for how it spends public revenues. In this respect accountability is more correlated with regulatory quality, rule of law and government effectiveness. In this case, it means that what is seen as an increase in the state capacity is party related to an increase in the accountability of government on how it spends the public revenues.

Another point about the findings in Table 2.8 is that even in the presence of taxation, natural resource rents could have a detrimental impact on freedom of expression, freedom of media, political and civil rights inside a country. In the table this is seen as the negative and significant relationship between voice and accountability, even in the presence of taxation or controlling for time or regional fixed effects.

2.7 Implications and conclusion

This study, to our knowledge, is the first empirical attempt to investigate the role of taxation in the relationship between natural resources and corruption. Using panel data, and by employing different econometric techniques such as Pooled OLS, FE and 3SLS the chapter sheds light on the direct and indirect effects of natural resources on corruption. The study shows that natural resources indirectly and through crowding out taxation, can result in the prevalence of corruption. The analysis shows that the direct impact of natural resources on corruption, in the absence of taxation, is very strong and significant. However, controlling for the effect of taxation the negative impact of resource rents on control of corruption loses its importance in most of the analyses. There are cases where the direct impact of natural resource rents on corruption becomes even positive and significant. This means that what is seen as the negative impact of natural resources on corruption control can be largely related to the absence of taxation in resource-rich economies. On the other hand, natural resource rents also crowds out taxation in our analysis. Taking into account the significant effect of taxation on corruption control, this means that natural resource rents indirectly and through taxation can have a negative impact on corruption control.

Our benchmark analysis in Table 2.3 is robust under different scenarios. First, we use
alternative measures of control of corruption, which is one of the independent variables in our system. Using the World Governance Indicator (WGI) and International Country Risk Guide (ICRG) measures of corruption shows that resource rents have a negative and significant impact on corruption control. As with our benchmark analysis in Table 2.3 taxation has a positive and significant impact on control of corruption once we add it to our system. Meanwhile, controlling for taxation decreases the size and significance of the direct impact of natural resource rents on corruption control. In the case of the WGI measure, the coefficient between resource rents and corruption varies very similar to that of under CPI. As we control for taxation and time fixed effects the size of the coefficient decreases, although it remains significant. Once we control for the regional effects in our taxation equation the coefficient loses its significance as well. Under the ICRG measure of corruption, the coefficient on resource rents loses its significance when we add taxation to the system. Furthermore, when we control for time and regional fixed effects the direct impact of natural resources on corruption turns positive and significant. This should not come as a surprise. In fact, as we reviewed in Chapter 1 the bulk of the literature on the resource curse supports the idea that resource rents are not bad per se for the development of the economy. However, if not allocated properly, they can realign the economic and political-economic structure of the economy in a way that is detrimental to the whole process of development. As with the benchmark model, the natural resource rents crowd out tax revenues significantly in all regressions under WGI and ICRG. Taking the positive impact of taxation on control of corruption into account, means that natural resources indirectly and through undermining taxation can contribute to corruption.

We also check our analysis under alternative measures of tax revenues. In our benchmark model we use tax revenues as a share of GDP. In Table 2.6 we replace this measure with tax revenues as a share of government revenues. Our result is in line with our benchmark findings in Table 2.3. In Table 2.6 we run our analysis for a sub-sample of resource-rich economies in our sample. Compared to the benchmark results in Table 2.3, taxation has a much stronger effect on the control of corruption in resource-rich countries in our sample. In the presence of taxation, the direct impact of natural resources on corruption control is insignificant. However, the indirect and negative impact of natural resources on
d\[\text{This is why the negative relationship between resource rents and economic performance is usually referred to as the paradox of plenty, as well.}\]
d\[\text{This chapter mainly focuses on how resources abundance changes the structure of public finances in a country and what is the implication of this for corruption as a driving force behind the resource curse. Others have studied the impact of natural resource abundance on education (Gylfason, 2001) democracy (Arezki and Gylfason, 2013) or civil war (Ross, 2012) in the past.}\]
Chapter 2. Rich in resource, poor at taxation, rich in Corruption

corruption control is strong and significant. This is because, in all our regressions, natural resource rents crowd out taxation and hence indirectly undermines control of corruption.

At the end we also check for the effect of taxation on other governance indicators, namely voice and accountability, regulatory quality, rule of law and government effectiveness. The analysis shows that taxation does not have a significant impact on voice and accountability, while it has significant and positive impact on other governance indicators. Furthermore, the direct and negative impact of natural resources on accountability is robust to controlling for taxation, time or regional fixed effects. One implication of this could be that the positive impact of taxation on governance is highly likely to be through increasing state capacity rather than improving the state/society relationship. However as we explained earlier, the concept of accountability that is used here can be different from what the proponents of taxation and development have in mind. Accountability here measures ‘perceptions of the extent to which a country’s citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media’. However, accountability for the proponents of taxation and development is mostly narrowed to the responsiveness of government with how it spends the public revenues. In other words, the latter definition is less politicised. In this respect, the impact of accountability, as the proponents of taxation have in mind, is in fact concealed in other indicators of governance such as regulatory quality, rule of law and government effectiveness.

Altogether the results highlight the importance of taxation and tax capacity in controlling corruption and improving other governance indicators. The study suggests that resource abundance has crowded out taxation and tax systems in resource-rich developing countries. These findings suggest that developing countries, in particular resource-rich ones, should invest heavily in building their tax capacity and tax systems. Financially, this is easier in the case of resource-rich developing economies. As unlike resource-poor developing economies resource-rich developing ones can ring fence part of their resource rents for this purpose. Through channels that we explained earlier, taxation is conducive to the control of corruption and misgovernance. On top of this, investing in building the tax capacity and tax system can sow the seeds for a full and sustainable fight against the resource curse, an area that needs to be addressed further, by future research.
Chapter 3

Oil-to-Cash, Corruption, and the Resource Curse

3.1 Introduction

3.1.1 Resource reliance and the violation of the social contract

The management of natural resources in resource-rich developing countries has proven to be one of the most challenging policy problems of our time. Developing countries endowed with an abundance of resources often end up trapped in low or even negative growth trajectories. Situated on a sea of natural resources in the form of oil and gas, countries such as Iran, Iraq and Nigeria have grown very slowly in the past four decades. Meanwhile, some countries in the rocky lands of southeast Asia with almost no natural resources, such as South Korea, Taiwan, Singapore and Hong Kong, have developed to the extent that their products compete with those of advanced economies in the international markets. This paradoxical phenomenon was coined by Auty (2001) ‘the resource curse’.

Although a curse may seem a puzzling outcome of a resource bonanza, it is in fact highly probable when one considers the complex dynamics involved in natural resource management. There is a significant literature on the different factors that contribute to the
Chapter 3. Oil-to-Cash, Corruption, and the Resource Curse

resource curse.\textsuperscript{1} Among these, however, many scholars believe that the prevalence of corruption and misgovernance within public institutions is the main cause of the curse (Sala-i Martin and Subramanian, 2012, Sandbu, 2006, Moss, 2010). In the countries concerned, the management of resource revenues is entirely in the hands of the government and the public have a blurred picture of how the resource incomes are earned and allocated. This lack of transparency creates fertile ground for corruption inside governing institutions. More importantly, resource abundance shifts the reliance of the government away from taxation as its main source of income to resource rents. These changes have a transformational impact on how the state and society interact. In a resource-poor economy, taxation acts as an implicit social contract between the government and its citizens. If the government is well behaved (i.e. it is not corrupt) then so too are its citizens (i.e. they pay their taxes), and if the government is badly behaved (i.e. it is corrupt), then so too are its citizens (i.e. they avoid paying their taxes). The reliance of the government on taxes is the mechanism that enforces this contract. Resource abundance allows for the violation of the contract. First, resource revenues make a government financially independent, as it no longer relies on people’s taxes for its fiscal expenditure (Mahdavy, 1970). Second, due to pervasive corruption and waste inside the public sector, people become unwilling to pay individual taxes even in cases where their government’s expenditure is not met solely through resource revenues. Furthermore, using behavioural economic models \textsuperscript{2}, Sandbu (2006) explains why people tend to care more about tax on incomes that they have earned rather than resource rents that they never see.

These factors have distanced governments from the people in resource-abundant countries in an unprecedented way. The new situation removes the most important checks and balances in relation to the behaviour of governments and thus creates an opportunity for corruption to foster within public institutions. The ultimate outcome of this vicious dynamic is slow economic growth, or the resource curse. It seems clear that under the current system of management in these countries, in which resource rents and not taxes are the main source of income for governments, there is no sustainable mechanism to constrain governments and boost transparency within the public sectors in resource-dependent countries.

\textsuperscript{1}Van der Ploeg (2011) and Frankel (2010) offer a broad review of the literature on how the resource curse might follow a resource bonanza.

\textsuperscript{2}Developed by (Kahneman and Tversky, 1984, Kahneman et al., 2003)
Figure 3.1: Oil and gas revenues in 2011 (% of total government revenue)

Note: In most of resource-rich economies government relies on resource rents rather than taxes for its income.

Source of data: Natural Resource Governance Institute

The challenge of addressing this issue has attracted many economic and political-economy scientists spanning the social science spectrum. One response to the problem has been an attempt to increase transparency and raise public awareness of natural resource management through various international institutions, such as Natural Resource Governance Institute $^3$ and the Extractive Industries Transparency Initiative. Although helpful, most of these organisations are exogenous entities and hence they cannot engage people in the management of natural resources in an active way. This means that they may not generate a sustainable demand for transparency within the public sector. More specifically, they may not be effective in re-establishing the social contract between governments and their citizens.

In recent years, proposals for the direct distribution of resource revenues as an attempt to deal with the resource curse have gained much attention. Under this policy, governments transfer part or all of their resource revenues to their citizens in the form of cash, and then tax each individual optimally. A government distributing revenues and then re-collecting them in the form of taxes may raise eyebrows at first. Where is the logic

$^3$Natural Resource Governance Institute was formed from merging The Natural Resource Charter with the Revenue Watch Institute.
in putting money into such a loop, which is administratively difficult and not free of risk? As we have said earlier, resource abundance has made governments financially independent and thus detached them from their public. Putting the resource revenues in the hands of the citizens re-establishes this link. On the one hand, governments once again rely solely upon their citizens to finance public expenditure. On the other hand, the temporary attachment of the citizens to these resource revenues makes them more interested in how their taxes are allocated and spent. This increases demand for transparency inside public institutions and decreases the potential for the development of corrupt practices.

In spite of this reasoning, there has been little theoretical work to show how oil-to-cash mechanisms, or more generally resource-to-cash mechanisms, might deal with the resource curse through controlling corruption and misgovernance in the public sector. To a large extent, this is due to the complex nature of the resource curse and how it relates to corruption and misgovernance within governing institutions. Nevertheless, there are various options available to formulate this process and demonstrate how corruption is related to the resource curse and how it operates in these economies. This chapter represents a contribution to this argument, using a general equilibrium model. The model also shows how corruption can result in the resource curse. Furthermore, it offers an explanation for the variation in the degree of the resource curse across different economies.

The remainder of the chapter continues as follows. Section 2 gives a background on the issues of the resource curse and taxation in resource-rich economies. Section 3 outlines the economy, presenting different scenarios and calculating optimal growth rates and growth-optimising tax rates for each of these scenarios. In Section 4 we compare the outcomes of each scenario and show analytically why oil-to-cash might work. In Section 5 we discuss some of critical and practical issues that oil-to-cash might face. Section 6 sums up the discussions and concludes.

### 3.2 Background

#### 3.2.1 The resource curse

Generally speaking, following a resource bonanza any outcome that can adversely affect the growth rate or the development path of the economy contributes to the resource curse. Although they usually overlap, one can categorise the causes of the curse along
Chapter 3. Oil-to-Cash, Corruption, and the Resource Curse

99

two lines: economic causes and political-economic causes.

3.2.1.1 Economic causes: Dutch disease and volatility

Most of the early work on the natural resource curse focused on economic issues such as Dutch disease and volatility. Dutch disease refers to the phenomenon of the discovery of resources resulting in a currency appreciation and hence damaging the economy’s non-resource, traded sector. If the non-resource, traded sector is the source of growth, the resource bonanza can result in deindustrialisation and despecialisation in the long run (Corden and Neary, 1982, Corden, 1984). One strand of the literature holds volatility responsible for the resource curse (Van der Ploeg and Poelhekke, 2009, Blattman et al., 2007). An intrinsic aspect of natural resources, especially oil and gas, is their price volatility in the international markets. This volatility can create fluctuations in the income streams of resource exporters. Some countries, such as Norway and Chile, use various forms of parking funds (wealth funds, development funds or saving funds) to smooth these fluctuations in their economy. However, most resource-exporting developing countries have failed to manage these funds properly. Broadly speaking, governments increase their spending during booms and have to cut spending during busts, resulting in procyclical fiscal policy. Volatility in receipts is therefore easily transmitted to the national economy. According to Frankel (2011), running counter-cyclical fiscal policies to control these boom-bust cycles is what makes Chile stand out not only among resource-rich countries, but also even among developed economies.

3.2.1.2 Political-economic causes: corruption and governance

Resource bonanzas can also threaten the health of the economy through political and political-economic channels. The windfalls create fertile ground for corruption and rent-seeking activities within governing institutions. There is a wealth of literature on how corruption, and public sector corruption in particular, can hamper economic growth (Mauro, 1995, Blackburn et al., 2011, Ehrlich and Lui, 1999, Rose-Ackerman, 1978). A resource bonanza can also instigate political instability. Most resource-rich economies tend to operate under dictatorships or weak democracies. Ross (2012) shows that oil-rich countries are more prone to civil war, especially if the countries are ethnically fractionised. He relates the tensions between the Kurdish people and the central governments
in Iraq, Iran to the fact that the Kurdish regions in these countries are rich in resources, stimulating calls for independence.

Corruption, the abuse of public office for private gain, has a history as old as civilisations. Corruption is still seen as a cancer that threatens the developing world (World Bank, 1996). It undermines the quality of public and private institutions and hence the whole process of social, economic and political development. In resource-rich economies, the adverse effect of corruption is even more pronounced. The existence of natural resources creates huge rental potential, and wherever and whenever there is rent available, there are rent-seekers and hence the potential for corruption. It should also be mentioned that the impact of resource bonanzas on any given economy, and the experiences among resource-abundant economies, are diverse. Whether this rent accelerates the development process or derails it hinges on the quality of the institutions at the time of the discovery of the resource (Mehlum et al., 2006a,b). Consider an economy with a fixed number of people who can become either entrepreneurs or rent-seekers. If, at the time of the discovery, production-friendly institutions are in place, the profits from engaging in production-friendly activities are high and agents prefer to become entrepreneurs. However, if institutions are ‘grabber-friendly’, people tend to be attracted to rent-seeking activities such as crime and corruption. While developed economies such as Norway, Australia and Canada had developed institutions at the time of discovery of their natural resources, the quality of the respective institutions in most developing countries was poor. Nigeria, Venezuela, Sierra Leone and Congo are all examples of countries that had weak institutions at the time of discovery and where resource abundance has exacerbated the scale of corruption. In fact, the scale of corruption and misgovernance is so high in these countries that many researchers believe that the failure to control it, rather than any economic reason such as Dutch disease, is behind their poor growth performance. Explanations for why resource bonanzas might impede economic development have therefore shifted from an economic to a political-economic emphasis (Sala-i Martin and Subramanian, 2012, Moss, 2010, Collier and Hoeffler, 2005, Ross, 2012).

The high level of public sector corruption in resource-dependent countries is due to the interaction between resource rents and the political systems in these countries. The political systems that contemporary economies operate under can loosely be divided into three groups: mature democracies, loose democracies and autocracies (dictatorships). The modern democracies that prevail in the developed world are characterised by strong
and effective states, established institutions and industrialized economies. Their resource revenues relative to the size of their economy are usually small, and their well-structured institutions easily absorb the resource rents into the economy. In contrast, the political systems of developing countries tend to be dictatorships or loose democracies. Their institutions are weak or even non-existent and their resource revenues account for a large share of their GDP. Resource abundance is known to promote economic growth in mature democracies but it seems to damage growth in both autocracies and loose democracies, with the latter more adversely affected than the former (Collier and Hoeffler, 2005). The reason for the sometimes successful economic performance of dictatorships relative to weak democracies is that factors such as state capacity, law enforcement or property rights that are conducive to development can also be found in non-democracies (Fukuyama, 2014, Frankel, 2010).

After a resource bonanza, governments are flooded with windfall revenues and no longer rely solely on tax incomes for their public expenditure. Resource revenues are continuously delivered to the incumbent government, but are hidden from public view. Since the citizens do not own the resources directly, their voices and preferences on how these revenues should be spent are ignored. The government has full control over this money and the first thing that the political party (or dictator) in power wants is to guarantee its hold on office. Due to a lack of scrutiny, parties in power find patronage more effective than the provision of public goods to help them stay in office. Accordingly, favouritism and nepotism become commonplace and leaders buy votes and loyalty in return for public employment (Auty, 2001, Isham et al., 2005). Meritocracy is usually non-existent and people are employed or reshuffled on the basis of their loyalties to those in power. This political change paves the way for pervasive corruption, misgovernance and inefficiency inside the public sector. Public officials responsible for the allocation of resources do so on the basis of kickbacks rather than based on how they may impact the economy. For example, it is very common for such countries to choose ambitious, unrealistically large projects, known as ‘white elephants’. The return on these projects for the economy is usually low, and in most cases it is beyond the capacity of the state to deliver them. However, politicians use white elephants prior to elections to manipulate voters (Robinson and Torvik, 2005) and due to their huge scale and their obscured facades, the projects also become a natural habitat for corruption and rent-seeking.

Another challenge for resource-rich developing economies is a lack of public capital
Chapter 3. Oil-to-Cash, Corruption, and the Resource Curse

(Bhattacharyya and Collier, 2013). However, this is not directly linked to a lack of public investment; in fact, public investment among some of these resource exporters is quite substantial (Pritchett, 2000). The problem is that most of the investment is not turned into capital. In a study of developing countries, Dabla-Norris et al. (2012) shows that only 40 per cent of investment spending is converted into capital stock, and the percentage is even lower in resource-rich countries. Although factors such as the existing stock of capital and the low capacity of the economy to absorb the investment can increase inefficiency (Van der Ploeg, 2012), the waste due to corruption is responsible for a large amount of this inefficiency (Kenny, 2006, 2007). But the problem does not end here. If the corrupt money were to be rechannelled back into the economy through the private sector, this could compensate in part for some of the damage caused by the corruption. However, most of these countries are subject to political instability and a high probability of civil war (Ross, 2012), which lowers the incentive for private investment. In many cases, the corrupt money does not even enter the private sector of the economy, but instead flows abroad in the form of portfolio capital.4

3.2.1.3 Taxation, governance and accountability

As discussed above and found in Chapter 2, the shift from taxation to resource income is the main consequence of a resource bonanza. But why should the source of income have such a big impact on the quality of governance and state capacity? Historically, governments – as institutions established to run the state – owe their administrative capacities to the existence of taxation, especially direct taxation (Brautigam et al., 2008, Fukuyama, 2004). Long-lasting, expensive wars forced states to tax their citizens, and in turn to develop their bureaucratic and administrative capacities to manage the income. Meanwhile, citizens wanted accountability for how the taxes were raised and spent. Therefore, albeit at different levels and sometimes implicitly, taxation has always created a tool with which taxpayers can hold governments accountable. Even in patrimonial societies where the king practically owned the state, tax payers wanted the assurance that their taxes were being used to create security, law and order within society. This accountability has increased over time. In modern history, the reliance of governments on taxation is closely linked to capitalism and liberal democracy (Schumpeter, 1918, Huntington, 1993,

4We exploit this fact in the model where we assume that corrupt wealth, both in the private and public sectors, is dissipated fully and does not contribute to the economy in any form.
Ross, 2004a). In fact, parliaments, as the cornerstone of modern democracies, were historically founded by tax payers to hold monarchs accountable for how taxes were raised and spent. In the mature democracies, this function of taxation is so established that it is no longer even discussed; discussion of taxation in these countries centers around tax policies rather than the link itself. However, in recent years the issue of the link between taxation and governance has re-emerged, and for the first time in the context of development. This is due to the boom in natural resource rents in the 1970s and the fact that the main source of income in a number of resource-rich economies has moved from taxation to natural resources (Moore et al., 2007). In a resource-poor economy under the motto of 'no taxation without representation', governments have to comply with the social contract. In other words, while in a tax-dependent economy 'no taxation without representation' is a demand, in a resource-dependent economy 'no representation without taxation' is a political fact (Huntington, 1993). As a policy initiative to change this fact, 'oil-to-cash' aims to change resource revenues into tax incomes, and thus re-establish the direction of accountability and address the resource curse. This chapter provides a theoretical framework for such a scheme and assesses its viability.

In Chapter 2 we discussed that natural resource rents are associated with higher levels of corruption. We studied the role of taxation in this relationship. Our analysis shows that taxation has a positive impact on control of corruption. Meanwhile, controlling for taxation weakens, and in many cases changes, the negative impact of natural resource rents on corruption control. One implication of this is that absence of taxation can explain part of the negative impact of resource rents on corruption control. This claim is further supported by our analysis which also shows that resource revenues have crowded tax incomes in resource-rich developing economies. The destructive impact of the reliance of government on natural resources and not taxes on the control of corruption is exploited, as an assumption, in setting up our growth model. The model is outlined in the following section.

### 3.3 The economy

Consider an overlapping generation economy with three agents: households, government and firms. The economy is endowed with an infinite amount of resources of which $X_t$ is extracted during each period. Time is discrete and indexed by $t = 0, 1, 2, ..., \infty$ and there is a unit of population of agents who live for two periods. Agents work only when
young and they consume only when old. Each agent supplies one unit of labour inelastically and their total income is saved and rented to firms in the form of capital. Agents derive utility from consumption in the second period. There is no uncertainty, agents cannot borrow from or lend to each other, and there is no altruism across generations. Firms combine private and public inputs to produce a homogeneous good which can be consumed or saved in the form of capital. The exchange rate is fixed and is normalised to unity, since we do not deal with issues of volatility and the Dutch disease. As we have said, the economy extracts some natural resources in each period, from which the government derives revenues. The government uses this revenue to finance productive public expenditure in one of two ways: either by allocating the revenue directly to the provision of public goods and services, or by transferring the revenue to households and then claiming it back through taxes to be spent on such provision. The government also obtains revenue from taxes on household incomes. However, a household’s willingness to pay taxes depends on the government’s compliance with the implicit social contract between the two parties – taxes are paid if the households observe no corruption inside the government, taxes are evaded if the households observe otherwise. It should be noted that in our analysis we have assumed that corruption in the provision of public goods occurs only when the provision is financed directly by resource revenues. This is not an ad hoc assumption. In Chapter 2 we show that countries that have heavier reliance on natural resource revenues rather than taxes are more prone to corruption.\(^5\) As we explained this is due to the positive role that taxation can play in the development of political, economic and social institutions.

In this chapter, we start our benchmark model with an economy that is resource-poor. The social contract is met, i.e. there is no corruption in the public sector and people therefore comply with their tax obligations. Then we add natural resources to the model, based on three scenarios. First, we start with an ideal benchmark where resource revenues are allocated to public expenditure and we assume that the social contract is upheld (‘resource-to-public expenditure without corruption’). Second, we consider a more realistic scenario in which the social contract is violated. Resources are allocated to public expenditure but

\(^5\)Essentially, here the assumption is that when the provision of public goods is financed directly by resource revenues corruption is higher than when it is financed by tax revenues. However, for simplicity we can assume that corruption zero when the public goods are financed by tax revenues and greater than zero when they are financed by resource rents. One could also continue the analysis with two distinct rates for corruption, one greater than another. This, however, complicates the derivation without changing the results.
corruption inside the public sector gives rise to tax evasion by households (‘resource-
to-public expenditure with corruption’). Third, we assume that resource revenues are
directly allocated to the citizens and then taxed optimally (‘resource-to-cash’). Under
this scenario, corruption is absent as resource revenues are treated like wage incomes and
households have full control over them. Of these scenarios, the resource-poor economy
and ‘resource-to-public expenditure without corruption’ are used as benchmarks. This
facilitates comparisons between the realistic scenario of ‘resource-to-public expenditure
with corruption’ and the ‘resource-to-cash’ scenario, i.e. the policy initiative. We show
that, by replicating the framework of a resource-poor economy, a resource-to-cash pro-
gramme can reestablish the social contract in a resource-rich economy.

3.3.1 A resource-poor economy

As a benchmark, we assume that the economy is resource-poor and that the govern-
ment relies on individual taxes to finance its expenditure. Paying for public expenditure
prompts the citizens to investigate how the government allocates their taxes. The contin-
uous checking and monitoring by the people, together with the fact that the government
does not have any other source of income, strengthens the social contract and stifles cor-
rupption within the public sector.

3.3.1.1 Firms

The representative firm combines private and public inputs to produce output, $y_t$.
Private inputs include units of labour $l_t$, which are provided by the young and units of
capital $k_t$ rented from the old. Public input is the aggregate stock of public goods $g_t$
provided by the government (Barro, 1990). The firm has a Cobb-Douglas technology and
generates output according to

$$ y_t = A l_t^{\alpha} k_t^{1-\alpha} g_t^\alpha, \quad (3.1) $$

$(A > 0, \alpha \in (0, 1))$. Markets for private factors are competitive and both labour and
capital are paid at their margins. Profit maximization implies

$$ w_t = \alpha A l_t^{\alpha-1} k_t^{1-\alpha} g_t^\alpha = \frac{\alpha y_t}{l_t}, \quad (3.2) $$
where $w_t$ is the competitive wage rate and $r_t$ is the competitive rental rate.

### 3.3.1.2 Households

Each individual household lives for two periods. In the first period it provides one unit of labour, which is paid for at the competitive wage rate. Household wages are the only source of income and are subject to a proportional tax $\tau$. The after-tax wage is saved according to

$$s_t = (1 - \tau)w_t. \quad (3.4)$$

This saving is rented to the firms in the form of capital. In the second period the household does not work. It uses the saving to finance the second period of consumption, from which it derives utility.

### 3.3.1.3 Government

The economy is resource-poor, so the only source of the government’s budget is the tax income that it collects from the labour force (i.e. the young). The government’s objective is to maximise growth. It runs a balanced budget in each period, so its budget constraint can be written as

$$g_t = \tau w_t. \quad (3.5)$$

### 3.3.1.4 Equilibrium growth rate and public policy

In equilibrium, markets clear. The labour market equilibrium condition requires $l_t = l = 1$. The capital market equilibrium requires the total supply of saving by the young to equal the total demand for capital. Therefore, the capital accumulation process can be given as $k_{t+1} = s_t$. Given these and the results from (3.1), (3.2) and (3.4), the growth rate of the economy is

$$\frac{k_{t+1}}{k_t} = \gamma = (\alpha A)^{\frac{1}{1-\sigma}} (1 - \tau)^{\frac{1}{1-\sigma}}. \quad (3.6)$$

From (3.6) one can see the two conflicting effects of taxes on savings and hence on the growth rate of capital. On the one hand, taxes can directly decrease household savings and
therefore the growth rate of capital. On the other hand, through higher government spend-
ing, taxes can improve wages and therefore increase savings within households indirectly.  
This argument means that there is an optimal tax rate in the economy that maximises  
growth.

To find the growth-maximising tax rate, we need to maximise (3.6) with respect to  
the tax rate $\tau$. The optimal fiscal policy is to choose a tax rate that equals the marginal  
productivity of the government’s public expenditure in output, the standard Barro rule,  

$$
\tau^* = \alpha.  \tag{3.7}
$$

3.3.2 A resource-rich economy

Now consider an economy that is endowed with an infinite amount of natural re-
sources. Assume that in each period the government extracts $X_t$, which is a constant  
share, $\phi$, of non-resource output, $y_t$,  

$$
X_t = \phi y_t,  \tag{3.8}
$$

( $0 < \phi < \infty$). This assumption is used mainly as a technical device to simplify the  
analysis and to facilitate a comparison between alternative cases. At the same time, the  
assumption is not too far removed from what one often observes in practice, and cap-
tures the idea that holding everything else constant, a developed economy tends to extract  
more. Here, the quality of institutions, the availability of public capital and technological  
progress, which are proxies for development, are approximated by $y_t$. In a recent study,  
Cust and Harding (2014) show that countries with high-quality, established institutions  
tend to extract a higher quantity of resources. To control for geographical characteristics  
and the amount of available resources, they study oil fields near a border between neigh-
bouring countries and find that the number of wells drilled on each side of the border is

---

6 $X_t$ is also the flow of resource revenues to the economy in each period, since exchange rate is fixed and normalised to unity.

7 As $y_t$ is a non-resource output, $\phi$ can take values higher than one.

8 The combination of infinite resources plus the extraction of resources in proportion to output gives rise to a constant balanced growth rate; the effect of a resource bonanza is to permanently alter this growth. Relaxing the assumptions would simply mean that the growth effect is temporary, but there would still be a permanent effect on the level of output. In addition, it is not the intention of this chapter to delve into issues of optimal resource extraction.
positively related to the quality of the institutions in the respective countries.

The assumption of infinite natural resources also seems reasonable. Proven oil reserves in countries such as Iran, Iraq and Venezuela are so vast that it is not unrealistic to assume them to be infinite (Esfahani et al., 2014). Furthermore, the government of a capital-scarce economy, with even a temporal windfall, may choose not to postpone the extraction of resources and instead behave as if the resource is infinite. Irresponsible, extreme rates of extraction can result from an unstable and short-term political environment in resource-rich developing economies. As discussed above, these countries are usually ruled by dictators or loose democracies. To strengthen their fiscal and political stance, those in power accelerate extraction during their time in office and behave as if the resource is infinite. Another justifiable explanation is that it may not be optimal for an economy with scarce public capital and high levels of poverty among its current population to postpone investment and consumption in favour of future, richer generations (Van der Ploeg, 2012). For example, when Turkey started oil extraction in the 1930s, it was a relatively poor country and lacked the basic public infrastructure that was essential to stimulate growth in the economy. It was therefore better for the country to ramp up the extraction and invest the proceeds on the grounds that it would achieve a higher rate of return.

3.3.2.1 Resource-to-public expenditure without corruption

In the previous scenario we use a resource-poor economy as a benchmark with the social contract upheld. In this section we add natural resources to the economy, holding everything else as before. This gives us the net impact of resource abundance when the social contract is not violated. In line with this, we assume that the government directly allocates the resource revenues to public expenditure in an efficient manner. There is no corruption inside the public sector and hence people fulfil their tax obligations fully. This scenario should therefore generate a higher growth rate than in the resource-poor economy. In the next section we use this latest scenario as the benchmark to see how the violation of the social contract affects the economy.

It should be mentioned that this current scenario does not depict reality. However, it allows the separation of two effects: resource abundance, and the violation of the social contract (or simply corruption). In the next section we outline a more realistic picture in which we relax the assumption of non-violation of the social contract.
3.3.2.1 Households

Similar to the benchmark economy, the only source of income for households is wage income. Resource revenues are directly allocated to public expenditure, and we assume that there is no corruption within the public sector. Therefore, government expenditure is efficiently allocated to the production of productive public goods. And since there is no corruption within the public sector, households are ready to comply with their tax obligations. Given this, they save their after-tax income as

\[ s_t = (1 - \tau)w_t. \]  

(3.9)

3.3.2.1.2 Government

The government controls resource rents and channels them directly to public expenditure. There is no corruption in the public sector and hence households pay their wage taxes fully. The government allocates both types of income for the provision of public capital (goods) which is used by the firms as an input towards private sector production. The government runs a balanced budget in each period, and the budget constraint of the government can thus be written as

\[ g_t = \tau w_t + X_t. \]  

(3.10)

3.3.2.1.3 Equilibrium

Market-clearing conditions, \( l_t = l = 1 \) and \( k_{t+1} = s_t \), together with (3.1), (3.2), (3.8) and (3.9), generate the growth rate of the economy as

\[ \frac{k_{t+1}}{k_t} = \gamma = \alpha A(1 - \tau)[A(\tau \alpha + \phi)]^{\frac{\alpha}{\alpha - 1}}. \]  

(3.11)

It is clear that the growth rate of the economy in (3.11) is greater than (3.6), i.e. the growth rate under ‘resource-to-public expenditure without corruption’ is greater than the growth rate of the benchmark, the resource-poor economy. This clearly shows that in the absence of corruption, resource abundance can be a blessing rather than a curse.

Optimising (3.15) with respect to the tax rate \( \tau \) gives the optimal tax rate as follows
Equation (3.12) shows that allocating the resource rents to the public expenditure directly decreases the optimal tax rate compared to the resource-poor economy, $\tau$. This is because resource rents are fully allocated to the public expenditure and the government does not need to tax wage incomes as heavily as in the resource-poor economy.$^9$

3.3.2.2 Resource-to-public expenditure with corruption

Using the previous scenario as a benchmark, this section studies the impact of the violation of the social contract. This scenario is representative of the situation in most resource-rich developing countries. Under this scenario, the government directly allocates resource revenues to public expenditure. Due to the lack of accountability and transparency, however, corruption is pervasive and a fraction $\theta$ of the resource rent is pocketed by public agents. The loss of resource revenue due to corruption in the public sector dissuades households from complying fully with their tax obligations. Households therefore withhold paying tax on a fraction $\mu$ of their income in each period. The concealed money, in both the private and the public sector, flows abroad and does not contribute to the national economy in any form.$^{10}$

3.3.2.2.1 Households

Wage income is still the only source of income for households. As discussed above, corruption inside government prompts households to conceal a fraction $\mu$ of their wages in each period to avoid tax. We assume that this concealed amount flows abroad and does not contribute to the national economy in any form. The saving of the individual household is therefore given as

$$s_t = (1 - \tau)(1 - \mu)w_t.$$  

---

$^9$There is a threshold for the amount of resources in the economy $\phi = \frac{\alpha^2}{1-\alpha}$ above which the government does not need to tax and the optimal tax rate decreases to zero. In principal, above this threshold the resource revenue is more than the government expenditure in each period. Therefore, the government should pay the difference back to the people in some form or other.

$^{10}$This is a very common form of money laundering used by politicians and public agents in developing countries. Unstable political systems and the weak prosecution powers of developing countries contribute to this illegal form of resource flows.
3.3.2.2 Government

The government has two sources of income: natural resource revenues and tax incomes. Due to misgovernance in the public sector, only a fraction \( \theta \) of the resource rent turns into productive public goods, with the rest, \( 1 - \theta \), being wasted through corruption. As a direct result of this, households conceal a fraction \( \mu \) of their income wage from taxation and the government is only able to tax the rest. In other words, the social contract between citizens and government is violated.\(^{11}\)

The government’s budget constraint is thus written as

\[
g_t = \tau (1 - \mu) w_t + \theta X_t. \tag{3.14}\]

3.3.2.3 Equilibrium

In equilibrium, market-clearing conditions require the equivalence of demand and supply in capital and labour markets, \( l_t = l = 1 \) and \( k_{t+1} = s_t \) respectively. These conditions, together with (3.1), (3.2), (3.8) and (3.13), give the growth rate of the economy as

\[
k_{t+1} \over k_t = \gamma = \alpha A(1 - \tau)(1 - \mu)[A(\tau \alpha(1 - \mu) + \theta \phi)]^{\alpha - 1}. \tag{3.15}\]

Comparing Equations (3.15) and (3.11) shows that for any tax rate, the growth rate under ‘resource-to-public expenditure without corruption’ is greater than under ‘resource-to-public expenditure with corruption’. Also, the growth rate in (3.15), unlike (3.11), can be smaller than (3.6).

Taking the derivative of the growth rate in (3.15) generates the optimal fiscal policy as follows

\[
\tau^* = \frac{(1 - \mu)\alpha^2 - \theta \phi (1 - \alpha)}{(1 - \mu)\alpha}. \tag{3.16}\]

The result shows that higher levels of tax evasion by households and corruption in the public sector increases the optimal tax rate. Comparing this tax rate with the tax rate under ‘resource-to-public expenditure without corruption’, we derive that (3.16) \( > \) (3.12) if \( \mu < 1 - \theta \). In other words, the optimal tax rate under ‘resource-to-public expenditure with corruption’ is higher if the rate of corruption in the public sector is higher than the

\(^{11}\)The social contract can also be modelled explicitly as \( \mu = \omega (1 - \theta) \). This replaces parameter \( \mu \) with \( \omega (1 - \theta) \) in the equations. However, it does not affect the result of the analysis.
rate of tax evasion in the private sector.

In what follows we show how, by using these benchmark scenarios, we are able to compare this more realistic case of ‘resource-to-public expenditure with corruption’ with the ‘resource-to-cash plan’, a policy aimed at tackling the resource curse.

3.3.2.3 Resource-to-cash

In the introduction we explain why the social contract is more likely to be upheld in a resource-poor economy. Basically the government relies on individual taxes for its expenditure and this in turn enforces accountability and decreases corruption in the public sector. In a resource-rich economy, which operates under the ‘resource-to-public expenditure with corruption’ we see how a resource bonanza can weaken this dependence and therefore pave the way for the violation of the social contract. In what follows, we show how by going back to a resource-poor economy’s set up, a resource-to-cash programme reestablishes the social contract in a resource-rich economy as well.

Under resource-to-cash scenario, the government is completely dependent on the public who now receive the resource revenues fully. The direction of dependence under the new arrangement becomes textbook and citizens have the means to enforce accountability. An accountable and transparent public sector in turn, creates incentives for the private sector to comply with its tax obligation as well.

3.3.2.3.1 Households

The resource-to-cash programme transfers resource rents $X_t$ to households in the form of cash. Households fulfil their tax obligations fully because the situation that gives rise to tax avoidance – i.e. corruption inside the public sector – does not exist.\(^\text{12}\) The resource transfers are treated like wage income by the government. That is, after handing out the resource transfers, the government treats them like any other household income and taxes them accordingly.\(^\text{13}\) The after-tax income (wages plus resource transfers) is saved as

$$s_t = (1 - \tau)(w_t + X_t).$$

\(^{12}\)The zero corruption rate here is to simplify the analysis. The results still hold in the presence of corruption if we simply assume that corruption under ‘resource-to-public expenditure with corruption’ is higher than that under the resource-to-cash policy.

\(^{13}\)For simplicity, we assume that both sources of income are taxed at the same rate.
The other characteristics of the households remain as before.

3.3.2.3.2 Government

The economy is resource-rich, and resource rents are handed to households in the form of cash at the beginning of period one. As outlined above, the government treats resource rents as wages and taxes the whole income of the household in the same way. The government runs a balanced budget and its objective is to maximise growth. Therefore, the government’s budget constraint can be written as

\[ g_t = \tau(w_t + X_t). \]  

(3.18)

There is no corruption inside the public sector and the tax on both types of income is transferred into productive public capital without any inefficiency.

3.3.2.3.3 Equilibrium

The market-clearing conditions require the equivalence of demand and supply in the markets for labour and capital, shown as \( k_{t+1} = s_t \) and \( l_t = l = 1 \) respectively. These conditions, together with (3.1), (3.2), (3.8) and (3.17), give the growth rate of the economy as

\[ \frac{k_{t+1}}{k_t} = \gamma = \left[A(\alpha + \phi)\right]^{\frac{1}{\gamma}}(1 - \tau)^{\frac{\alpha}{1 - \alpha}}. \]  

(3.19)

Comparing Equations (3.6) and (3.19) shows that, under any tax rate the growth rate of the resource-rich economy under the resource-to-cash policy is higher than in a resource-poor economy. As with ‘resource-to-public expenditure without corruption’, this clearly shows that in the absence of corruption, resource abundance can be a blessing rather than a curse.

Optimising the growth rate of the economy in (3.11) with respect to the tax rate \( \tau \) gives the optimal tax rate as

\[ \tau^* = \alpha. \]  

(3.20)

One can see that the optimal tax rate under the resource-to-cash policy is equal to the tax rate in a resource-poor economy, \( \tau = \alpha \). In other words, Equation (3.20) shows that resource abundance does not change the growth-optimising tax rate if the country operates a resource-to-cash programme.
3.4 Comparative analysis

In the preceding section, we outlined different scenarios and calculated the optimal growth rates and optimal fiscal policies under each framework. We now offer a comparative analysis of the results.

The relative growth rates under ‘resource-to-cash’ and ‘resource-to-public expenditure without corruption’, (3.19) and (3.11) respectively, depend on the tax rate, the marginal productivity of public or private capital, and the size of the resource revenue in the economy. In particular, one can determine a critical (threshold) level of taxes at which the two growth rates are equal and then deduce the implications of a tax rate that is either lower or higher than this. The key factors which determine this threshold can also be observed. For a simple illustration of the threshold, consider the case in which

\[ \alpha = 1 - \alpha^{14}, A \equiv \tau = \frac{\phi}{2(\gamma + \phi)(\gamma - \phi)}. \]

With a tax rate above this threshold, the growth rate of the economy under ‘resource-to-cash’ is higher than under ‘resource-to-public expenditure without corruption’. It is clear that the value of the threshold gets closer to zero as the share of resources in the economy, \( \phi \), increases. This means that in a country with a large share of resources, at almost any positive tax rate the growth rate under resource-to-cash is higher than resource-to-public expenditure without corruption. In Figure 3.2 the threshold tax rate, \( A \), is where lines ‘c’ and ‘d’ intersect, respectively (3.11) and (3.19).\(^{15}\)

As with the previous case, comparing (3.15) and (3.19) shows that there is a threshold tax rate above which the growth rate of the economy under ‘resource-to-cash’ is higher than that under ‘resource-to-public expenditure with corruption’. This threshold is

\[ C \equiv \tau = \frac{(1 - \mu)\theta \phi}{2(\gamma + \phi)(\gamma - \phi)(1 - \mu)} \]

As the figure shows, threshold C is below threshold A. This is due to the presence of corruption and tax avoidance, in other words, the violation of the social contract. One can see that as the share of natural resources, \( \phi \), in the economy increases, the threshold rate falls. There are two reasons behind this. First, at any given tax rate, the higher share of resources increases the growth rate under ‘resource-to-cash’,

\(^{14}\)It should be noted that marginal productivity of government spending in general is non linear(Agénor, 2012). However in most of developing countries, due to inefficiency and corruption inside public sector, it is underestimated. If so, \( \alpha > 1 - \alpha \), the optimal taxation for all cases in our analysis increases.

\(^{15}\)As one can guess from the Figure 3.2 the optimal policies under under scenarios ‘a’ and ‘c’ is to have negative tax rates. However, as we do not have any economy with negative tax rate, growth rate of the economy has been provided under positive tax rates.
shifting the growth line up; meanwhile under ‘resource-to-public expenditure with corruption’ the increase in the share of resources decreases the dependency of the state on taxes and thus makes the positive tax rate less efficient. Second, holding every thing else constant, an increase in corruption, $1 - \theta$, or in tax evasion, $\mu$, decreases the threshold for any tax rate. This second reason is the focus of this chapter. The model clearly shows how the violation of the contract (i.e. an increase in corruption, and hence in tax evasion) pushes the growth rate of the economy down and decreases the threshold tax rate.\footnote{This transition corresponds to the downward movement of line ‘c’ to ‘a’, and the fall of threshold A to C.}

Comparing Equations (3.11) and (3.15) shows that at any tax rate, the growth rate under ‘resource-to-public expenditure without corruption’ is greater than under ‘resource-to-public expenditure with corruption’. Also, at a glance one sees that the growth rate in (3.15), unlike (3.11) and (3.19), can be smaller than (3.6). In other words, in the presence of corruption, resource-to-public expenditure can generate a growth rate that is lower than that of a resource-poor economy, i.e. line ‘a’ can fall below line ‘b’. In this case, the threshold above which the growth rate of the resource-poor economy is higher depends on the rate of corruption, the rate of tax evasion, the share of natural resources in the economy, and the marginal productivity of public and private capital. The threshold tax
rate is $B \equiv \tau = \frac{2(1-\mu)\theta\phi}{1-(1-\mu)^2}$. An increase in corruption, $1 - \theta$, an increase in tax evasion, $\mu$, or a decrease in the share of resources in the economy, $\phi$, reduces this threshold and increases the possibility that the growth rate of the economy falls below that of a resource-poor economy. This analysis clearly shows how the violation of the social contract can result in the resource curse. Corruption in the public sector not only wastes resource revenues, but also increases tax evasion among households. This two-fold waste can result in a growth rate that is lower than that of a resource-poor economy that has no corruption and relies only on tax revenues for its expenditure. This is a worst-case scenario, but it represents a highly probable form of the resource curse that a resource-rich economy can become trapped in. The growth rate in (3.15) can also be greater than (3.6) but it does not come close to its highest limit (potential), which is (3.11). This subtle form of the resource curse happens when the scale of corruption and tax evasion is trivial. It can also happen when the amount of resources in the economy is so high that the revenues can compensate for any waste in the public sector and the tax evasion practices of the private sector. This is the case in particular in the countries of the Gulf Cooperation Council (GCC).

The growth-maximising tax rates for ‘resource-to-public expenditure without corruption’ and ‘resource-to-cash’ are given in (3.12) and (3.20) respectively. Substituting these tax rates in the growth equations, (3.19) and (3.11) respectively, shows that the growth rates of the economy under these two scenarios are equal. This is to say that in the absence of corruption, there exists a public policy choice that can generate a growth rate as high as that under ‘resource-to-cash’. Therefore, it should not matter whether resources are transferred to the people or allocated to public expenditure. On the other hand, Equation (3.16) is the optimal public policy under ‘resource-to-public expenditure with corruption’. Generally, at any rate (and therefore under this specific tax rate) the growth rate of the economy under ‘resource-to-public expenditure without corruption’ is greater than the rate under ‘resource-to-public expenditure with corruption’. Knowing that the growth rates of the economy under the optimal tax rate for ‘resource-to-cash’ and ‘resource-to-public expenditure without corruption’ are identical, we can derive the following important conclusion. With optimal fiscal policy in place for each scenario, the growth rate of the economy under ‘resource-to-cash’ is greater than under ‘resource-to-public expenditure with corruption’.

\footnote{As before, to illustrate the threshold we calculate it for the simple case where $\alpha = 1 - \alpha$.}
To sum up our analysis, the exact level of the growth rate and the optimal tax rate depends on the share of natural resources in the economy, $\phi$, the rate of corruption in the public sector, $1 - \theta$, the tax evasion rate in the private sector, $\mu$, and the marginal productivity of private and public capital. However, holding everything else constant, the model clearly shows that the violation of the social contract (i.e. an increase in corruption leading to tax evasion) can hamper economic growth. It also shows how the degree of this violation can explain the diverse experiences among resource-rich economies when it comes to the resource curse.

Finally, the analysis shows how the oil-to-cash programme, a policy initiative aimed at re-establishing the social contract, can address the resource curse. To do this, the model is set to compare growth rates of the economy under ‘resource-to-public expenditure with corruption’ (the realistic scenario) and ‘resource-to-cash’ (the policy initiative). Using ‘resource-to-public expenditure without corruption’ as a benchmark, one can see that under optimal fiscal policies, the growth rate of the economy under ‘resource-to-cash’ is always higher than under ‘resource-to-public expenditure with corruption’. This is precisely the argument that the proponents of oil-to-cash policies stress in support of a direct distribution of resource revenues to the public.

3.5 Discussion

3.5.1 Some criticisms that the oil-to-cash programme faces

Although several countries have started some form of direct distribution of resource revenues, no resource-rich economies have implemented it using the framework presented above, i.e. resource-to-cash (or the more specific focus of this chapter, oil-to-cash). Governments do pass on some of their resource revenues in the form of cash transfers, but the process does not include any taxation on the transfers, which is the centrepiece of the oil-to-cash framework. This means that although oil-to-cash is gaining attention in political and academic circles, it is not still exercised. In what follows, we present a critical review of some of the arguments for and against the programme.

Our model focuses on corruption as the driving force behind the resource curse and depicts how oil-to-cash, by re-establishing the social contract, can address the problem. The issue is that not only is the scope and opacity of corruption in resource-dependent
developing economies massive, but it also can happen at various stages. These include the signing of contracts and allocation of licences to extracting companies, the taxation of extracting companies, in announcing the true size of the extracted resources, in the price that resources are sold at, in government spending policies, and in procurement in the public sector. The oil-to-cash method does not affect most of these stages directly; for example, it does not affect how contracts are signed. Also, unless there is serious and sufficient pressure, the original amount of resource rent is not announced and hence is still subject to manipulation. The oil-to-cash programme only reveals the sum of the resource revenues that are distributed in the form of cash. Another possibility is that the programme might result in the substitution of corruption from the transparent to the non-transparent stages of resource management. However, proponents of oil-to-cash claim that once the social contract is established through taxation, it reinforces accountability and transparency at all levels of governance. To put it another way, demands for transparency may not be limited to oil-to-cash, but may be diffused into all levels of resource management.

For countries that rely heavily on resource rents for their public expenditure, oil-to-cash is not free of risks or uncertainties. One issue with different forms of direct distribution in general, and oil-to-cash in particular, is their irreversibility. A study on the state of Alaska (Goldsmith, 2002) reveals that any politician who even considers a policy that might decrease the cash transfers to households in any way is better off looking for another career. Due to the politically irreversible nature of cash transfers, they are usually prioritised over other areas of public expenditure. For example, during an economic downturn politicians usually prefer to cut public investment spending rather than politically sensitive items such as transfer payments. This becomes more important when, in the absence of income from taxation, resource revenues are the only source of income for public investment in an economy. For example, in Iraq as Figure 3.1 shows oil revenues accounted for 97 per cent of the government’s fiscal revenues in 2011. Proponents of oil-to-cash counter that under the existing system of management in these countries, a large proportion of public spending is wasted in corruption, and at the same time the forces behind this inefficient form of management are so established that occasional struggles for reform have proved unsuccessful. Supporters of the programme emphasise that only a radical plan such as oil-to-cash can re-establish the social contract in a sustainable way and hence reduce corruption within the public sector.
One could argue that the oil-to-cash approach is built on the narrow assumption that taxation is the only element that connects states and societies. There are many other factors – such as political, ethnic and ideological differences – that affect how states and societies interact (Moore et al., 2007). However, it is important to bear in mind how each of these factors is influenced by economic underdevelopment. The so-called Arab Spring across the Middle East and North Africa offers a vivid example of this. Although the uprising evolved into religious and ethnic wars, one should not forget the economic underpinnings (Malik and Awadallah, 2013) and the pervasive corruption that ignited it in the first place.

Following the above discussion, one might say that the issue of corruption is not particular to resource-rich developing countries – there are resource-poor developing economies that struggle with this problem as well. This can be explained as follows. In the model we assume a broad-based, individual income tax, which based on the analysis results in the establishment of the strong social contract. Furthermore, we assume that the economy has the capacity to raise direct individual taxes that are more difficult to collect. However, most of the resource-poor developing world relies on indirect taxes (Gordon and Li, 2009). Indirect taxes are not usually broad based, and hence do not strengthen the social contract in the same way as direct taxes. In addition, there is a two-way, vicious circle between weak state capacity and indirect taxes such as excise and duties in developing countries (Fukuyama, 2014). The main problem in most of the developing world is that there are few resources out there to provide funds for investing in building state capacities to break this relationship. In resource-rich developing countries, however, resource rents can provide the means to invest in the capacity of the state to raise direct taxes, and hence escape this vicious circle.

3.5.2 Taxation in resource-rich developing countries

The discussion in support of oil-to-cash centres around the philosophy of taxation. The success of this programme therefore hinges on a good understanding of taxation and tax systems in resource-dependant economies. This section explains how resource rents have crowded out incomes from taxation in these countries. We also shed some light on taxation and the barriers to reconstructing the tax system, tax policy and tax administration in resource-rich developing economies.
In Chapter 2 we show and discuss how natural resource rents crowds out taxation. Also in an empirical study of a sample of 35 resource-rich economies Crivelli and Gupta (2014) show that resource abundance often crowds out different types of taxation in these countries. This can either be a policy choice by the government or the natural outcome of resource bonanzas. After the first oil shock in the 1970s, the revenues of most resource-rich governments inflated overnight and have remained high. Following this, and in a strategic move to boost private sector activity and economic growth, these countries lowered their tax rates (Cottareli, 2012). Tax policies are complicated and taxes are administratively more difficult for governments to collect than resource revenues, especially in the case of point-source resources. This has been important in reducing the incentive for governments to raise taxes in resource-rich developing countries. Furthermore, prior to the emergence of resource bonanzas, neither scholars nor policymakers considered that different sources of revenue could have different impacts on a government and the way that it interacts with its citizens. As Moore et al. (2007) put it, there was not a single line on how the sources of a government’s income and taxation could affect governance. Therefore, both as a policy to boost economic growth and due to the cost of collecting taxes, taxation became less desirable. This policy has had a major impact on the dynamics of resource-rich economies, however.

In recent years, tax policy and tax systems have returned to the forefront of the discussion in resource-rich economies. As explained earlier, this is partly related to the emphasis of the oil-to-cash supporters on the dynamics that taxation can create, but there are other reasons. Over time, and occasionally as a direct result of the resource boom, governments have expanded their role in resource-rich countries. Meanwhile, resource stocks are in decline in some countries and prices are subject to wild volatility. Resource revenues are often no longer sufficient to cover governments’ increasing public expenditure. Besides, the low tax rate policy has not stimulated economic growth and private sector activity significantly in these countries. Finally, tax systems can also be a source of data and information with which to plan other economic policies. For all these reasons, there is a general consensus that the governments in these countries should invest in building their tax systems and increasing their tax capacities. However, there are serious barriers to this. One major problem is that the administrative capacity in resource-rich countries has deteriorated over the years and their taxation policies are inefficient and

\footnote{Point-source resources refers to mineral and fuel resources such as oil and gas. Isham et al. (2005) also discuss that the resource curse in countries with point-source resources is more evident.}
often run on an ad hoc basis (Knack, 2009). Put simply, taxation and tax systems exist almost in name only in most of these countries.

There are also social and political obstacles to reintroducing taxation. Reliance on the new source of income for years has transformed the way that governments and societies function and interact in resource-abundant countries. Rulers may not be interested in a state that has the capacity to collect taxes and manage public services, seeing this as a threat to their access to the resource rents and their clandestine activities.

Another side to the story is that taxation is a two-way street – it also needs the compliance of the taxpayers. A reduction in tax revenues can also be a result of the conscious choice of taxpayers to simply not pay their taxes. When the resource bonanzas first emerged, the perception was that governments would manage the resource rents responsibly and turn them into public wealth. Unfortunately, this social contract has been continuously violated by pervasive corruption over the years. Malfeasance and bribery in the public sector are commonplace and newspapers are full of stories of how the resource revenues are being wasted in these countries. Inefficiency in the handling of resource revenues by governments has created an atmosphere such that the governments do not dare ask for extra resources in the form of taxation. As a direct result of this, the public have no incentive to pay even their legal taxes.

A basic mistake by economists is the assumption of the functional tax system in their models (Besley and Persson, 2009). However, from the preceding analysis, one can appreciate the scale of the problem when it comes to taxation in resource-rich developing countries. Therefore, in parallel with (or even prior to) the oil-to-cash system, these countries should focus on rebuilding their tax systems, as a prerequisite for addressing the dynamics of taxation is to have a tax system in operation in the first place. Designing and rebuilding a tax system is a demanding project that requires a long-term plan. This plan should be clear, well-defined and depoliticised. The latter is important, since populist policies such as the direct distribution of resource revenues can easily be hijacked by politicians in order to manipulate voters, a recurrent theme in developing countries.
3.6 Conclusion

After almost four decades, the natural resource curse is still the most critical issue facing resource-rich developing countries. Corruption in the public sector is increasingly seen as one of the driving forces behind the curse. In a resource-poor economy, the government relies on public taxation for its expenditure. This creates an implicit social contract that enables citizens to hold their government accountable for any wrongdoing within the public sector. Resource abundance, however, has changed the nature of dependence in resource-rich economies. The government owns and allocates the resource rents itself and ignores the voice and preferences of its citizens. This has paved the way for corruption and misgovernance in the public sector. The waste of resource revenues in turn deters citizens from fulfilling their tax obligations. This dynamic has detached people from public affairs in an unprecedented way. In recent years, the idea of a resource-to-cash programme – or more specifically, an oil-to-cash programme – as a policy to deal with the curse of corruption has gained popularity in economic and political circles. Under such programmes, resource revenues are directly transferred to the public and then each individual is taxed optimally. This is a policy initiative to transfer the ownership of resource rents from the government to the citizens. Implementing the policy re-establishes the social contract, empowers citizens and creates incentives for them to hold their governments accountable. Despite the prevalence of the programme in political and academic circles, little theoretical work has been undertaken in this area. This study has set out to fill this gap.

The model presents a general equilibrium model for the oil-to-cash programme and how by establishing taxation it might deal with the resource curse. The model shows how in the presence of corruption, resource abundance results in a curse. In addition, in line with reality, the model explains why the degree of the curse varies from one country to the next.

In the discussion section, we critically review the oil-to-cash plan and study its practicality. In the model, we assume an economy with a tax system that has the capacity to collect direct, individual income taxes. This assumption helps us to draw our analysis, holding state capacity to raise taxes constant. It is necessary, however, to relax this assumption to study the practicality of ‘oil-to-cash’ in a country. Due to weak state capacity to raise direct taxes, resource-rich developing countries rely on indirect taxes when
resource revenues do not meet their expenditure. Studies show that there is a two-way causal relationship between weak state capacity and indirect taxes such as excise and duties. This is an issue in both resource-rich and resource-poor developing countries. However, unlike their resource-poor counterparts, resource-rich developing countries can use resource rents to build their tax system and hence escape this vicious circle.

Prior to adopting the oil-to-cash programme, the challenge is to construct a tax system that can manage the circulation of resource revenues between taxpayers and government efficiently. This is extremely important, and future research should expand on the political and economic barriers to rebuilding and designing a broad-based tax system. Dealing with this question opens the way to overcoming some of the economic and political deadlocks in resource-rich developing countries.
Thesis conclusion and implications

This thesis is a contribution to the impact of natural resources on the process of development. In the Chapter 1, we review channels through which natural resource abundance can affect an economy. Our analysis shows that the relationship between natural resources and the economy is a complex and dynamic one. Nevertheless, the chapter also tells us that we now know a great deal about how natural resource bonanzas can affect the political, economic and social institutions in a country. One of the main issues that has been covered in the resource curse literature is the high level of corruption in resource-rich developing economies. This is due to the extensive impact of corruption on the whole process of development. Corruption can damage the health of political, economic and social institutions and therefore derail the economy from its development path.

The negative relationship between natural resources and corruption control per se is multilayer and complex. In Chapter 2 we study the role of public finance in the relationship between corruption and resource rents. As we discuss throughout the thesis, taxation can have a crucial impact on the bureaucratic and administrative capacity of the state. Furthermore, taxation forms a social contract between state and citizen, based on how citizens can hold their government accountable for wrongdoings inside the public sector. Natural resource abundance shifts the reliance of government from tax revenues to resource rents. Due to this, the administrative capacity of the state is damaged and the social contract is weakened. These drawbacks pave the way for inefficiencies and corruption inside public institutions.

Our empirical analysis shows that in the absence of taxation natural resource rents have a negative impact on corruption control. However, when we control for the impact of taxation in our regression, this negative relationship weakens and in many cases, changes sign. This means that an absence of taxation can explain much of the negative relationship between resource rents and corruption control. Meanwhile, the dynamic analysis shows
that natural resource abundance crowds out non-resource tax revenues for government. Considering the positive impact of taxation corruption, this means that resource rents indirectly, through crowding out tax revenues, damages the corruption control.

In Chapter 3 we study a cash transfer programme, which has been suggested to deal with corruption, and hence the resource curse. Known as oil-to-cash, the programme suggests for natural resource rents, partly or in total, to be distributed between citizens. Each citizen then, is taxed optimally on its total income, which includes resource transfers plus his/her other incomes. Related to our findings and analysis in Chapter 2, the programme is an attempt to establish taxation in resource-reliant economies. Normally, in a tax-reliant economy taxation forms a social contract between people and citizens. People pay taxes and in return hold their government responsible for the efficient allocation of resources inside the public sector. The fact that government relies on citizens for its revenues enforces the contract. Natural resource rents have weakened the foundation of the contract. Government relies on resource revenues \(^{19}\) for its income and does not consider itself accountable for how it allocates the rents. On the other hand, resource rents are not seen or controlled by people at any stage. Therefore, people see the rents as other people’s money and they do not see themselves entitled to the right of overseeing them. Even if they see themselves as entitled to this right, they do not have practical mechanisms to enforce the contract. In many cases therefore, people react to the waste of these resources by evading their legal taxes, where possible. The final outcome of this has been the crowding out of taxation, prevalence of corruption and tax evasion in resource-rich developing economies. Oil-to-cash is a proposal to deal with corruption by establishing taxation, i.e. the social contract.

Chapter 3 contribution is to present a model for the oil-to-cash programme. The model clearly shows how the violation of the social contract, and hence a surge in corruption, can result in the resource curse. Furthermore, it explains the variation in the degree of the curse across economies. At the end, we also critically review the practical issues that the oil-to-cash plan might face.

The most important implication of this thesis is for resource-reliant economies to invest in rebuilding their tax systems and increasing their tax capacities. In this thesis, we

\(^{19}\)In fact government owns natural resources and controls the whole process of its management and allocation.
have studied the implication of this for corruption and misgovernance inside public institutions. This opens new questions about how tax systems should be designed, regulated and structured in these economies. Furthermore, what is the impact of different types of taxation on state capacity and governance. It is also important to study how to set the political ground or form the political will to start the process of taxation and of building a tax system. In terms of the oil-to-cash plan it is essential for countries to have their tax system in place before embarking on such a programme. This is because a tax system needs to be in place to facilitate the circulation of resource revenues between citizens and the government. And one should not forget that the ultimate target of oil-to-cash is to establish taxation. Having this in mind is very crucial. Because, programmes like this can easily be hijacked by populist politicians in order to gain power or win elections.

Also, as has been raised in the discussion, taxation can have a much broader impact on the whole process of development. This opens the possibility for new research questions to delve into how taxation might affect other determinants of the resource curse. For example, how taxation is related to the Dutch disease, volatility or even conflict in resource-dependant economies.
Appendices
### Table A.1: Definitions and source of data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Notes</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corruption control(CPI)</td>
<td>Control of corruption scores between 0 to 10</td>
<td>Transparency International</td>
</tr>
<tr>
<td>Corruption control(WGI)</td>
<td>Control of corruption scores between 2.5 to 2.5</td>
<td>World Governance Indicators</td>
</tr>
<tr>
<td>Corruption control(ICRG)</td>
<td>Control of corruption scores between 0 to 6</td>
<td>International Country Risk Guide</td>
</tr>
<tr>
<td>Resource rents</td>
<td>Total share of resources(gas,oil,forest,mineral) as percentage of GDP</td>
<td>World Bank</td>
</tr>
<tr>
<td>Tax revenues</td>
<td>Non-Resource tax as percentage of GDP</td>
<td>ICTD (Compiled at Sussex University)</td>
</tr>
<tr>
<td>Vice and Accountability</td>
<td>Voice and accountability scores between 2.5 to 2.5</td>
<td>World Governance Indicators</td>
</tr>
<tr>
<td>Regulatory quality</td>
<td>Regulatory quality scores between 2.5 to 2.5</td>
<td>World Governance Indicators</td>
</tr>
<tr>
<td>Rule of law</td>
<td>Rule of law scores between 2.5 to 2.5</td>
<td>World Governance Indicators</td>
</tr>
<tr>
<td>Government effectiveness</td>
<td>Government effectiveness scores between 2.5 to 2.5</td>
<td>World Governance Indicators</td>
</tr>
<tr>
<td>In GDP per capita</td>
<td>logarithm of GDP per capita</td>
<td>World Bank</td>
</tr>
<tr>
<td>In population</td>
<td>logarithm of population</td>
<td>World Bank</td>
</tr>
<tr>
<td>Democracy</td>
<td>Average of civil liberties and political rights</td>
<td>Freedom House</td>
</tr>
<tr>
<td>Press freedom</td>
<td>Press freedom scores between 0 and 10</td>
<td>Freedom House</td>
</tr>
<tr>
<td>Common law</td>
<td>pertaining to British law (Dummy)</td>
<td>The World Factbook (CIA)</td>
</tr>
<tr>
<td>Civil law</td>
<td>Pertainning to French or continental European law (Dummy)</td>
<td>The World Factbook (CIA)</td>
</tr>
<tr>
<td>Aid</td>
<td>Overseas development aids, per capita</td>
<td>World Bank</td>
</tr>
<tr>
<td>Debt</td>
<td>Stock of public debt,percentage of GDP</td>
<td>World Bank</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Agricultural value added (% of GDP)</td>
<td>World Bank</td>
</tr>
<tr>
<td>Openness</td>
<td>Sum of non resource export plus import(% of GDP)</td>
<td>World Bank</td>
</tr>
<tr>
<td>Fractinalisation</td>
<td>Average of religion, ethnicity and language diversity</td>
<td>UCLA Anderson School of Management</td>
</tr>
<tr>
<td>Past wars</td>
<td>Number of inter-state wars since 1816</td>
<td>Correlates of War (COW) database.</td>
</tr>
<tr>
<td>S.Asia</td>
<td>country located in south Asia (Dummy)</td>
<td>World Bank Categorisation</td>
</tr>
<tr>
<td>Mena</td>
<td>country located in the Middle East or North Africa (Dummy)</td>
<td>World Bank Categorisation</td>
</tr>
<tr>
<td>E.Asia</td>
<td>country located in the East Asia Pacific (Dummy)</td>
<td>World Bank Categorisation</td>
</tr>
<tr>
<td>Euro&amp;Cent.Asia</td>
<td>country located in Europe or central Asia (Dummy)</td>
<td>World Bank Categorisation</td>
</tr>
<tr>
<td>lat.Car</td>
<td>country located in Latin America or Caribbean (Dummy)</td>
<td>World Bank Categorisation</td>
</tr>
<tr>
<td>N.America</td>
<td>country located in North America (Dummy)</td>
<td>World Bank Categorisation</td>
</tr>
<tr>
<td>Sub.S.Africa</td>
<td>country located in Saharan Africa (Dummy)</td>
<td>World Bank Categorisation</td>
</tr>
</tbody>
</table>

Notes: Detailed information about the variables is provided in the data section of chapter 2.
## Appendix B

### Table B.1: List of countries used in the analysis

<table>
<thead>
<tr>
<th>Country</th>
<th>Tab1/col1</th>
<th>Tab2/col3</th>
<th>Table2.5(ICRG)</th>
<th>Table2.4,8(WGI)</th>
<th>Table2.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Angola</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Armenia</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>3 Azerbajan</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>4 Bangladesh</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>5 Belarus</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Belize</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Benin</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Bhutan</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Bolivia</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Botswana</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Brazil</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Bulgaria</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Burundi</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Cambodia</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 Cameroon</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 Chad</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 China</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 Colombia</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 Comoros</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 Djibouti</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 Dominica</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 Ecuador</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23 Eritrea</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 Ethiopia</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 Fiji</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 Gabon</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 Georgia</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 Ghana</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 Grenada</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 Guatemala</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 Guinea</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 Guinea-Bissau</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33 Guyana</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34 Haiti</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 Honduras</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 India</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37 Indonesia</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38 Iran</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39 Jamaica</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 Jordan</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41 Kazakhstan</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42 Kenya</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43 Lebanon</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44 Lesotho</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>Tab2.1/col1</td>
<td>Tab2.1/col3</td>
<td>Table2.5(ICRG)</td>
<td>Table2.4,R(WGI)</td>
<td>Table2.7</td>
</tr>
<tr>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>----------------</td>
<td>-----------------</td>
<td>----------</td>
</tr>
<tr>
<td>Liberia</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Madagascar</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Malawi</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Malaysia</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Mali</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Mauritania</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Mauritius</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Mexico</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Moldova</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Mongolia</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Morocco</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Mozambique</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Nepal</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Niger</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Nigeria</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Pakistan</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panama</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paraguay</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peru</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rwanda</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serbia</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sudan</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swaziland</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tajikistan</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanzania</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Togo</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tonga</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tunisia</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turkey</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turkmenistan</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uganda</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ukraine</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vanuatu</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vietnam</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zambia</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Total Sample | 86 | 73 | 56 | 76 | 32 |

Notes: Most of our analysis is based on the second column, i.e with 73 countries in the sample.
Bibliography


Hintze, O. (1906). Military organization and the organization of the state.


UCLA Anderson School of Management (2016). Fractionalization data @online. **URL**: http://www.anderson.ucla.edu/search-results?q=fractionality


