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The Source of Self-Restraint? How Domestic Politics and International Markets Shape Natural Resource Policy in the Developing World

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The Source of Self-Restraint? How Domestic Politics and International Markets Shape Natural Resource Policy in the Developing World

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To my mothers.

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The Source of Self-Restraint? How Domestic Politics and International Markets Shape Natural Resource Policy in the Developing World

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Suppose a country discovers oil or copper in its subsoil and decides to sell these resources in international markets. What should it do with the unexpected profits? It can use a portion of this money to invest in human capital and public goods. It can pay external debt obligations or set money aside in a rainy day fund. It can redistribute resource revenues at the subnational level to reduce regional disparities. But if history serves as a guide, most political leaders in resource-rich countries will use their newfound wealth for electoral or personal gain. For example, they will cut taxes, increase personnel spending, and distribute excludable goods like food or medicine, even if these isolated allocation decisions worsen public service provision in the long run.

Under what conditions do political leaders create formal institutions that promote sustainable development through natural resource revenue, instead of spending this revenue immediately to maximize political support? This is the question my project seeks to answer. I argue that the choice to institutionalize the distribution of extractive revenues is influenced by two factors: political competition and sovereign borrowing.

First, I posit that political leaders are more likely to restrict their own discretion over the extractive sector at moderate levels of political competition. When political uncertainty

is low and rulers are safe in their seats, they can adopt long-run developmental strategies, rather than use public funds for short-term political survival. Under these circumstances, the marginal benefit of using resource revenue to win additional votes is negligible. Still, rulers must face some political competition: there must be a credible opposition citizens can turn to if the incumbent produces bad policy. This middling range of competition, coupled with high public approval, provides space to implement long term-policy while generating enough short-term incentives to do so.

Second, I investigate how IMF lending influences natural resource governance; after all, many resource-rich nations in the developing world still need loans to mitigate their capital scarcity. While most IMF agreements mandate policy reforms in exchange for financial support, compliance with these reforms is often mixed at best. Given these expectations, I investigate how and when borrowing governments go against their political interests and comply with IMF conditions requiring natural resource policy reform. I argue that borrowers are more likely to promote these reforms when they are under an IMF agreement, particularly if the agreement includes conditions that highlight the salience of fiscal reforms. However, the effectiveness of these conditions is highly dependent on context: reforms are more likely when the IMF can credibly threaten to suspend loan payments.

Third, I examine the role of global capital markets in shaping a country's natural resource policy, arguing that competition for private capital flows reduces policymakers' autonomy to allocate natural resource revenue. In contexts of low creditworthiness and high risk of sovereign default, natural resource policy can provide additional information that allows creditors to distinguish between "good borrowers" and "bad borrowers," thus shaping how much access to credit a country will have in times of need. As a result, policymakers seeking to attract foreign capital commit to greater fiscal discipline by restricting their own discretion over the allocation of natural resources – even if this mitigates their ability to manipulate resource rents for political gain and is not associated with an immediate reduction in risk premiums.

I test these three main arguments using novel data on natural resource policy for 87 countries between 1854 and 2019. My statistical models leverage variation in the content of these policies across countries and over time. I also employ qualitative evidence obtained from case studies and IMF staff reports to illustrate the proposed mechanisms. Results support the existence of a the curvilinear relationship between political competition and policy passage. They also largely corroborate the positive relationship between policy passage and sovereign borrowing. These findings have important implications for the management of natural resource revenue. I identify the circumstances under which capital-scarce leaders are willing to overcome their political self-interest, instead adopting policies that – at least on paper – are more efficient in the long run.

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Chapter 1

Introduction

In Book XII of Homer's *Odyssey*, the Greek hero Odysseus (known as Ulysses in Roman mythology) sails past the island of the Sirens, beautiful creatures whose singing is known to lure sailors towards the shore and to death. After consulting the goddess Circe, Odysseus, the king of Ithaca, devises a strategy to ensure a safe journey: he commands his men to put beeswax in their ears and to bind him to the mast of the ship. This way, he alone can hear the singing of the Sirens, and he is physically unable to act upon the impulse to approach the shore, thereby protecting his crew – and himself – from a deadly fate.

What can Greek mythology teach us about public policy? Quite a lot, according to Elster (1977), who uses the metaphor of "binding oneself to the mast" to denote how individuals can protect themselves from undesirable outcomes in the future by deliberately restricting the options at their disposal. These *precommitment strategies*, as Elster calls them, are easier to adopt today than tomorrow, because individuals' preferences are not consistent over time: we value present welfare over future welfare and are willing to sacrifice future benefits (say, the safety of our crew) for the sake of present gratification (approaching the Sirens). By tying our hands to the mast in advance, as Odysseus did, we can overcome our passions and self-interest, ensuring that our preferences remain consistent over time (Elster 2000).

This study examines the political role of a proverbial Siren: natural resource wealth. Much like Odysseus to the Sirens, public officials are drawn to revenue from oil, natural gas, and minerals, as this money allows them to increase public spending without the need to increase taxes or remain accountable to citizens. I examine under what circumstances public officials tie themselves to the mast and create formal institutions that promote sustainable development through natural resource revenue, instead of spending this revenue immediately

to maximize political support. Precommitment strategies are "an act of commission and not of omission" (Elster 1977, p. 474): in other words, tying one's hands is a deliberate choice. In contexts of natural resource wealth, I examine when and why such a choice comes about.

1.1 The Puzzle

To varying degrees, all resource-dependent economies, from Azerbaijan to Zimbabwe, face the challenge of managing a large, volatile, and finite source of revenue. Natural resources are associated with a series of well-documented negative outcomes, like higher onset of civil war (Ross 2004), fewer women in the labor force (Ross 2008), and increased rent-seeking behavior (Andersen, Johannesen, et al. 2017; Mahdavi 2019). In the wake of an oil price boom, for example, there is no significant increase in social transfers, public good provision, infrastructure, or household income (Caselli and Michaels 2013). Instead, public officials tend to use their newfound wealth for political and personal gain, by decreasing tax rates, increasing wages, and delaying cuts (Talvi and Végh 2005). In enabling governments to circumvent budget constraints, resource wealth encourages fiscal profligacy and erodes the quality of domestic institutions over the long run. Indeed, the institutions collecting revenue from natural resources are different from the institutions collecting revenue from taxpayers; high resource dependence makes countries less likely to invest in institutions that collect taxes, in turn increasing resource dependence (Besley and Persson 2010).

From a purely economic perspective, resource dependence is also problematic because global oil, ore, and metal prices are highly volatile. Countries that specialize in products with high price volatility tend to experience lower growth rates and less foreign direct investment, a problem that is particularly salient for landlocked nations with underdeveloped financial systems and few alternative sources of revenue (Ploeg and Poelhekke 2009).

It is clear that these problems exist, but it is not clear why any individual incumbent would want to address them. After all, incumbents are driven by political survival (Franzese 2002; Gehlbach, Sonin, and Svolik 2016). They want to maximize their political capital

today, instead of waiting for some uncertain tomorrow, when they might no longer be in power, oil prices might go down, and natural resources might be depleted. Following the discovery of oil, for example, citizens tend to be excessively optimistic, overplay potential future revenue flows, and pressure the incumbent for a present-day increase in consumption (Collier 2017; Ross 2001b). These pressures exist in all resource-rich countries, but they are particularly pronounced in poor societies, since individuals living under scarcity have higher discount rates and focus on immediate goals at the expense of future ones (Mullainathan and Shafir 2013). As a result, rational, office-seeking politicians tend to prioritize tangible short-term benefits over uncertain future promises, particularly in the developing world. Thus, access to natural resource leads to a time inconsistency problem: it generates perverse incentives by encouraging fiscal profligacy. Among citizens and rulers alike, today's preferences diverge from tomorrow's preferences, and the temptation to disregard tomorrow's preferences in favor of today's is very high, in what is known (at least since Auty 1995) as the resource curse.

The puzzle is not why the resource curse exists. The puzzle is why, despite all political benefits of increased current expenditure, despite the temptation of rent-seeking behavior, despite the urge to disregard fiscal discipline, some incumbents escape the curse and act in a time consistent manner. Given all the above-mentioned political incentives, it is surprising that some rulers are willing to risk short-term pain for long-term gain, as Odysseus did. Instead of increasing public consumption and discounting the future, they engage in what Ross (2012, p. 242) calls a "politically altruistic – even suicidal – behavior" by making forward-looking decisions and saving money for the future, purchasing foreign assets, or promoting domestic capital formation. Why do they do it? In this study, I develop a theory for what drives politically altruistic – rather than politically egoistic – behavior among resource-rich governments. In other words, I examine *when* and *why* resource-rich states establish a regulatory framework that binds them to the mast to overcome their time inconsistency problem.

1.2 The Argument in Brief

This study develops a theory to explain variation in how governments manage their natural resource wealth. The crux of my explanation is the following: some resource-rich governments overcome their political egoism and make time consistent decisions because domestic politics, international organizations, and sovereign credit markets compel them to do so. By *time consistent decisions* I mean that some governments tie their own hands, passing legislation that curtails their own discretion over natural resource revenue and increases the ex post costs of non-compliance. To use Elster's of speech, policymakers bind themselves to the mast, restricting their own future ability to deviate from certain policy choices – or at least increasing the price of doing so. Instead of spending natural resource revenue as they please, pursuing policies that maximize present-day political support by delivering quicker but smaller net social gains, these governments commit ahead of time to pursuing policies that deliver greater long-term net gains, but at a slower pace. For example, instead of cutting taxes in the wake of a natural resource boom, political leaders might use the additional revenue to invest in primary education; primary education requires high initial investments and does not deliver immediate results, but it is also one of the most important tools to reduce income inequality in the long run (Lustig 2015). More generally, some leaders are willing to exchange short-run welfare for policy investments that result in greater long-run welfare, even if this choice jeopardizes their own political prospects – after all, they might no longer be in office when their long-term policy choices finally begin to show results.

Most rulers do not want to risk their incumbency by saying no to citizens, unless there are mechanisms in place producing "an increase in 'anticipal' utility that more than compensates for the decrease in immediate consumption" (Frederick and Loewenstein 2002, p. 353). In other words, incumbents will only tie their hands – rather than use resource revenue to meet short-run discretionary financing needs – when they anticipate that the utility of consuming natural resources tomorrow is higher than the utility of consuming natural resources today.

Only under such circumstances will politicians display what Frederick and Loewenstein (2002, p. 353) call "the propensity to exercise self-restrain."

Over the course of this study, I identify three mechanisms through which governments can tie their hands. First, they can earmark natural resources towards issue areas considered to be neglected or underfunded, like health, education, social security, infrastructure, or regional development. Second, they can accumulate reserves in a natural resource fund, which is a state-owned investment account that uses the proceeds of non-renewable natural resources to purchase international assets. Third, they can pass fiscal rules, which impose long-term constraints on fiscal policy through numerical targets – for instance, by establishing how much oil revenue should be deposited into the natural resource fund, or how much can be withdrawn from the fund and transferred to the national budget in any given year.

I focus on statutory commitments, that is, on earmarks, funds, and fiscal rules that are enacted and regulated by legal documents, like laws, executive decrees, acts, codes, or constitutional amendments. This statutory character reflects a higher level of commitment and a stronger willingness to bind oneself to the mast than if these measures were just informal agreements, even if the credibility of a written commitment still varies across countries and contexts. The focus on legal documents implies that the decision to tie hands comes from politicians, not from career bureaucrats. This means that tying hands is a political – not just a technocratic – decision.

Having identified these three mechanisms, my argument in a nutshell is as follows: in resource-rich countries, officeholders are more likely to tie their hands (that is, to earmark natural resources, create a natural resource fund, or pass fiscal rules), first, at intermediate levels of political competition; second, as they sign loan agreements with multilateral organizations like the IMF; and third, as a tool to improve their credibility in global capital markets.

According to the first part of my argument, political leaders are more likely to restrict their own discretion over the extractive sector at moderate levels of political competition.

When political uncertainty is low and rulers are safe in their seats, they can adopt long-run developmental strategies, rather than use public funds for short-term political survival. Under these circumstances, the marginal benefit of using resource revenue to win additional votes is negligible. Still, rulers must face some political competition: there must be a credible opposition citizens can turn to if the incumbent produces bad policy. This middling range of competition, coupled with high public approval, provides space to implement long term-policy while generating enough short-term incentives to do so.

To elaborate on the second part of the argument, consider that many resource-rich nations in the developing world still need loans to mitigate their capital scarcity. With this in mind, I investigate how IMF lending influences natural resource governance. While most IMF agreements mandate policy reforms in exchange for financial support, compliance with these reforms is often mixed at best. I examine compliance with IMF conditions requiring natural resource policy reform. I argue that borrowers are more likely to reform the natural resource sector when they are under an IMF agreement, particularly if the agreement includes conditions that highlight the salience of fiscal reforms. However, the effectiveness of these conditions is highly dependent on context: reforms are more likely when the IMF can credibly threaten to suspend loan payments.

In the third and final part of my argument, I examine the role of global capital markets in shaping a country's natural resource policy, arguing that dependence on external finance reduces policymakers' autonomy to allocate natural resource revenue. In contexts of low creditworthiness and high risk of sovereign default, natural resource policy can provide additional information that allows creditors to distinguish between "good borrowers" and "bad borrowers," thus shaping how much access to credit a country will have in times of need. In order to credibly signal their commitment to greater fiscal discipline, political leaders can restrict their own discretion over natural resource revenue – even if doing so reduces their ability to manipulate resource rents for political gain and is not necessarily associated with an immediate reduction in risk premiums.

Why should political uncertainty and sovereign borrowing (either in the form of multilateral loans or in the form of capital markets) propel officeholders to overcome their time inconsistency problem? In other words, why should these three factors increase the likelihood that resource-rich governments will tie their hands, as I argue? First of all, because citizens, international organizations, and credit markets have clear preferences regarding the regulation and future allocation of natural resource revenue. Second, because an open economy needs to be responsive to the demands of multiple actors (Ezrow and Hellwig 2014). Though political parties need to respond to shifts in public opinion to remain in power, globalization reduces this responsiveness for parties with experience in government, as economic issues cease to be purely domestic: they also gain a global component. Given that market preferences are often at odds with the preferences of the mass public, tying hands is what allows resource-rich states to reconcile domestic with international preferences, by saying yes to markets and international organizations while saying no to citizens, provided there is limited risk of losing political support. Admittedly, domestic and international preferences do not influence officeholders in equal manner. After developing and testing my theory, I adjudicate across these disparate preferences, identifying under what circumstances we should expect one actor to be more influential than another.

1.3 Contribution to Extant Research

The main contribution of this study is to challenge the existence of a deterministic resource curse. In order to highlight my contribution, I briefly sketch out how natural resource wealth is covered by extant research – namely, as an exogenous shock. To reiterate, there is an extensive literature on how oil (and, to a lesser extent, mineral wealth) is associated with negative outcomes: it leads to fiscal profligacy (Besley and Persson 2014), rent-seeking behavior (Andersen, Johannesen, et al. 2017), civil war (Ross 2004), authoritarianism (Andersen and Ross 2014), and fewer women in the labor force (Ross 2008). In all these cases, though, resource wealth is an explanatory variable, or simply an instrument for public rev-

enue (e.g. Caselli and Michaels 2013).

Jones Luong and Weinthal (2006) are among the few political scientists to theorize natural resources as something incumbents have control over – a product of political decisions over who owns and controls these resources, rather than something a country is exogenously bestowed upon. They theorize that mineral reserves have different effects on the concentration of wealth, depending on whether these reserves are in the hands of the state or the private sector. This reasoning is echoed by Collier (2017, p. 218), who posits that "the assignment of ownership is entirely a social construct" with important political implications. Similarly, Brooks and Kurtz (2016) argue that the effect of natural resource endowments is mediated by the quality of domestic institutions, and Mahdavi (2019) provides evidence that oil-related bribery stems from domestic institutional choices over resource extraction. This emerging tradition of a "conditional resource curse," as represented by Jones Luong and Weinthal (2006), Brooks and Kurtz (2016), Collier (2017), and Mahdavi (2019), acknowledges that natural resource revenue is endogenous: countries can adopt different patterns of extraction and production that determine whether this revenue will be a blessing or a curse. The "conditional resource curse" literature moves the discussion forward by giving more agency to governments, allowing us to "reverse the causality implied in earlier work" (Brunnschweiler and Bulte 2008, p. 250). This is the literature I speak to. In reversing the causality implied in earlier work, my contribution is to conceptualize not only the *implications* of different patterns of extraction, but also the *origins* of such patterns.

To understand the origins of these patterns, I build on prior work identifying the options at the disposal of resource-rich governments (e.g. Ploeg 2010; Ploeg 2011; Venables 2010; Venables 2016). In particular, Ploeg and Venables (2012) conclude that these governments must make two choices – to extract or not extract, to invest or to save – that are exclusively a function of capital scarcity and return to investment. The authors acknowledge that resource revenues might not be put to productive use for political reasons (for example, because incumbents want to maximize their chances of staying in power, or because autocrats tend

to pocket some of this revenue), but devote limited attention to the political mechanisms that affect the choice of one option over another. This is a clear gap in the extant scholarship. It is important to build a theory that acknowledges these mechanisms because political pressures, rather than purely utilitarian calculations, might be the driving force behind governments' decision to extract or not extract, to invest or to save. After all, these decisions are made by politicians, not by career bureaucrats. Extant explanations simplify this decision-making process, which is a necessary first step. My contribution is to build on these simplified models to understand how external forces influence the decisions of policymakers.

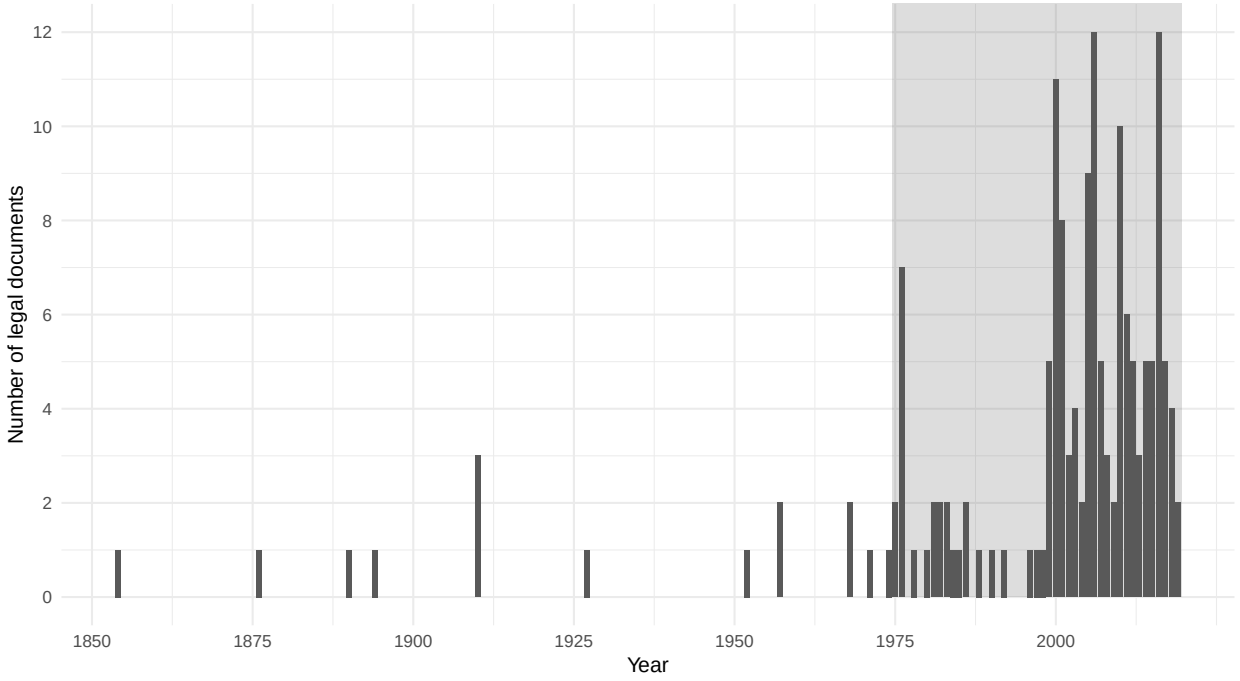
In sum, there is a gap left uncovered by political scientists and economists alike, who focus on the implications of natural resource wealth and typically treat this wealth as an exogenous shock to governments' budget, ignoring the fact that much of the resource curse is endogenous to the resource extraction or allocation process. Extant scholarship focusing on governments' decision-making process treats such decisions as the product of utilitarian – not political – calculations. Collier (2017) attempts to bridge this gap by investigating how psychological biases drive the public decision process surrounding natural resource policy, breaking this process down into three steps: passing natural resource legislation, creating a public institution that implements this legislation, and building a critical mass of citizens who support both prior steps. Still, he engages in theory building, not theory testing, which is what I do. In building a theory of why and when resource-rich countries overcome their time inconsistency problem, I incorporate the utilitarian calculations identified by Ploeg and Venables (2012) and others, but expand these calculations to account for the political preferences of three groups: opposition groups, international organizations, and sovereign credit markets. To do so, I develop a novel dataset that allows scholars to identify the origins of natural resource policy across countries and over time. Although my theory and analysis are primarily focused on the natural resource sector, the theory and data collection procedure can well extend to other sectors and institutional contexts.

1.4 Data

I test the argument outlined above by developing an original dataset of natural resource policy in 87 resource-rich countries between 1854 and 2019. Specifically, I collect 163 laws, acts, codes, executive decrees, royal decrees, and constitutional amendments creating or regulating natural resource earmarks, funds, and fiscal rules. These legal documents were written in fifteen languages – from Albanian to Vietnamese – and passed in 55 countries; the remaining 32 countries have not passed any legal document meeting the selection criteria during the period under study. A full list of these countries and their respective legal documents is available in Appendix A. The earliest document in the dataset is the Texas Common School Law, passed on 31 January 1854, which set apart millions of acres of land in West Texas and stipulated that proceeds from this land should be used to fund public education. The most recent document in the dataset is Guyana's Natural Resource Fund Act (Act No. 12), passed on 23 January 2019, which established that all revenue from oil should be deposited into a natural resource fund for the benefit of present and future generations as well as the sustainable development of the country. Figure 1.1 depicts the distribution of these documents over time.

Despite the availability of data since 1854, the empirical analysis in Chapters 3 and 4 is restricted to the period between 1975 and 2019, while the analysis in Chapter 5 begins in 1990. This follows the advice of Andersen and Ross (2014, p. 998), according to whom "using a very long time-series ... has an important drawback: It can open the door to misleading inferences, if the relationship between the independent and dependent variables has changed over time." They show that the relationship between natural resources and domestic institutions changed after "the big oil change" of the 1970s, when the real price for a barrel of crude oil jumped from 18.60 dollars to 59 dollars within months. Three important shifts unsettled global markets at the time: first, OPEC's unilateral decision to increase oil prices; second, Richard Nixon's decision to close the gold window, ending the system of fixed exchange rates; third, a wave of nationalizations in the developing world that weakened the

Figure 1.1: Number of Legal Documents Passed Every Year, 1854-2019



This figure depicts the temporal distribution of 163 legal documents regulating the natural resource sector in 55 countries. Only the shaded period is included in the empirical analysis.

seven transnational companies controlling the global oil production until then. These shifts led to higher and more volatile oil prices, particularly after 1973. There is reason to believe that the "big oil change" also affected the nature of extractive institutions, given how few legal documents existed until 1975 (as Figure 1.1 shows). Therefore, to ensure that the relationship between independent and dependent variables is orthogonal to these changes, I limit the empirical analysis to the period from 1975 onwards. I present these data in more detail over the next chapters.

Though 55 countries have some sort of natural resource policy in effect, not all legal documents were passed at the national level. 11 US states (Alabama, Alaska, Idaho, Louisiana, Montana, New Mexico, North Dakota, Texas, Utah, West Virginia, and Wyoming) have their own earmarks, funds, or fiscal rules, as do two Canadian provinces (Alberta and the North-

west Territories), two Emirates (Abu Dhabi and Dubai), and the state of Western Australia. These subnational documents are not directly comparable to their national counterparts, which is why they are not included in the empirical analysis. The empirical analysis also excludes two documents adopted by members of the Central African Economic and Monetary Community (CEMAC), since supranational resource policy might not be driven by the same factors as national policy.[1] Finally, I drop two small nations – Brunei and Nauru – due to limited availability of data on covariates.

1.5 Outline

The remaining chapters of this study develop and test the theory of natural resource policy articulated above. Following this introduction, Chapter 2 defines the key terms that are used throughout the study. In particular, I delimit the geographical scope of the analysis, provide a definition of non-renewable natural resources, and discuss what distinguishes these resources from other primary commodities like coffee, soy, or rice. I demonstrate that non-renewable natural resources are associated with three fundamental problems: they are exhaustible, have volatile prices, and crowd out other sectors of the economy. Afterwards, I outline in greater detail how governments across the world have attempted to counteract these problems – namely, by earmarking natural resources, creating natural resource funds, and passing fiscal rules. These three strategies, which I jointly refer to as *natural resource policy*, are the focus of the subsequent chapters.

In Chapter 3, I build upon this material to theorize that natural resource policy is more likely to emerge at moderate levels of political competition. As a starting point, I review an extensive literature showing that natural resource wealth increases the political capital of incumbents, allowing them to withstand adverse economic circumstances by investing in patronage networks. When there is an established political competition, though, incumbents

[1] CEMAC is made up of six resource-rich nations, all of which are included in the dataset: Chad, Equatorial Guinea, and Gabon, which have national-level policy, and Cameroon, the Central African Republic, and the Republic Congo, which do not.

shift the focus from an informal to an institutionalized allocation of public resources, creating formal institutions to promote long-term development through natural resource revenue. Still, if the political arena is too crowded and uncertainty is too high, leaders will deliver inefficient and short-sighted public policies. I identify a moderate level of political competition at which incumbents are most likely to pass legislation restricting their own discretion over the resource sector. Statistical models show that moderate certainty about future political outcomes reduces incumbents' need for discretion over natural resources: these leaders are secure enough to adopt long-run developmental strategies rather than pay out short-term rents, but not so secure that they face no incentive to develop institutions in the first place. I explore these findings in greater detail using the case of Mexico, where the introduction of natural resource policy coincided with a decline in single-party rule.

Chapter 4 uses text analysis to gauge the role of international organizations – in particular, the IMF – in setting best practices for natural resource governance. As the world's de facto lender of last resort, the IMF typically conditions loan disbursement to policy reforms on issues like debt management, privatization, fiscal transparency, trade liberalization, public spending, and natural resource management. The stated goal is to help borrowing countries develop strong economic fundamentals that avert future crises, which is why failure to comply with these predetermined reforms can lead to loan interruption. I argue that resource-rich countries are more likely to reform the natural resource sector when they are under an IMF agreement. Still, not all agreements are the same: some agreements set broad and vague numerical targets for the public budget, while others mandate narrow and targeted changes in a specific sector. I show that natural resource policy tends to be introduced not necessarily when conditions mention the natural resource sector, as one might expect, but rather when they highlight the salience of fiscal reforms. This effect is particularly pronounced when there is a credible threat of loan suspension in case of non-compliance: as shown in previous research, borrowers who are closely aligned with the Fund's main principal – the United States – are less concerned about complying with conditions because they do

not fear that the Fund will cut off financial support.

To conclude the empirical analysis, Chapter 5 examines how global capital markets compel resource-rich countries to regulate revenue from the resource sector, thereby promoting global policy convergence. Using Mexico as a point of departure, I argue that natural resource policy can serve as a commitment device, as it signals to bondholders that the country in question is a reliable economic partner managing its resource riches with discipline and self-restraint. In passing such a policy, Mexico intends to gain an edge over other developing nations competing for similar sources of global capital, improving its standing in credit markets and reducing sovereign borrowing costs. To preview the findings, I find support for the argument that competition for private capital flows increases the odds of reforming the extractive sector, but I uncover mixed evidence that policy adoption succeeds in reducing the risk premium demanded by private lenders. When countries have limited access to global capital markets to begin with, policy reforms provide information about the state of the domestic economy that might in fact trigger a short-term *increase* in risk premiums, even if these premiums recover in the long run. I illustrate the countervailing effects of natural resource policy on risk premiums using the case of Ecuador, which has passed eight different legal documents regulating its hydrocarbon sector (more than any other country in my analysis) and defaulted on its sovereign debt in 1982, 1999, 2008, and 2020.

Finally, Chapter 6 closes this study by discussing the implications and limitations of my findings. I highlight the scholarly contributions of the project and outline a number of extensions to consider in future work.

Chapter 2

What are Natural Resources?

Table 2.1 presents the four kinds of non-renewable natural resources examined in this study: mineral products, chemical products, precious metals, and base metals.[1] These resources are primary commodities, that is, they are raw materials traded in international markets. However, unlike edible commodities (like coffee, soy, or rice), they exist in finite quantity and cannot be replenished.

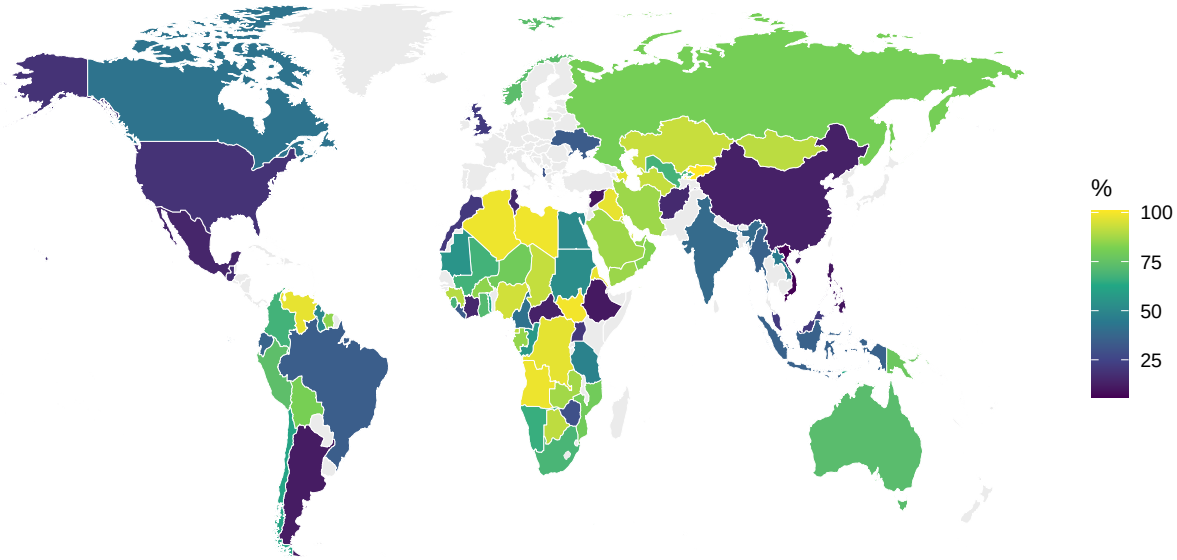
Table 2.1: Types of Non-Renewable Natural Resources

Mineral products	Chemical products	Precious metals	Base metals
Ores, mineral fuels, mineral oils, and products of their distillation	Rare-earth metals, radioactive elements, explosives	Precious metals, precious or semi-precious stones	Iron, steel, copper, nickel, aluminum, lead, zinc, tin, and others

I delimit the geographical scope of the analysis to the 87 resource-dependent countries depicted in Figure 2.1 (see Appendix A for full list), which are the major producers and traders of the resources listed in Table 2.1. While Venables (2016) classifies 51 countries as resource-rich, I expand his classification to encompass resource-*dependent* countries, not just resource-*rich* countries, because richness is relative, but dependence is absolute. In 2017, the small Pacific island of Nauru exported only 0.62 percent of the world's calcium phosphate, a figure that paled when compared to Morocco's 29 percent or Jordan's 24 percent. However, phosphate accounted for nearly 70 percent of all Nauruan exports in that year. Nauru may hold a trivial share of the global calcium phosphate market, but this share is crucial for the

[1] This list follows the two-digit classification established by the 2002 Harmonized Commodity Description and Coding Systems, specifically the commodities included in Sections V, VI, XIV, and XV: `https://unstats.un.org/unsd/tradekb/Knowledgebase/50043/HS-2002-Classification-by-Section`

Figure 2.1: Resource-Dependent Countries and Percent of Export Value Coming From Non-Renewable Natural Resources, 2017



This choropleth map depicts the 87 resource-dependent countries examined in this study. The color of each country represents the percent of this country's export value coming from mineral products, chemical products, precious metals, and base metals in 2017, based on export data from the UN Comtrade Database. Figure 2.1 includes all countries in either Venables's or the Natural Resource Governance Institute's list, with the exceptions of Bangladesh and Cambodia, because non-renewable natural resources account for less than 1 percent of total exports in each of these two countries. For this reason, Bangladesh and Cambodia are not included in the study.

undiversified Nauruan economy. Similarly, South Sudan exported only 0.15 percent of the world's crude oil in 2017, yet crude oil accounted for 99.2 percent of its export value in the same period. These export shares are shown in Figure 2.1, which combines the shares for all four categories of non-renewable natural resources listed in Table 2.1.

With resource-*dependence* in mind, I expand the sample of Venables (2016) to include the countries covered by the Natural Resource Governance Institute (2017). Using this selection process, every sovereign country in South America (with the exception of Paraguay and Uruguay) counts as resource dependent, as do most sovereign nations in Africa.[2] Even

[2]The South American and African countries excluded from Figure 2.1 – and from the analysis – predominantly export commodities like wood, coconuts, cashews, and soybeans, in addition to meat and fish.

within OECD countries, there is variation in resource dependence: in 2017, non-renewable natural resources overall accounted for 18.9 percent of US exports, but 72.4 percent of all Australian exports.

To be fair, export share is not the only way to assess resource dependence or resource wealth. Jensen and Wantchekon (2004) measure resource dependence as the share of oil and mineral exports among total merchandise exports, as Figure 2.1 does, but there are other ways to measure this concept. While Ploeg and Poelhekke (2009) quantify resource dependence as the GDP share of exports coming from natural resources, Haber and Menaldo (2011) use a measure of fiscal reliance, that is, the percentage of government revenue coming from oil, gas, or minerals. Venables (2016) references natural resource *rents*, measured by the World Bank as the price of oil, natural gas, coal, minerals, and forests, minus the average cost of producing these commodities, as a share of GDP. Relatedly, Dunning (2008) considers that rentier states are those in which rents provide a significant share of the public revenue. Table 2.2 summarizes how extant political science literature measures resource dependence and resource abundance, based on a review by Smith (2017).

Though Ploeg and Poelhekke (2009, p. 737) note that "the literature uses the words dependence and abundance interchangeably," Brunnschweiler and Bulte (2008, p. 249) find that "the common proxy for resource abundance in the literature... defined as the ratio of resource exports to GDP... is more appropriately thought of as a measure of dependence (or intensity) than as a measure of abundance." This distinction is important because resource abundance is exogenous, but resource dependence is endogenous to institutional factors. In other words, policymakers have no control over the existence of natural resources in their subsoil, but they have at least some control over how to integrate these resources into the national economy. Therefore, future mentions of natural resource *wealth* or *abundance* in this study refer to natural resource *dependence* and to the countries in Figure 2.1.

Non-renewable natural resources are generally owned by the state (Jones Luong and Weinthal 2006). The state might extract such resources directly, as in Norway, or grant non-

Table 2.2: Common Measures of Resource Abundance and Resource Dependence

Measure	Source
OPEC membership (dummy)	Fish (2002)
Fiscal revenue derived from non-renewable resources (resource rich if >20 percent)	Venables (2016)
Non-renewable resource exports as a share of total exports (resource rich if >20 percent)	Venables (2016)
Oil and mineral exports as a share of total exports (resource rich if >50 percent)	Gandhi and Przeworski (2007)
Oil exports as a share of total merchandise exports (resource dependence)	Jensen and Wantchekon (2004)
Oil and mineral exports as a share of GDP (resource dependence)	Ross (2001a), Brunnschweiler and Bulte (2008), and Ploeg and Poelhekke (2009)
Stocks of natural resource wealth (resource abundance)	Brunnschweiler and Bulte (2008) and Ploeg and Poelhekke (2009)
Oil, gas, and mineral revenue as a share of total government revenue (fiscal reliance)	Haber and Menaldo (2011)
Fuel income per capita	Haber and Menaldo (2011)
Fuel income per capita as a share of GDP per capita, in PPP (rent leverage)	Smith (2017)
Price of oil, natural gas, coal, minerals, and forests, minus the average cost of production, as a share of GDP (resource rents)	Venables (2016)
States in which rents from oil and minerals provide a significant share of the public revenue (rentier states)	Dunning (2008) and González (2018)
Non-tax revenue per capita	Morrison (2009)

state actors the right to extract such resources in exchange for a fee (known as a royalty), as in Chile (Guajardo Beltrán 2012; Holmøy 2009), but ownership of subsoil resources is rarely in private hands. There are three exceptions: Russia and Kazakhstan, which privatized their oil sectors, and the US, where regulations vary from state to state (**Goldberg2009**; Weinthal and Jones Luong 2006). However, even in these cases, private actors pay a severance tax on the market value of the extracted resource. In Texas, for example, the severance tax is 4.6 percent for oil and 7.5 percent for gas.[3] As a result, much of the export value shown in Figure 2.1 actually accrues to the state.

Having presented the geographical scope of the analysis, I now discuss what makes non-renewable natural resources so unique. To preview the discussion: in the short run, oil, copper, gold, and other materials in Table 2.1 have volatile prices, and it is all but impossible to forecast these prices correctly; in the medium to long run, resource-dependent economies need to find alternative sources of revenue, because these resources will be depleted. All this generates political incentives to use natural resource bonanzas for political gain, steering incumbents towards short-term spending at the expense of long-term planning. In discussing the distinctive features of natural resources, I set the stage for a theory of why and when resource-rich governments are willing to engage in long-term planning, accounting for the influence of domestic politics, international organizations, and global markets in counteracting these political incentives.

2.1 The Problems with Natural Resources

I exclude renewable natural resources from the analysis, instead focusing on their non-renewable counterparts, because non-renewable resources are associated with three fundamental problems: they are exhaustible, crowd out other sectors of the economy, and their prices vary dramatically over time. As a result of all this, they harm long-term fiscal planning, generating the time inconsistency problem that lies at the heart of this study.

[3]These figures come from the Railroad Commission of Texas.

2.1.1 Dutch Disease

During a price boom, a significant segment of the domestic economy tends to shift towards the extractive sector to benefit from the bonanza, thereby weakening the non-extractive sector (typically construction, manufacturing, and agriculture). To understand why, recall the definition of primary commodities: they are raw materials traded in international markets, which means that commodity exporters sell their products in international markets in exchange for foreign currency. An unexpected influx of foreign currency (due to an increase in oil prices, for example) can appreciate the real exchange rate, increasing the price of exports and making the non-resource tradable sector less competitive in international markets. To make matters worse, the influx of foreign currency might be used to purchase foreign goods that compete with domestic goods, weakening the domestic non-resource sector even further.

The more a country specializes in the resource sector, the more foreign currency comes in, the less competitive the non-resource sector, and the bigger the incentives to move away from the non-resource sector, in what is called the factor movement effect: two factors of production, labor and capital, move from the non-resource to the resource sector (Røed Larsen 2006). This leads to specialization and deindustrialization. For example, every one dollar increase in natural resource revenue correlates with a 74 cent decrease in non-resource exports and a 23 cent increase in imports (Harding and Venables 2016). Another negative consequence is that the proceeds of the resource sector tend to be concentrated in the hands of few individuals, so the move away from agriculture or manufacturing might lead to an increase in inequality. Finally, the move towards the resource sector results in a loss of positive externalities (for example, innovation) associated with the non-resource sector; in what is called the spillover-loss effect (Røed Larsen 2006).

All these changes are symptoms of the Dutch disease, named after a natural gas boom in 1977 that led to a decline of the manufacturing sector in the Netherlands (Rudra and Jensen 2011). Other examples of Dutch disease include the Australian gold booms in the second half of the 19th century and the Colombian coffee boom in the 1970s (Humphreys, Sachs, and

Stiglitz 2007). Alternative sources of foreign currency, like remittances (Acosta, Lartey, and Mandelman 2009) and foreign aid (Younger 1992), can also lead to Dutch disease, but on a much smaller scale. In 2018, for example, remittance inflows across the world amounted to 689 billion dollars, while members of the OECD Development Assistance Committee provided 153 billion dollars worth of aid. In comparison, the export of mineral fuels moved 2.17 trillion dollars.[4]

The negative effects of Dutch disease might be weakened by capital controls, which can prevent an outflow of investment in the manufacturing sector, or by currency devaluation, which might attenuate the loss of international competitiveness for the non-extractive sector. These negative effects are less pronounced for sectors that are capital intensive (Ismail 2010). Additionally, the move away from the non-resource sector and towards the resource sector may create new jobs and increase income by generating backward linkages, as the resource sector makes use of local inputs. However, there are limits to labor mobility across sectors: since workers in agriculture and manufacturing cannot become oil specialists overnight, unemployment is likely to rise (Ross 2007). Ultimately, price booms are followed by busts, so these changes do not last (Venables 2016). In short, a drop in economic diversification increases the vulnerability of resource-rich countries to exogenous price shocks, since these countries are now putting all their eggs in one basket: the extractive sector.

2.1.2 Price Volatility

International commodity prices are volatile[5] and difficult to forecast (Hamilton 2009). Some prices are less volatile than others; the price of Arabica coffee is more volatile than the price of crude oil, which in turn is more volatile than the price of gold (World Bank 2014). But regardless of the commodity, its price is difficult to forecast, since it is susceptible to exogenous shocks. Pandemics, commodity speculation, increases in world demand, terrorist

[4]The sources for these three figures are the World Bank Migration and Remittances Data, the OECD Development Assistance Committee, and the UN Comtrade Database, respectively.

[5]In this context, "volatile" is a synonym of "unstable" and represented by the standard deviation of the logarithm of the price (see, for example, Ebeke and Ehrhart 2011).

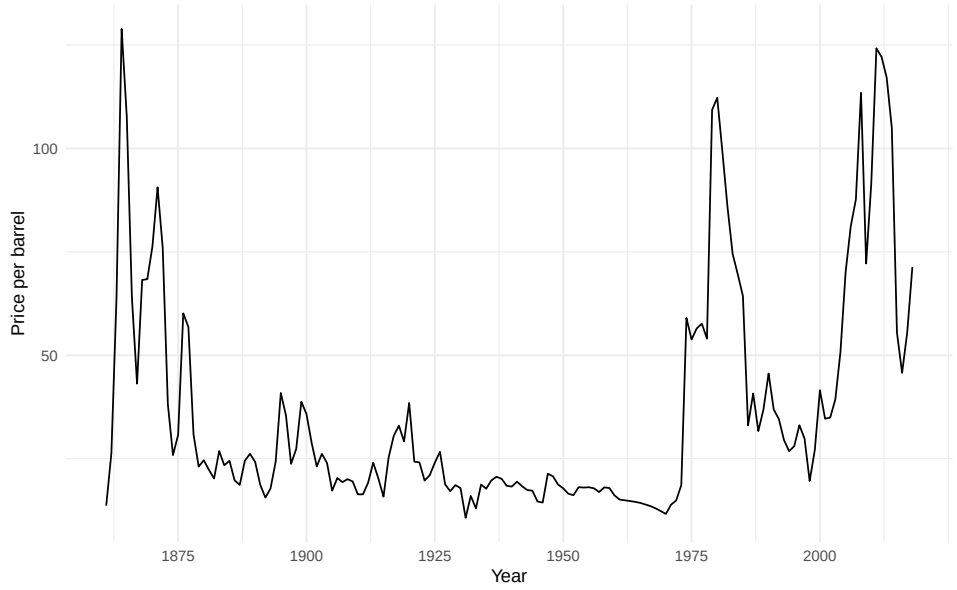
attacks on oil refineries, geological limitations on increasing production, and time delays in extractive projects all generate uncertainty about future revenues (Hamilton 2009). As a result, resource prices follow a random walk: the best guess for tomorrow's price is today's price, which makes it hard for producers to plan ahead. To make matters worse, an increase in commodity price volatility is associated with less foreign direct investment and lower growth rates, a problem that is particularly salient for landlocked resource-dependent countries with underdeveloped financial systems and few alternative sources of revenue (Ploeg and Poelhekke 2009).

To be fair, the price of Arabica coffee is also very volatile. Price volatility is a problem for all kinds of commodities, not just for the ones listed in Table 2.1. However, one factor exacerbates the price volatility of non-renewable natural resources: these products have a low price elasticity of supply. Put simply, in the short run, producers are not able to adjust the supply to meet a change in demand, so they cannot regulate prices by increasing or decreasing production. In other words, there is a misalignment between supply and demand that exacerbates the volatility in prices. This is particularly the case for crude oil (Ploeg and Poelhekke 2009; Hamilton 2009).

To illustrate this volatility, consider Figure 2.2, which shows the average yearly price for a barrel of crude oil, in 2018 US dollars, from 1861 until 2018, using data from BP (2019). Until 1918, few countries produced significant quantities of oil, and production was controlled by a few transnational and vertically integrated oil companies – the Seven Sisters – until the late 1960s (Andersen and Ross 2014). This, coupled with the postwar Bretton Woods system of fixed exchange rates, explains why prices were relatively stable from 1918 until 1973. In 1973, members of the Organization of Petroleum Exporting Countries (OPEC)[6] unilaterally decided to increase oil prices, a decision that was accompanied by a wave of nationalizations in the oil sector (in Algeria, Iraq, Venezuela and elsewhere). Some OPEC members also

[6]At the time, the following countries were OPEC members: Algeria, Ecuador, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela.

Figure 2.2: Crude Oil Prices, in 2018 US Dollars per Barrel



This figure shows the average yearly price for a barrel of crude oil, in 2018 US dollars (deflated using the Consumer Price Index for the US), from 1861 until 2018, using data from BP (2019). From 1861 to 1944, BP reports the US average price; from 1945 to 1983, it reports the posted price for Saudi Arabian light oil; and from 1983 onwards, it reports the price for Dated Brent.

imposed a short-term embargo against Israeli allies (Colgan 2014). All this resulted in what Andersen and Ross (2014) call "the big oil change" – a combination of circumstances that unsettled the global oil market. As Figure 2.2 shows, real prices jumped from 18.60 dollars in 1973 to 59 dollars in 1974 and have fluctuated starkly ever since.

OPEC, which represents the world's biggest oil producers, has limited power to control the global supply of oil. OPEC assigns formal production quotas (or "market allocations") to its members since 1982, but cheating on these quotas is widespread; Algeria, for example, has exceeded its production quota for every single month between 1982 and 2009 (Colgan 2014). The 1973 oil shock was a unique event, the exception that proved the rule; in the words of Colgan (2014, p. 614), "OPEC is unlikely to ever again influence the oil market as it did in 1973." The only country that has some power in setting international oil prices is Saudi Arabia, which controls about 14 percent of the global production of crude oil, but this

power is unrelated to its OPEC membership. Other than Saudi Arabia, oil producers do not have the power to set prices (at least not since 1973) and are unable to increase or decrease their oil supply in response to global demand. As a result, oil producers are vulnerable to exogenous price shocks: they do not have the tools to mitigate price volatility.

There is no equivalent to OPEC for other natural resources. The prices of nickel, silver, copper, zinc, aluminum, gold, and other resources, while significantly less volatile than the market price of oil, are still correlated with oil returns, and thus equally difficult to predict (World Bank 2014). There are international commodity agreements in place to stabilize the prices of cocoa, coffee, sugar, wheat, tin, and rubber, but nothing similar exists for natural gas or minerals.[7] As a result, states have no control over prices and can only make educated guesses as to how much money they will collect in the future. This is the first distinctive feature of non-renewable natural resources, and it has negative implications for economic development: while the direct effect of natural resources on long-run growth is positive, the indirect effect through price volatility is negative (Ploeg and Poelhekke 2009, p. 739). Since resource-rich countries tend to specialize in the extractive sector at the expense of other sectors, no other segment of the economy is competitive enough to offset the volatility of commodity prices.

When the sources of money are predictable, it is easier to set yearly spending goals and reconcile short-term spending with long-term planning. For example, governments know that they will always have a population to tax and can design the budget accordingly. However, when countries rely on money from volatile sources, planning ahead is much harder. When a significant part of the budget comes from natural resources, public revenue is a function of many factors beyond most governments' control. Political actors do not know exactly how much money they will make off natural resources in the next year. They may be surprised by

[7]Even diamond prices, which remained stable for much of the 20th century, increased in volatility after the global monopoly of British mining company De Beers was dismantled in the 2000s. Today, the diamond market suffers from oversupply, worsened by declining investment in the mining sector and reduced demand for luxury goods. See Elizabeth Paton. "The World Has a Diamond Glut. Why Is That a Problem?" *New York Times*. 16 August 2019.

high prices in one given year, only to see these profits dwindle in the following year. Given this unpredictability, resource-rich governments need strong institutions that allow them to insulate public spending from the volatility of commodity prices, avoiding stop-go cycles in public investment. Absent strong institutions that engage in fiscal planning, the volatility of revenue will be transmitted to the budget (Crivelli and Gupta 2014): countries will respond to an increase in resource revenue with increased spending and will not accumulate savings for times of economic downturn.[8] The problem with natural resources is not price volatility in itself, but rather the inability of most governments to protect public spending from such volatility.

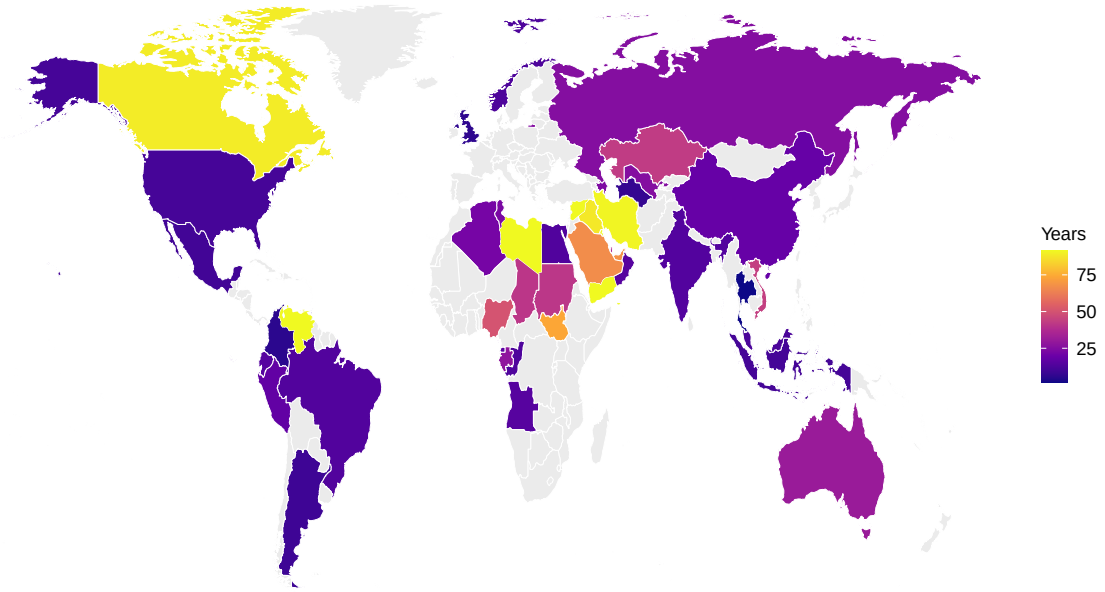
2.1.3 Depletion

Unlike coffee, soy, or rice, the primary commodities discussed in this study exist in finite quantity and cannot be replenished. The exact lifespan of a non-renewable natural resource varies from country to country. For example, Norway's oil and gas wealth is considered to be temporary: it is expected to last no longer than one generation, that is, no longer than 30 to 35 years. Saudi Arabia's oil reserves are considered permanent, since they will last for more than one generation. To quantify this lifespan, Figure 2.3 shows the reserves-to-production ratio for oil and natural gas, for selected countries, as calculated by BP (2019). The reserves-to-production ratio divides the reserves remaining at the end of 2018 by the total production in the same year. The result is the length of time (in years) that these remaining reserves would last if production were to continue at the same rate. This calculation uses only *proven* reserves, that is, reserves for which at least 90 percent of the resource is likely to be recoverable, using current technology, by economically profitable means.[9] Accordingly, Figure 2.3 does not include reserves that are "technically recoverable:" these reserves *can* be

[8] In fact, Ploeg and Venables (2012) show that countries with a large share of resource rents in their gross national income tend to have *negative* genuine saving rates.

[9] *Probable* reserves are those for which 50 to 90 percent of the resource is likely to be recoverable, and *possible* reserves are those for which less than 50 percent is likely to be recoverable. Again, these categories consider current technology and economic profitability.

Figure 2.3: Reserves-to-Production Ratio for Oil and Natural Gas, 2018



This choropleth map shows the reserves-to-production ratio for oil and natural gas, for selected countries in 2018, as calculated by BP (2019). The reserves-to-production ratio divides the reserves remaining at the end of 2018 by the total production in the same year. The result is the length of time (in years) that these remaining reserves would last if production were to continue at the same rate. This figure excludes countries like Chile and Mongolia, which export chemical products, precious metals, and base metals, but no significant quantities of oil or natural gas.

recovered using current technology, but doing so is not economically profitable. The median country has a reserves-to-production ratio of 23.66 years. Venezuela is an outlier, with a reserves-to-production ratio of 548.88 years.

The reserves-to-production ratio might be misleading, because countries might discover new reserves that prolong the expected time until depletion. For example, at the end of 1998, the total proven reserves of oil and natural gas for the US corresponded to 28.6 billion barrels. By 2018, this figure had jumped to 61.2 billion barrels, due to the discovery of several new fields in Alaska and the Gulf of Mexico, but also due to technological advances (like hydraulic fracturing) that increased the number of recoverable reserves and made "technically recoverable" reserves actually profitable. As a result, the reserves-to-production ratio for the

US actually increased from 9.8 years in 1998 to 11.0 years in 2018.

However, even if the total proven reserves continue to increase, exploring these new reserves has technological, environmental, and monetary costs that are impossible to predict (Baunsgaard et al. 2012). To illustrate how costly it is to explore new reserves, consider the case of Brazil. In 2006, Petrobras found oil in the pre-salt layer off the coast of Rio de Janeiro, in what is believed to be one of the world's largest oil reserves.[10] Even so, the costs associated with deepwater drilling were so high that the Brazilian government decided to postpone the extraction of offshore pre-salt oil, instead prospecting its offshore post-salt oil, which was more easily accessible. This strategy was only reversed a decade later, as the post-salt reserves began to dwindle. As countries like Brazil deplete easily accessible reserves, they need to turn to reserves with higher technological, environmental, and monetary costs.

The bottom line is that oil and gas reserves in Brazil, Norway, and Saudi Arabia will be depleted at some point. This is what happened to Nauru, which discovered calcium phosphate reserves in the 1970s and all but exhausted them within 20 years. Calcium phosphate still accounts for nearly 70 percent of Nauruan exports, but these exports are only a fraction of what they used to be in the past.[11] Like Nauru, the governments of Brazil, Norway and Saudi Arabia face a practical problem: at current consumption rates, they might run out of natural resources in the short run. This is less of a problem for countries with diversified economies. Norway, for example, is already divesting from fossil fuels and moving towards cleaner sources of energy. Saudi Arabia's Vision 2030 plan explicitly aims to develop the tourism and entertainment sector in order to diversify the economy and mitigate oil dependence. But not all resource-rich states have the fiscal capacity or political will to do the same, as the case of Nauru illustrates.

Setting aside the question of whether natural resources *will* be exhausted, there remains the question of whether they *should* be exhausted. There is a moral argument to be made

[10] Talal Husseini. "Tracing the History of Exploration in the Brazilian Pre-Salt Oil Region." *Offshore Technology*. 4 October 2018.

[11] *The Economist.* "Paradise Well and Truly Lost." 20 December 2001.

for respecting the rights of future generations over natural assets. At the same time, most of the resource-dependent countries in Figure 2.1 are poor. Given their short time horizons and immediate spending needs, should these governments worry about future generations at all? Given the uncertainty about future revenue and the certainty about current needs, should incumbents prioritize public consumption over future savings? According to Collier (2014, p. 51), current generations have a custodial role that "entitles a poor country to deplete its oil, as long as the revenues are used in part to accumulate other assets such as ports and schools which are bequeathed to the next generation." Put differently, Collier argues that current generations do not have a curator role: their duty is not to leave natural assets untouched, but rather to pass on to future generations assets of equivalent value.

Still, climate change has increased the understanding that the current generation *should* assume a curator role and preserve natural assets. As the world's biggest markets move away from fossil fuels and towards clean energy, oil and gas discoveries become increasingly less profitable. Countries like France and the United Kingdom will ban the sale of diesel and gasoline fueled cars by 2040;[12] international organizations like the World Bank and the European Investment Bank are no longer lending to new fossil fuel projects;[13] and recent oil auctions in Latin America have led to disappointing results,[14] as even big oil companies are now moving towards renewable sources of energy. From a fiscal standpoint, it might not be advantageous to rely on the extraction of natural resources not only because these resources will be exhausted, but also because global demand for them is consistently declining.[15] This dilemma is unique to non-renewable natural resources. It raises the need to design natural resource policy that allows future generations to benefit from present resource wealth, promoting investment in non-resource sectors to enable economic diversification in the long

[12]Charlotte Ryan and Jess Shankleman. "U.K. Joins France, Says Goodbye to Fossil-Fuel Cars by 2040." *Bloomberg.* 26 July 2017.

[13]Amy Myers Jaffe. "Striking Oil Ain't What It Used to Be." *Foreign Affairs.* 20 January 2020.

[14]Manuela Andreoni and Ernesto Londoño. "Brazil Had High Hopes for Its Big Oil Auction. They Went Bust." *The New York Times.* 6 November 2019.

[15]Jillian Ambrose. "Rise of Renewables May See Off Oil Firms Decades Earlier Than They Think." *The Guardian.* 14 October 2019.

run.

2.2 Strategies to Counteract These Problems

Governments are generally aware of the problems discussed in the previous section, even before resource extraction begins.[16] In this section, the strategies typically adopted by policymakers to mitigate the three problems discussed above: natural resource earmarks, funds, and fiscal rules. I call these strategies "tying hands" because they are typically enshrined in legislation – in the form of laws, constitutional amendments, statutes, executive decrees, acts, codes, or coalition agreements – and thus constrain policymakers' future discretion over how to allocate natural resources.

2.2.1 Strategy 1: Earmark Natural Resources

Recall Collier's (2014) aforementioned statement that current generations have a custodial, not curator role: a poor country is entitled to deplete its oil, as long as it uses these revenues to accumulate assets that benefit future generations – in other words, as long as it uses resource revenue to fund domestic investment. This is the first strategy policymakers can adopt to mitigate the negative consequences of natural resource wealth.

If resource revenue is used to fund domestic investment, as Collier suggests, it may be paid into a general account and allocated according to the needs of the state, but it can also be used to fund a particular spending commitment, in what is called earmarking, ring-fencing, or hypothecating (Kiser and Karceski 2017). Since Buchanan (1963), much has been written on earmarked taxes – particularly in the United States, where they carry a negative connotation and are associated with pork barrel in the congressional allocation process. This does not need to be the case, though. Earmarks can counteract political pressures for increasing current expenditure by channeling domestic investment into issue areas that

[16] Collier (2017) discusses the cases of Botswana and Great Britain, two countries that regulated the prospection of natural resources in the 1960s – prior to the discovery of diamonds and oil, respectively. For a more recent example, see Michael Forsythe. "Mongolian Harvard Elites Aim for Wealth Without 'Dutch Disease'." *Bloomberg*. 15 February 2010.

are neglected or underfunded, like health, education, social security, infrastructure, and regional development (Bauer, Rietveld, and Toledano 2014). According to Mozambique's 2015 Budget Law, for example, 2.75 percent of the country's oil and mining revenue is earmarked for the development of resource-extracting regions. In Bolivia, 27.3 percent of the direct tax on hydrocarbons must go to Renta Dignidad, a universal and non-contributory pension scheme. Similarly, withdrawals from Chile's Pension Reserve Fund are earmarked for pensions, welfare, and social security liabilities.

In earmarking resource revenues for investment in non-resource sectors, officeholders can diversify the economy and reduce resource dependence, thus combating the effects of Dutch disease. For instance, Norway uses the proceeds of oil to invest in renewable energy; in 2019, it decided to entirely divest from firms that explore oil and gas.[17] Given that Norway's oil wealth is not expected to last for longer than 30 to 35 years, this economic diversification can minimize the inevitable losses that will arise from oil depletion. As to low-income countries like Timor-Leste, such "investing-in-investing" (Collier and Venables 2011, p. 21) is a good strategy to promote capital formation; these countries stand to gain more from investment in durable physical assets than from savings. Since the resulting assets are illiquid, they are also less likely to be plundered in times of bust.

The relationship between resource earmarks and the public budget is indicative of whether these earmarks are truly supporting non-resource sectors of the economy. There are two types of earmarks: off-budget and on-budget (Center 2017). In the case of the former, resource wealth is treated as extra-budgetary and not subject to the oversight of the legislature or the central bank. In the case of the latter, resource wealth flows directly into the official budget and is included in the annual budget law. Since on-budget earmarks are subject to legislative scrutiny and recorded as part of the official budget, they are less likely to be misused for political gain.

[17] Rob Davies. "Norway's $1tn Wealth Fund to Divest from Oil and Gas Exploration." *The Guardian.* 8 March 2019.

The disadvantage of earmarks is their rigidity. Tying revenue to expenditure might prevent misappropriation, but it also strips governments of the ability to respond to emergencies and makes public budgets more vulnerable to revenue volatility. Until 2008, for example, 92 percent of the central budget of Ecuador was earmarked for education, health, infrastructure, wages, fuel or electricity subsidies, and debt amortization, which means that Ecuadorian policymakers had discretion over just 8 percent of the central budget. Since oil was (and is) the primary source of revenue for Ecuador, all these expenditures were conditional on oil revenue, so the government spent considerably more when oil prices were high, and considerably less when prices were low (Acosta, Albornoz, and Araujo 2009). Ecuador abolished these earmarks in 2008, out of belief that the old system was too rigid.

Overall, earmarking natural resources can address two of the three problems discussed previously: it can combat Dutch disease by diversifying the economy, and it can mitigate the negative effects of depletion by converting natural assets into lasting investments. However, earmarks do not solve the issue of price volatility – in fact, earmarks might transmit this volatility to the public budget, since spending on health, education, social security, infrastructure, and regional development will also be volatile: it will increase when commodity prices are high and decline when commodity prices are low.

2.2.2 Strategy 2: Create Natural Resource Funds

Instead of promoting domestic investment (or in addition to doing so), some countries accumulate reserves in a sovereign wealth fund, which gives them enough liquidity to stay afloat in times of need. A sovereign wealth fund is a state-owned investment account that uses national savings to purchase international assets[18] like private equity and real estate (Chwieroth 2014). Natural resource funds, in particular, are sovereign wealth funds financed exclusively through the extraction of non-renewable natural resources; they do not receive

[18]Botswana, Chile, Ghana, Kazakhstan, Norway, and many others explicitly prohibit their funds from purchasing domestic assets. Iran is one of the few countries allowing for both (see Bauer, Rietveld, and Toledano 2014).

proceeds from privatization or central bank reserves. In simple terms, the main role of a natural resource fund is "to prevent governments from relying on resource rents by putting those rents beyond their reach" (Karl 2007, p. 271). This is the second strategy to overcome the problems caused by non-renewable natural resources.

The IMF (2008) identifies five types of funds with five different mandates. First, stabilization accounts mitigate budget volatility caused by unexpected fluctuations in resource prices. When oil revenue declines, for example, countries can draw from their stabilization accounts to sustain current expenditures – instead of, say, borrowing from international capital markets. Second, savings accounts benefit future generations. Since oil, natural gas, and minerals are not renewable, saving natural resource revenue can prolong the financial benefits of resource extraction. Third, reserve investment corporations increase the return on foreign exchange reserves, which in turn can be used to manage exchange rates and reduce the risk of Dutch disease. Venables (2016, p. 176) calls this a "parking fund:" a temporary storage unit for economies that cannot absorb the unexpected influx of foreign currency all at once. Fourth, development funds finance socio-economic projects, including durable physical assets like public infrastructure. Such funds are often paired with earmarks. When return to investment is higher than return on savings, as in low-income countries, this can help promote "investment-in-investment." Finally, contingent pension reserve funds help finance pensions and social welfare liabilities.

These five mandates are not mutually exclusive, as shown by the case of the Nigerian Sovereign Investment Authority, which consists of three natural resource funds: the Stabilization Fund, the Future Generations Fund (a savings account), and the Nigerian Infrastructure Fund (a development fund). Since these funds have different time horizons, they pursue different investment strategies: stabilization funds have a short-term, low-risk investment profile, whereas savings accounts have a long-term, high-risk investment profile due to their low liquidity needs.

Today, funds have become something of a status symbol (Chwieroth 2014). Resource-

rich countries are particularly keen to emulate their most successful peer, Norway, whose oil-funded Government Pension Fund Global is worth over one trillion dollars. Still, many countries do not disclose information about the size of their funds, and some funds are in fact completely empty: for instance, there is not a single dollar left in Chad's Oil Revenue Sterilization Mechanism (Natural Resource Governance Institute 2017).

Regardless of the type, Wang and Li (2016) assess a fund's degree of institutionalization according to the existence of rules regulating the fund's (1) change of structure, (2) source of funding, and (3) use of principal and earnings, as well as (4) the role of the government and (5) the role of fund managers. The more rules are in place and the more encompassing these rules, the more institutionalized the fund. This goes to show how much variation there is across fund legislations. Some laws specify a formal procedure for changing the fund structure, while others do not. Some stipulate how much money should be deposited in any given year (a deposit rule) or how much money can leave the fund to enter the public budget (a withdrawal rule), while others do not. Some funds are subject to public scrutiny, regular audits, and legislative oversight, while others are not.

In sum, funds have the potential to address all three problems posed by natural resources and outlined in the previous section. Funds can mitigate Dutch disease by storing excess foreign currency until the domestic economy has the capacity to absorb it; they can combat price volatility by stabilizing the budget; and they can prolong the benefits of resource extraction by ensuring that future generations will have access to such revenue, even after natural resources run out. However, a single fund cannot fulfill all three mandates at once, since each mandate has a different time horizon and requires a different investment strategy. Unless states create three different funds, they will need to prioritize one issue over the others.

2.2.3 Strategy 3: Pass Fiscal Rules

A fiscal rule is a multi-year constraint on fiscal policy that sets concrete numerical targets, like how much to save, how much to spend, or how much to borrow (Lledó, Yoon, et al. 2017). While these rules are not exclusive to resource-rich countries, they have the potential to tackle two resource-specific problems: they can mitigate Dutch disease by constraining how much resource revenue enters the public budget, and they can insulate public spending from price volatility by setting a ceiling on how much states can spend. To do so, though, fiscal rules might need to be paired with natural resource funds to absorb the excess revenue that is not entering the budget and might need to be complemented by earmarks to ensure that public expenditure is still meeting the essential needs of the state.

The IMF distinguishes between four kinds of fiscal rules: budget balance, expenditure, revenue, and debt rules. Budget balance rules set targets for the overall fiscal balance, often accounting for variations in commodity prices, aiming to lower the size of the public deficit. According to Chile's 2006 Fiscal Responsibility Law, for instance, the president is required to set a fiscal objective (based on a ten-year forecast of copper and molybdenum revenues) at the beginning of each four-year term. The downside of budget balance rules is that they can lead to procyclicality; even if the budget is balanced, spending might increase in times of boom and decrease in times of bust, which is disruptive for public policy. To mitigate these stop-go cycles, expenditure are more specific: they set boundaries for current spending, preventing resource-rich countries like Azerbaijan or Botswana from spending too much during price booms (or too little during price busts). When these countries are suddenly flooded by foreign currency, they are often unable to absorb this money all at once. After all, every country has absorption constraints, which means that it cannot scale up investment; it cannot simply use oil revenue to train skilled labor or build infrastructure overnight (Ploeg and Venables 2013). Expenditure rules delay domestic spending until policymakers can design policies that allocate resource revenue in a productive manner (Ploeg and Venables 2012).

Revenue rules impose floors or ceilings on the government's income. This is the case of

Timor-Leste, where a 2005 law stipulates that oil revenues must be saved in the Petroleum Fund, and 3 percent of this fund's value, at most, can be withdrawn and transferred to the national budget in any given year. Timor-Leste's Petroleum Fund works as a "parking fund," removing the "excessive" money from the economy. The logic is different from expenditure rules, but the purpose is the same. In stipulating how much resource revenue can enter the budget, revenue rules prevent an unexpected influx of foreign currency that would lead to appreciation of the domestic currency and would weaken the non-resource sector. In other words, revenue rules are intended as an antidote to Dutch disease.

Finally, debt rules impose limits on borrowing, usually by setting a debt-to-GDP ratio as a fiscal anchor. This is what Ecuador's 2010 Public Responsibility Law does: it limits non-financial public sector debt to 40 percent of the GDP, in addition to limiting the debt of decentralized entities to 200 percent of their annual revenue (Lledó, Yoon, et al. 2017). Debt rules can prevent countries from borrowing excessively against their natural resource wealth, but also keep these very same countries from borrowing at times they need most, during a commodity price slump (Mihalyi and Fernández 2018).

There is no optimal number of rules, and all four kinds of rules can coexist (Eyraud et al. 2018), but too many fiscal targets might make the budget too rigid. As with earmarks, governments might be unable to respond to unforeseen circumstances because they tied their hands too tightly. To prevent this from happening, officeholders can invoke escape clauses, temporarily suspending the enforcement of a fiscal rule in response to extraordinary events (like financial crises or natural disasters) that threaten the macroeconomic stability of the country.

2.2.4 Other Strategies

To transfer resource revenues from the public to the private sector, one possibility is to create citizen dividend schemes, though only Alaska and Mongolia have made use of these schemes so far. In Alaska, resource revenues are placed in the Permanent Fund, and since

1982 the income of this fund is distributed among all individuals who claim residency in the state for a full calendar year.[19] In 2019, each eligible individual received a Permanent Fund Dividend of 1,606 dollars. As to Mongolia, between 2006 and 2016 the government used mining taxes to maintain a number of different cash transfer programs for children aged 17 or less; the Child Money Program paid 20,000 Mongolian tugriks (about 7.40 US dollars) to each child per month in 2016, after which it was discontinued.

However, citizen dividend schemes do not appear to be successful in combating price volatility, asset depletion, and Dutch disease. Private individuals typically have a spending bias: they overestimate the size and duration of revenues and disregard the inter-generational impact of their own spending decisions, which is why they are unlikely to save their share of the citizen dividend (Ploeg and Venables 2012).[20] Few countries outsource natural resource allocation decisions to private individuals, which is why I do not discuss citizen dividend schemes in detail.

Another, more widespread practice to transfer resource revenues from the public to the private sector is through fuel subsidies. In subsidizing domestic retail prices, governments shield customers from the volatility of international prices. While fuel subsidies also exist in countries that are not rich in natural resources, oil exporters – namely, China, India, Russia, and the United States – are among the world's highest subsidisers (Venables 2016; Coady et al. 2019). The problem with fuel subsidies is that they are fiscally expensive, promote inefficient sources of energy, crowd out expenditures in more important policy sectors, and benefit the rich far more than the poor, as poor citizens are less likely to have a car and make use of fuel (Arze del Granado, Coady, and Gillingham 2012; Ploeg and Venables 2012). As a result, researchers and policy advisors warn against fuel subsidies (Cust 2017).

In sum, natural resource earmarks, funds, and fiscal rules are by no means the only strate-

[19] Alaska Department of Revenue, Permanent Fund Dividend Division.

[20] Anecdotally, in a 2017 survey of 1,004 Alaska voters, 85 percent of all respondents agreed that "many people spend a large part of the [Permanent Fund Dividend] on basic needs." See Economic Security Project. "Alaska PFD Phone Survey: Executive Summary." 22 June 2017.

gies to manage natural resource wealth. There are other institutional mechanisms through which governments tie their hands (like citizen dividend schemes and fuel subsidies), but these three are the most widespread. Researchers and international organizations typically agree that earmarks, funds, and fiscal rules are the best practices to combat price volatility, asset depletion, and Dutch disease. Accordingly, these are the three strategies I focus on in this project.

2.2.5 Compliance

Throughout this section, I demonstrated that earmarks, funds, and fiscal rules are regulated in different ways across countries and over time. For example, Ecuador's five oil funds – all earmarked for subsidies and debt repayment – were liquidated in 2008, and that Chad's Oil Revenue Sterilization Mechanism is *de facto* an empty bank account. This raises the question of whether resource-rich governments are *really* tying their hands when they claim to do so. After all, even if the majority of officeholders is genuinely interested in mitigating price volatility and Dutch disease, some might create earmarks, funds, and fiscal rules without ever intending to comply with these policies in first place.

While we cannot uncover the true intention of policymakers, we can make inferences about their intention based on the content of natural resource policy. On the one hand, when governments enact policy that is – to use Kelemen et al.'s (2014) terminology – *strict* and *clear*, we can assume that these governments *intend* to comply with their hand-tying mechanisms. Many policymakers write clear natural resource policy, with unambiguous fiscal goals and concrete numerical targets. Their funds have the highest degree of institutionalization (as per Wang and Li's classification), with clear rules regulating the fund's change of structure, funding source, use of earnings, management strategies, and government oversight. Their earmarks are on-budget, subject to public scrutiny, and legislative oversight. Put simply, there are various signs that these governments are truly well intentioned and committed to tying their hands, at least on paper.

This does not mean that the rules are always followed; in times of bust, a country might genuinely be unable to meet its overly ambitious goals, despite having passed policy that is *clear* and *strict*. Indeed, following the 2007-2008 financial crisis and again during the 2015-2016 commodity price crash, many governments resorted to escape clauses, postponed the implementation of rules, or modified existing measures to meet targets. For instance, Colombia's 2011 fiscal law sets clear targets for the size of the public deficit, but it also stipulates that "in case of extraordinary events threatening the macroeconomic stability of the country, enforcement of the fiscal rule may be temporarily suspended."[21] The Natural Resource Governance Institute (2017) ranks Colombia's Savings and Stabilization Fund as the world's number one fund in terms of good governance and has found that Colombia was one of the few countries to comply with its fiscal rules during the 2015-2016 commodity price crash (Bauer and Mihalyi 2018). This evidence arguably puts Colombia in the group of well-intentioned countries making commitments they plan to meet, even if this is not always possible in case of "extraordinary events."

On the other hand, when policymakers enact natural resource policy that is lenient and vague, we cannot be certain that these policymakers truly intend to tie their hands. In this case, financial crises might be a credible excuse to withdraw money from funds that were never transparent, to channel off-budget earmarks towards patronage, or to violate fiscal rules that were poorly designed to begin with. For example, Algeria's law creating the Revenue Regulation Fund (which collects money from annual hydrocarbon tax surpluses) does not set clear numerical targets and does not foresee an independent oversight organization, so it is not possible to adjudicate whether the fund is meeting its vaguely defined goal of "public debt reduction."[22]

In short, the specificity of natural resource policy is a good indicator of how seriously the government takes this policy. Granted, politicians might write long and specific legislation

[21]Ley 1473 de 2011 por medio de la cual se establece una regla fiscal y se dictan otras disposiciones, Art. 11. 5 July 2011.

[22]Loi de Finances Complémentaire 2000, Art. 10. 28 June 2000.

that they never plan to implement, creating earmarks, funds, and fiscal rules that look great on paper but do not exist in practice. Alternatively, they might not be able to comply with this legislation in times of economic downturn. Still, written legislation is arguably the clearest indicator of policymakers' intentions, and the necessary first step for a government to credibly tie its hands. A public commitment to create earmarks, funds, or fiscal rules increases the cost of non-compliance by drawing attention to misconduct. For this reason, legislation can be a good predictor of behavior (Amick, Chapman, and Elkins 2020), which is why it is worthy of study.

2.3 Summary

This chapter defined the central concept of the project and delimited the geographical scope of the analysis. In particular, I discussed how dependence on non-renewable natural resources has negative effects for a country's economy and what this country can do to minimize such effects. Political leaders can reduce the side effects of price volatility, resource exhaustion, and Dutch disease by constraining their future discretion over natural resource revenue, in the form of earmarks, funds, and fiscal rules. In constraining their future decisions, these leaders commit to pursuing a consistent natural resource policy in times of commodity price boom, but also in times of bust.

I have not discussed what motivates incumbents to pursue any of these strategies in first place, or what drives the choice of one strategy over another. This is what I examine in the remainder of this study. In the words of Røed Larsen (2006, p. 609), "it is often not the question of what policies were followed, but why these policies were allowed and implemented at all." In discussing the political motivation for tying hands, I develop a theory that conditions these decisions to the influence of three actor groups: international organizations, bondholders, and opposition parties.

Chapter 3

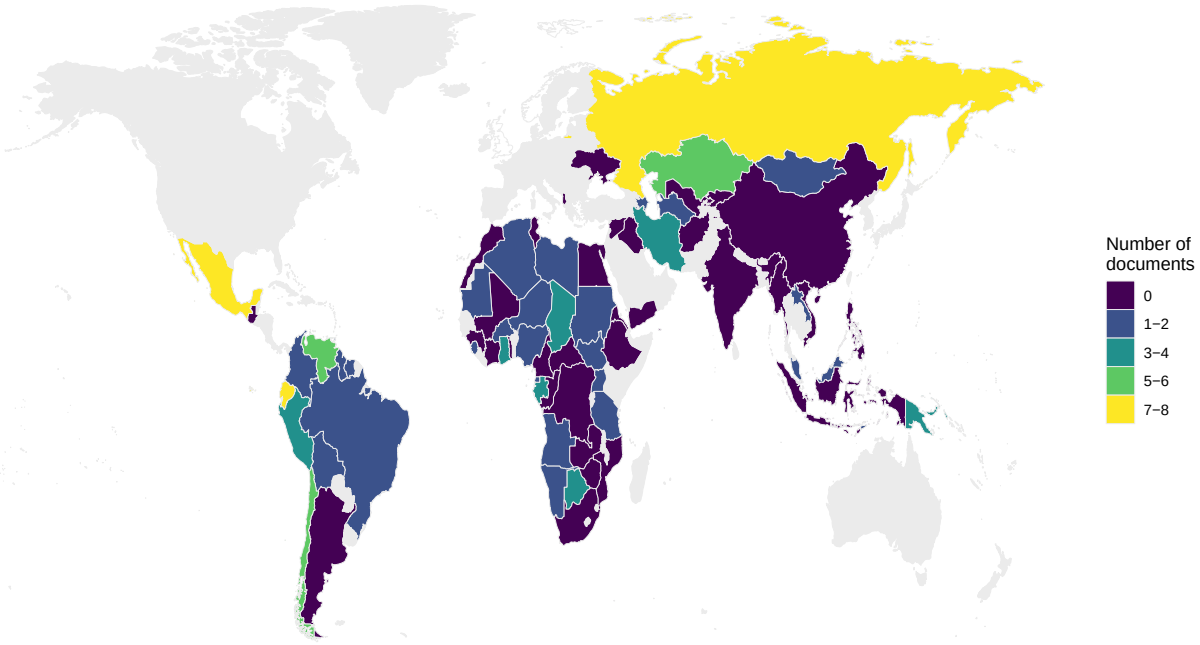
The Political Origins of Natural Resource Policy

In May 2015, ExxonMobil announced a significant oil discovery 120 miles off the coast of Guyana, with production scheduled to begin in January 2020. Ahead of production begin, President David Granger signed into law the Natural Resource Fund Act "to manage the natural resource wealth of Guyana for the present and future benefit of the people in an effective and efficient manner."[1] The law stipulates that resource wealth should be saved in a fund and managed in a transparent manner. Given that Guyana is one of the poorest countries in the Americas, with high unemployment rates and low levels of investment in education, concerns about the *future* benefit of its people are laudable, but surprising. Citizens in Guyana and elsewhere have well-established preferences: they want high real income, high growth, low inflation, low unemployment, and are willing to punish any incumbent who fails to meet these expectations (Schultz 1995). In signing the Natural Resource Fund Act, the Guyanese government committed to saving most of its future oil revenue, instead of spending it immediately to meet citizens' demands. As shown in Figure 3.1, Guyana is not alone: several states have created formal institutions to promote long-term development through natural resource revenue. Why do some states take up such commitments, while others do not?

I examine variation in domestic legislation among countries that are rich in non-renewable resources like oil, natural gas, and minerals. Using novel data on extractive sector legislation for the countries shown in Figure 3.1, I show that incumbents are more likely to pass laws restricting their own discretion over resource revenue when they have high approval ratings and face moderate levels of political competition. In the short run, I attribute this to a lower

[1] Act No. 12 of 2019 – Natural Resource Fund Act, Article 3. 23 January 2019.

Figure 3.1: Number of Legal Documents Regulating the Natural Resource Sector, by Country, 1975-2019



This map depicts the 74 countries examined in the empirical analysis. The color of each country represents the total number of legal documents passed at the national level to regulate the natural resource sector between 1975 and 2019.

danger of political sanctioning: when rulers are safe in their seats, they are less concerned about political survival and can make decisions that are at odds with popular demands for lower taxes and increased spending. In the long run, when rulers face moderate levels of political competition, it is more advantageous to institutionalize the distribution of extractive revenues than to deliver private benefits or co-opt the opposition. This is because highly competitive and highly uncompetitive systems generate similar disincentives to craft and enact long-term development policy. In competitive regimes, rulers need budgetary discretion to spend immediately, delivering broad benefits to secure public support for reelection; in uncompetitive regimes, rulers are not held accountable or pressured to develop transparent institutions, instead delivering narrow benefits to maintain their support basis. In contrast,

moderate certainty about future political outcomes reduces incumbents' need for discretion over natural resources: these leaders are secure enough to adopt long-run developmental strategies rather than pay out short-term rents, but not so secure that they face no incentive to develop institutions in the first place. These findings are confirmed by an additional study of ten Latin American nations, with quarterly data from 1980 to 2018.

There is evidence that politically contested arenas produce larger quantities of public services, as incumbents fearing for their seats face a sense of urgency: they must deliver public goods to secure political support (Hobolt and Klemmensen 2008; Lake and Baum 2001). However, other studies indicate that competition has a countervailing effect on public services: in making legislative bargaining more difficult, competition might actually *worsen* public goods provision (Gottlieb and Kosec 2019). Given these mixed findings, it is difficult to make predictions for resource-rich states, where political competition tends to be lower to begin with: when political elites have access to oil, gas, and mineral wealth, they use these resources to strengthen their grip on power (**Goldberg2009**). My findings reconcile these seemingly disparate research agendas, showing that political opponents can push for public service delivery even in political arenas with limited contestation.

My findings also speak to an extensive literature linking natural resources to fiscal profligacy, rent-seeking behavior, and institutional failure (Ross 2015). I theorize natural resources as the product of political decisions over who owns and controls these resources, rather than something a country is exogenously bestowed upon. Like Jones Luong and Weinthal (2006), Brooks and Kurtz (2016), and Collier (2017), I recognize the existence of a "conditional resource curse:" countries adopt different patterns of extraction and production that condition whether resource wealth will be a blessing or a curse. To understand these patterns of extraction, I examine the origins of institutions that shape a government's relationship with its subsoil assets.

The remainder of this chapter is structured as follows. First, I present the puzzle in more detail. Second, I develop an argument of why and when political leaders choose fiscal

restraint over fiscal profligacy. After discussing the research design and the data, I test the argument, discuss the findings, and conclude with implications for future research.

3.1 A Time Inconsistency Problem

Democrats and autocrats alike are motivated by political survival: they want to distribute spoils to allies, co-opt the opposition, and secure political support (Franzese 2002; Gehlbach, Sonin, and Svolik 2016). In times of economic growth, the optimal political strategy is to enact policies that are immediately visible and clearly attributable to the incumbent, instead of saving for future administrations or funding long-term projects that may be discontinued when windfalls fade away (Talvi and Végh 2005). Investment in the long run is risky, because individuals are impatient and do not trust the government to fulfill longer-term policy promises (Jacobs and Matthews 2012). This collective impatience pushes rulers towards allocation decisions that maximize short-run policy benefits, particularly ahead of elections (Nordhaus 1975). After all, any public servant can name the administration that increased their salary.

Some rulers can pursue this optimal political strategy by exploring non-renewable natural resources, which increase the political capital of incumbents in four ways. First, they provide an alternative source of revenue that reduces the need to collect taxes – a change supported by taxpayers, who do not trust the state with their money (Besley and Persson 2014). This, however, has negative consequences for the quality of fiscal institutions. Since the institutions collecting revenue from natural resources are different from the institutions collecting revenue from taxpayers, investing in the former reduces the need to invest in the latter: resource-rich governments no longer need to incur the transaction costs of measuring citizens' income, bargaining over tax rates, or monitoring compliance. Taxation plays a crucial role in state building, so states that do not invest in fiscal institutions reduce their ability to implement a range of other policies (Besley and Persson 2010).

Second, natural resources reduce public demands for accountability and representation

(Ross 2001a). While taxation does not automatically generate demand for accountability, even complicated and less salient taxes are the product of a political bargain: taxpayers agree to pay taxes because they are confident that other taxpayers will also pay taxes and rulers will deliver the promised public goods (Levi 1988). In eliminating this bargaining process, natural resources remove the need for rulers to meet their side of the bargain. As a result, citizens lose any sense of ownership over public resources, are less prone to monitoring the budget, and less likely to demand good governance, in what Karl (2007, p. 265) calls a "participation deficit." This phenomenon has been observed in countries as diverse as São Tomé and Príncipe (Vicente 2010), Indonesia (Paler 2013), and Brazil (Caselli and Michaels 2013).

Third, natural resources generate demands and opportunities for increased public spending (Ploeg and Venables 2012). On the demand side, citizens have unrealistic expectations of what resource wealth can or cannot do, pressuring the government to share its newfound riches by increasing short-term public consumption (Collier 2017). On the opportunity side, leaders often have the discretion to spend resource windfalls at will and circumvent budget constraints. This leads to the final mechanism through which natural resources increase the political capital of a ruler: they lead to greater spending on patronage (Ross 2001a). Oil, in particular, is associated with increased bribery and increased personal savings in offshore bank accounts (Andersen, Johannesen, et al. 2017; Mahdavi 2019). In reducing citizens' demand for accountability and providing financial means to reward political allies, resource wealth weakens institutional checks and balances (Vicente 2010; Paler 2013; Caselli and Michaels 2013). Thus, any government – left or right, democratic or authoritarian, open or closed to international markets – likes resource rents and wants to spend them (Karl 1997; Ross 2015). As a result, "when funds are readily available, and known by all to be available, it requires exceptionally strong traditions and strong-willed financial officials backed by their political leaders to maintain fiscal discipline" (Little et al. 1993, p. 379). Most resource-rich countries lack these traditions or this strong will (Talvi and Végh 2005).

In brief, resource wealth leads to a time inconsistency problem: it erodes the quality of institutions over the long run, but also increases the political capital of incumbents in the short run – and, politically, the short run matters most. Put bluntly, "a sudden resource bonanza tends to erode critical faculties of politicians and induce a false sense of security" (Ploeg 2011, p. 392). Among citizens and rulers alike, today's preferences are different from tomorrow's preferences, and the temptation to disregard tomorrow's preferences in favor of today's is very high. The puzzle is not why the resource curse exists; prioritizing tangible short-term benefits over uncertain future promises is a rational choice. The puzzle is why, despite all political benefits of increased current expenditure, the temptation of rent-seeking behavior, and the urge to disregard fiscal discipline, some incumbents escape the curse and act in a time consistent manner. *Time consistent* means that some governments tie their own hands, passing legislation that curtails their own discretion over natural resource revenue. Instead of spending this revenue as they please, pursuing policies that maximize present-day political support by delivering quicker social gains, rulers commit ahead of time to pursuing policies that deliver long-term gains, but at a slower pace (Jacobs 2016).

From a fiscal standpoint, time consistent policies are important because oil, gas, and mineral prices are difficult to forecast. Pandemics, commodity speculation, terrorist attacks on oil refineries, geological limitations, and time delays in extractive projects generate uncertainty about future prices (Hamilton 2009), and resource-rich countries have limited tools to mitigate this price volatility (Ploeg and Poelhekke 2009). Furthermore, global demand for fossil fuels is in decline, as the worlds biggest markets are moving towards clean energy.[2] For example, France, the United Kingdom, and others will ban the sale of diesel and gasoline fueled cars by 2040;[3] the World Bank and the European Investment Bank are no longer lending to new fossil fuel projects;[4] and recent oil auctions in Latin America have led to disappoint-

[2]Jillian Ambrose. "Rise of Renewables May See Off Oil Firms Decades Earlier Than They Think." *The Guardian.* 14 October 2019.

[3]Charlotte Ryan and Jess Shankleman. "U.K. Joins France, Says Goodbye to Fossil-Fuel Cars by 2040." *Bloomberg.* 26 July 2017.

[4]Amy Myers Jaffe. "Striking Oil Ain't What It Used to Be." *Foreign Affairs.* 20 January 2020.

ing results,[5] as even big oil companies are moving towards renewable sources of energy. To prolong the benefits of resource wealth, resource-rich states need to make forward-looking decisions. In the next section, I construct a typology of forward-looking policies and develop a theory of when states resort to these measures.

3.2 Theorizing Natural Resource Policy

3.2.1 A Typology of Natural Resource Policy

Incumbents typically constrain their own discretion over natural resources in three ways. First, they accumulate reserves in a sovereign wealth fund, which gives them enough liquidity to stay afloat in times of need. A sovereign wealth fund is a state-owned investment account that uses national savings to purchase international assets like private equity and real estate (Chwieroth 2014). While some sovereign wealth funds receive proceeds from privatization or central bank reserves, natural resource funds are financed only by oil, gas, or mineral rents. Different funds follow different mandates: some aim to save for future generations, others are used to mitigate budget volatility caused by unexpected fluctuations in resource prices, and others, still, finance socio-economic projects, pensions, or social welfare liabilities (IMF 2008). All funds share one characteristic: they put resource revenue beyond the government's reach to prevent misappropriation.

Second, incumbents earmark natural resources: instead of paying revenue from the extractive sector into a general account and allocating it according to discretionary needs, political leaders commit ahead of time to using this revenue for a particular budget item (Kiser and Karceski 2017). Earmarks counteract political pressures for increased current expenditure by channeling domestic investment into underfunded issue areas, like health, education, and infrastructure. Officeholders can diversify the economy by earmarking resource revenues for investment in non-resource sectors. Several nations also adopt revenue sharing systems, by which a share of resource revenue is transferred to states and munici-

[5]Manuela Andreoni and Ernesto Londoño. "Brazil Had High Hopes for Its Big Oil Auction. They Went Bust." *The New York Times.* 6 November 2019.

palities and earmarked in advance: when local authorities receive their share of rents, they must spend it on priority areas identified by the central government.

Third, incumbents act in a forward-looking manner by passing fiscal rules, which are multi-year numerical targets on fiscal policy, like how much to save, how much to spend, or how much to borrow (Lledó, Yoon, et al. 2017). Fiscal rules prevent rulers from spending too much during price booms (or too little during price busts). When the economy is flooded by foreign currency, it is often unable to absorb this money all at once. Fiscal rules limit the amount of resource revenue that enters the public budget, delaying spending until policymakers design policies that allocate this revenue efficiently. Alternatively, these rules impose debt limits to prevent countries from borrowing excessively against their natural resource wealth. While fiscal rules exist in several nations with no relevant extractive sector, they fulfill a different role when resource revenue is large relative to total revenue: they are designed to mitigate the volatility of commodity prices and prolong the benefits of resource extraction (Baunsgaard et al. 2012).

These three strategies are complementary: governments can create a fund, earmark it for education, and constrain how much of this fund enters the budget every year. To ensure that rulers can respond to emergencies, these measures typically include escape clauses, allowing the government to withdraw money from its fund or engage in deficit spending under extraordinary circumstances. Still, funds, earmarks, and fiscal rules are costly to implement: they require laws, bureaucracies, and regulatory bodies that states with low institutional capacity are unable to develop. Not every state is able or willing to make a hard choice and act in a time consistent manner.

3.2.2 Hypotheses for the Long Term

When do rational, self-interested, office-seeking incumbents overcome the pressure of using natural resource revenue for short-term gain, instead pursuing policies that are costly in the short term but bring long-term rewards? The crux of my explanation is the following:

some rulers make time consistent decisions because domestic politics allows them to do so. I argue that the decision to tie hands is more likely to arise at intermediate levels of political competition, because political competition represents two dimensions: the value of budgetary discretion and the public demand for accountability. If competition is low, the ruler derives no electoral value from budgetary discretion, but faces no public demand for accountability. If competition is high, the ruler faces high public demand for accountability, but ascribes a high electoral value to budgetary discretion. For rulers to tie their hands, they must be secure enough to enact long-run policies without jeopardizing their future political prospects, but not so secure that they can afford to eschew institutional development altogether.

The central mechanism behind this argument is electoral sanctioning: citizens reward the incumbent for positive outcomes and punish the incumbent for negative outcomes (Ashworth 2012). Punishment is viable when there are political alternatives and today's winners might be tomorrow's losers. To illustrate this logic, suppose the head of state of an oil-producing country is up for reelection, and their challenger is a political outsider promising to use future oil revenue to cut taxes or increase public consumption. Ideally, the head of state would level the playing field by limiting the kind of policy promises their challenger can make. After all, they have privileged information about the current state of the public finances and know that cutting taxes or increasing public consumption will harm the economy. They would prefer not to distribute short-term benefits to buy off voters, since clientelism might have high electoral costs (Weitz-Shapiro 2012).[6]

However, heads of state who say no to their constituency risk losing political support. If the opposition is strong, rulers cannot afford to lose votes and face no incentive to lock in policies that might work against them in times of need. Instead, they will use natural resource wealth to meet the expectations of the citizenry, delivering short-run policy benefits to key constituencies to boost political support and secure reelection. For example, they

[6]For example, since middle-class voters derive a smaller marginal utility from material goods, they are not typically the target of clientelism and thus have no interest in supporting it (Weitz-Shapiro 2012).

will increase personnel spending and distribute excludable goods, like food or medicine. Short-term political survival is the main factor driving incumbents' behavior; secondarily, incumbents are willing to invest in long-term institutional development, but only if such an investment does not detract from their primary goal. This is how the time inconsistency phenomenon comes about.

If, on the other hand, rulers have comfortable winning margins and are confident about their future electoral prospects, they can afford to institutionalize the allocation of natural resources. Job security prolongs the time horizons of politicians, allowing them to reform the extractive sector and lock in policies that are beneficial for the public finances in the long run, without risking political losses in the short run. The longer the time horizons, the lower the marginal benefit of manipulating resource revenue for immediate political gain. Instead of delivering excludable goods on an informal basis, a confident ruler can commit to institutionalizing the distribution of public resources.

Still, the incumbent cannot be too comfortable in their seat, or else they will face no incentives to tie hands. In the absence of a political alternative, the threat of electoral punishment is not credible; voters are not able to sanction the incumbent, even if they want to, because there is no exit option. Institutional development is costly: in developing extractive institutions, rulers must estimate the size of available reserves, establish rules for public procurement, stipulate the subnational distribution of resource rents, determine how much of these rents should be saved or spent, and create regulatory bodies that can enforce compliance, to name only a few tasks. When politicians are secure under the status quo, why should they make a public commitment to create institutions that are ambitious and difficult to implement? It is cheaper to deliver narrow benefits and distribute spoils, co-opting other political actors and precluding any potential opposition.

As the strength of the opposition grows, the ruler needs to co-opt and appease an increasing number of political actors to remain in power. If there is a political opponent who can credibly demand access to resource revenues, it is cheaper to deliver broad public services

than narrow individual benefits, and it pays off to make public commitments institutionalizing the future allocation of natural resource revenue, rather than pay off important political opponents through patronage.[7] To institutionalize natural resource policy, rulers need to face "mild constraints" (Doner, Ritchie, and Slater 2005, p. 329) that make it difficult for them to remain in power without improving institutional performance. If the constraints are too small, rulers can afford to make commitments, but are not pressured to do so. If the constraints are too large, rulers cannot afford to make commitments, even if the opposition pressures them to do so.

Consistent with this reasoning, Hypothesis 1 predicts that the relationship between political competition and policy adoption follows an inverted U-shape: at intermediate levels of competition, it pays off for rulers to tie their hands, instead of using rents to maximize electoral outcomes (which they would do if competition is high) or co-opt opponents (which they would do if competition is low). Governments are more likely to pass natural resource policy (thus restricting their own future ability to deviate from agreed-upon policy choices) when they are confident that doing so will not jeopardize their tenure, but not so confident that they can pocket the money or buy political support without facing any kind of sanctioning. At intermediate levels of competition, the opposition does not pose a threat to incumbency, but is a nuisance that increases the opportunity cost of pure patronage. There is an optimal level of political contestation below which rulers will not be held accountable by the public, and above which rulers will overspend for electoral gain. This optimal level of contestation generates the necessary incentives to build institutions insulating the extractive sector from discretionary spending.

> **Hypothesis 1 (political competition):** *Incumbents are more likely to pass natural resource policy at intermediate levels of political competition.*

[7] Bueno de Mesquita et al. (2002) make a similar argument: the larger the winning coalition (that is, the group of people whose support the ruler needs in order to stay in office), the bigger the incentives to provide effective public policy.

To illustrate the prediction of Hypothesis 1, consider the case of Botswana, where political elites built strong institutions to overcome the curse posed by diamond wealth. Acemoglu, Johnson, and Robinson (2003) attribute these positive outcomes to the dominance of the Botswana Democratic Party (BDP), which has enjoyed a large and stable majority in the National Assembly since the country's independence in 1966. While Botswana has freely contested democratic elections, the main opposition party, the Botswana National Front (BNF), never won over 37 percent of the vote and is not strong enough to threaten the lasting rule of the BDP. Botswana faces the optimal conditions for the creation of natural resource policies: indeed, it runs one of Africa's most successful funds (the Pula Fund, created in 1996) and has clearly defined fiscal rules (passed in 2003). The BDP can resist short-term political pressures to spend more, instead saving income from diamond exports for future generations, because it knows with relative certainty that it will be the ruling party of these future generations. In committing to a balanced budget, the BDP ensures the future availability of public funds, knowing it will reap the benefits of fiscal prudence.

Separation of powers affects citizens' ability to make demands. When casting a ballot, voters condition their choice to the state of the economy. When the electorate can discern between political actors and identify who is responsible for the state of the economy, it rewards or punishes the responsible actor correctly (Powell and Whitten 1993). If the economy is doing well, voters reward the incumbent; if not, they punish the incumbent by voting for the opposition. However, this clarity of responsibility varies across political systems (Hellwig and Samuels 2007). When the executive and the legislative are elected independently, it is easier to assign policy responsibility and act based on this assignment. If there are conflicts between different branches of the government, these branches reveal more information to the public, allowing voters to identify correctly who is responsible for what (Samuels 2004). It is less easy to do so when the executive is appointed by the legislative and there are no fixed terms, as under parliamentarism. When there is a minority government or a ruling coalition, for example, it is difficult to single out the party responsible for bad economic

performance. Since it is easier to identify the "guilty" political actor in presidential systems than in parliamentary systems, it is easier to hold incumbents accountable in the former than in the latter: presidents can serve as a focal point for electoral punishment. Consistent with this finding, Hypothesis 2 predicts that incumbents are and more likely to pass natural resource policy under presidentialism, as they are more afraid of electoral punishment.

> **Hypothesis 2 (presidentialism):** *Incumbents are more likely to pass natural resource policy in presidential systems than in parliamentary systems.*

3.2.3 Hypotheses for the Short Term

To what extent do short-term political changes affect the timing of natural resource policy? To answer this question, I return to the case of Botswana, where an established but non-threatening opposition (the BNF) generated incentives for a confident incumbent (the BDP) to pass natural resource policy. Since voters weight the recent past more heavily than the distant past, the general policy pattern is to see relative austerity at the beginning of a politician's term, followed by an increase in spending as election day approaches (Franzese 2002). Consistent with this pattern, the BDP should pass natural resource policy at the beginning of a five-year term, rather than at the end. However, Schultz (1995) finds that this spending pattern varies from election to election: governments do not always manipulate the economy ahead of elections, only when their incumbency is at risk.[8] If the incumbent has broad political support and is likely to be re-elected, there is no need to induce business cycles that carry reputational costs and harm future economic performance. The BDP might pass natural resource policy ahead of elections, provided it has enough short-run political capital to implement these policy changes. For example, the BDP under President Festus Mogae was probably not concerned about setting limits to public expenditure in 2003, because it knew that this decision would not hurt the party's prospects for the 2004 election.[9] From

[8] As Bodea and Hicks (2018) and Betz (2018) show, the temptation to manipulate the economy prior to elections can lead to the institutionalization of another commitment device: independent central banks.

[9] Indeed, the BDP increased its victory margin over the BNF in the 2004 election, winning 44 of the 57 seats in the National Assembly. The BNF won 12 seats.

this scenario, I derive Hypothesis 3: regardless of the electoral calendar, incumbents tie their hands when they have immediate political credit (in other words, high support from the public) that can be spent on unpopular measures.

> **Hypothesis 3 (public support):** *Incumbents are more likely to pass natural resource policy when they have strong public support than when they have weak public support.*

Citizens hold the incumbent accountable when they can identify the party responsible for economic conditions, but this clarity of responsibility becomes more opaque in contexts of natural resource abundance. In Latin America, for example, presidents are punished for every short-term economic setback, because the electorate has limited information about global economic outcomes and is unable to discount exogenous shocks driving their country's economic performance (Campello and Zucco Jr. 2016). Thus, presidential popularity and reelection prospects depend on commodity prices and US interest rates, two factors that the presidents of Mexico or Brazil evidently cannot control. I theorize that this also has consequences for the allocation of natural resource revenue. There is evidence that governments spend on patronage when oil rents decline and on public services when rents increase (González 2018). In times of bust, rulers compensate citizens for job losses in the extractive sector to avert electoral punishment. In times of boom, rulers have more room to breathe: they can deliver better infrastructure and more social services to meet the booming sector's demands. In line with this argument, Hypothesis 4 predicts that incumbents are more likely to lock in natural resource policy (reducing the funds available to patronage) in times of bonanza, when they do not expect to be sanctioned by citizens because public support is already high.

> **Hypothesis 4 (resource revenue):** *The effect of public support on natural resource policy is stronger when resource revenue is high than when resource revenue is low.*

3.2.4 Competing Explanations

Natural resources could constrain political competition, and not the reverse: rulers might use windfalls to create entry barriers and increase participation costs for their rivals (**Goldberg2009**). Still, there is meaningful variation in competitiveness across the 74 resource-rich countries examined in this study. For example, in 2018, the largest party in the lower chamber of the legislative had an average 31.8 percent lead over the second-largest party, but this ranged from a 1.5 percent lead in Guyana to a 98 percent lead in Equatorial Guinea, with a standard deviation of 27 percent. In providing financial resources to the incumbent, natural resources pose challenges to the strength of the opposition, but few countries are like Equatorial Guinea; in most regimes, the existence of a credible opposition is exogenous to the choice to spend or save rents.

Regime type might drive variation in natural resource policy. Sanctioning the incumbent is less risky, less costly, and more likely under democracy. Democracies produce higher levels of public goods than autocracies (Lake and Baum 2001) and are more willing to disseminate policy-relevant data (Hollyer, Rosendorff, and Vreeland 2011). Since democratic institutions have more checks and balances, democracies may be more likely to tie their hands than autocracies, in an attempt to increase transparency in an otherwise opaque sector. For example, given that oil and mining companies want to secure their assets and mitigate the bargaining advantages of host governments (Jensen, Biglaiser, et al. 2012), resource-rich autocracies – more than resource-rich democracies – may tie their hands to address these concerns. Yet sanctioning the incumbent is also possible under autocratic rule, as even dictators face some uncertainty (Weeks 2008). Stable autocracies rely on nominally democratic institutions to distribute spoils and bribe potential opposition forces, broadening the ruler's basis of support and lengthening their tenure (Gandhi and Przeworski 2007; Wright 2008). This explains the proliferation of natural resource funds in absolutist monarchies like Brunei or Saudi Arabia: in developing extractive institutions, these monarchs delimit the scope of demands the opposition can make. Democrats may be more likely to

tie their hands than autocrats, but the curvilinear effect of political competition should be orthogonal to regime type.

I posit that natural resource policy is more likely under presidentialism than under parliamentarism. However, since presidential systems are more widespread in Latin America and Africa than in the developed world (Shugart and Mainwaring 1997), policy variation might be a function of geography, rather than political system. In empirical tests, I disentangle the effect of geography from the effect of governing system.

Additional rival explanations raise the possibility of policy diffusion: governments might tie their hands to emulate their resource-rich peers. Mexico,[10] Timor-Leste,[11] Mongolia,[12] and others modeled their natural resource legislation after Norway's, suggesting that countries tie their hands after their peers have done so (Chwieroth 2014). Alternatively, rulers might adopt certain natural resource management strategies because because doing so was labeled a best practice by the World Bank and the IMF (Baunsgaard et al. 2012), an explanation I address in Chapter 4. These arguments are compelling, but incomplete. Why do countries emulate each other's behavior or comply with international best practices? Diffusion is a necessary, but insufficient explanation for natural resource policy: peer pressure might motivate political leaders to tie their hands, but not every government succeeds in passing natural resource legislation. Theories of spatial policy dependence are conditional; institutional, political, economic, and social factors determine countries' susceptibility to policy diffusion (Neumayer and Plümper 2012). I investigate these factors in the next section.

A final alternative explanation is that stakeholders other than opposition parties influence natural resource policy. The International Labor Organization (ILO) Convention 169, adopted in 1989, establishes that indigenous and tribal peoples must be consulted ahead of

[10]Adam Critchley. "Mexico Launches Sovereign Oil Fund." *BNamericas*. 2 January 2015.

[11]IRIN. "Is Timor-Leste's Plan for Oil Fund Investments a Risk Worth Taking?" *The Guardian*. 24 October 2011.

[12]Alicia Campi. "Mongolia's Quest to Balance Human Development in its Booming Mineral-Based Economy." *Brookings East Asia Commentary*. 10 January 2012.

time whenever extractive or infrastructure projects have the potential to affect the territories of indigenous communities (Falleti and Riofrancos 2018). The existence of this convention suggests that indigenous communities might affect the design of natural resource legislation. However, only 22 countries (15 of them in Latin America) have ratified this convention, and even fewer have converted it into formal legislation. In most cases, the right to prior consultation is merely symbolic. For social movements to have a say in the design of extractive institutions and the implementation of extractive projects, Falleti and Riofrancos (2018) show that these movements need to be incorporated into political parties. Even when this happens, indigenous communities are rarely unitary actors that vote uniformly against these projects. For example, between 2007 and 2017, Bolivia's Ministry of Hydrocarbons and Energy conducted 58 prior consultations, and only in one case did indigenous communities oppose the extraction of natural resources. In sum, indigenous and tribal peoples are unlikely to influence the content of natural resource policy unless they are part of a political party, a finding that aligns with my proposed hypotheses.

3.3 Data

3.3.1 Dependent Variable: Natural Resource Policy

To understand why governments tie their hands, I examine all legal documents regulating the natural resource sector in 74 developing countries classified as resource rich by the IMF (Venables 2016), the Natural Resource Governance Institute (2017), or both.[13] I limit the analysis to resource-rich countries because discovering and extracting oil, gas, and minerals is a necessary condition for passing natural resource policy; we cannot observe this policy in countries that have not discovered any subsoil assets or have chosen not to develop the extractive sector.

To collect this evidence, I proceed in two steps. First, using the Natural Resource Governance Institute (2017) and the IMF Fiscal Rules at a Glance Dataset (Lledó, Yoon, et al.

[13]The analysis excludes high income countries, though results are identical if they are included. See Appendix A for full list.

2017) as a starting point, I document all instances in which one of these 74 countries created a natural resource fund, earmarked natural resources, or set fiscal rules.[14] Second, I track the laws, executive decrees, acts, codes, and constitutional amendments associated with the creation and regulation of each measure.[15] These documents are published in Official Gazettes, available to the public through the Foreign Official Gazette Database (FOG) and the Global Legal Information Network (GLIN), two initiatives sponsored by the US Library of Congress. The resulting corpus consists of 101 legal documents passed by 40 countries between 1975 and 2019. The remaining 34 countries, while included in the analysis, have no recorded earmarks, funds, or fiscal rules at the national level.

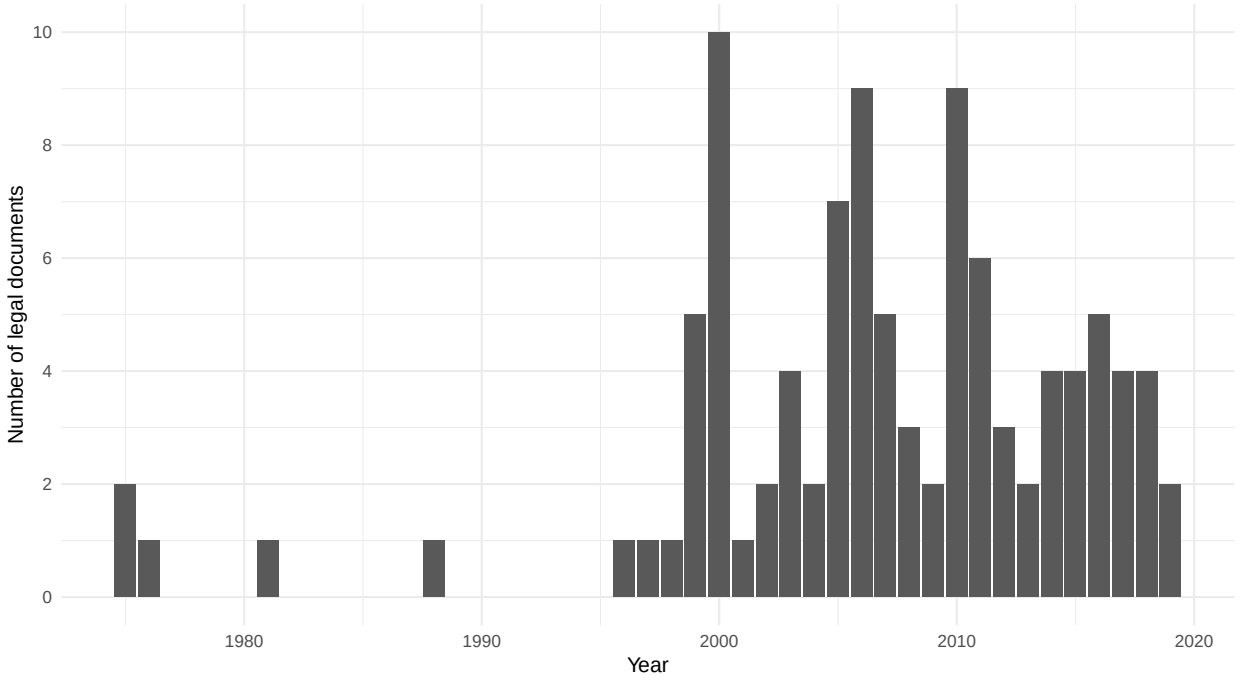
I focus on measures enacted and regulated by written legal documents because this statutory character reflects a higher level of commitment than informal agreements. The existence of a written document indicates that the decision to institutionalize natural resource policy comes from politicians, not lower-level career bureaucrats. In this context, tying hands is a political (not just a technocratic) decision. While this only captures de jure policy, not de facto behavior, it is useful to understand when and why de jure policy is enacted because it is a necessary first step toward explaining the effects of law on behavior. Laws can be a good predictor of behavior: Amick, Chapman, and Elkins (2020) find that both constitutional and statutory rules mandating a balanced budget are associated with higher fiscal discipline.

Figure 4.2 shows the number of legal documents passed at the national level between 1975 and 2019. I generate the dependent variable *Policy adoption*, which is a binary indicator of whether the government in question passed any legal document regulating the natural resource sector each year. *Policy adoption* is a rare event; Russia and Ecuador lead the list, having passed eight legal documents each (see Figure 3.1).

[14] I only include in rules that set fiscal targets related to natural resources. I discard rules referring to the general budget unless they make explicit reference to resource revenue.

[15] There are 34 documents passed by subnational entities in four federations (Australia, Canada, the United Arab Emirates, and the United States), and two documents adopted by members of the Central African Economic and Monetary Community (CEMAC). Since these subnational and supranational documents are not comparable to national-level legislation, I exclude them from the analysis, though their inclusion returns identical results (see Appendix B).

Figure 3.2: Number of Legal Documents Passed Every Year, 1975-2019



This figure depicts the temporal distribution of 101 legal documents regulating the natural resource sector in 40 countries.

To illustrate the content of these legal documents, consider Tanzania's Oil and Gas Revenue Management Act, passed on 4 August 2015. This document creates the Oil and Gas Fund to maintain fiscal and macroeconomic stability, finance investment in oil and gas, enhance social and economic development, and safeguard resources for future generations. The Act includes earmarking provisions: every year, up to 3 percent of the GDP can be transferred from the fund to the consolidated budget; from this transfer, at least 60 percent should fund human capital development, particularly in science and technology. Finally, the Act sets yearly limits for total public expenditure (40 percent of the GDP) and for the size of the fiscal deficit (which should not exceed 3 percent of the GDP once oil and gas revenue attains a level of at least 3 percent of the GDP). Tanzania's Oil and Gas Revenue Management Act restricts the government's discretion over natural resource revenue in all

three manners identified in this study: through funds, earmarks, and fiscal rules. Like Tanzania, many other countries use one legal document to tie their hands in different ways. In operationalizing the dependent variable as *Policy adoption*, rather than as a count of individual funds, earmarks or rules, I ensure that Tanzania's intertwined measures are not counted multiple times.

3.3.2 Independent Variables

Drawing from **Goldberg2009** and Berliner (2014), I measure political competition as the strength of the ruler relative to their potential challengers. *Seat difference* represents the difference in the share of seats held by the two largest parties in the lower (or only) chamber of the legislature. Narrower winning margins reflect higher levels of political competition. Regardless of whether the second-largest party is a member of the ruling coalition or not, a decline in *Seat difference* poses a threat to the largest party, signaling an increase in the relative strength of political alternatives. I choose this measure of political competition because it has the broadest coverage across countries and over time, and it reflects an underlying competition between parties that is important in presidential and parliamentary systems alike. It represents the actual distribution of power in the legislature, mitigating issues of malapportionment that would arise if I examined differences in *vote* share. To capture the curvilinear relationship predicted by Hypothesis 1, I include both *Seat difference* and its squared term, predicting that the former will have a positive effect and the latter will have a negative effect. This measure is calculated using V-Dem data (Coppedge et al. 2019).

One potential criticism of *Seat difference* is that it focuses on legislative competition at the expense of executive competition. To mitigate such concerns, I estimate additional models with an alternative measure of political competition: *Polcomp*, the Polity index for political competition that ranges from 1 to 10, where 1 represents "repressed competition" and 10 represents "institutionalized open electoral participation" (Marshall and Gurr 2015). These models, which lead to identical results, are presented in Appendix B.

Hypothesis 2 identifies one factor that increases the odds of policy adoption: separation of powers. Assuming rulers are more likely to be rewarded – or punished – by their constituency under separation of powers, I include the dichotomous variable *Presidential system*, coded one if the chief executive is directly elected and zero otherwise,[16] based on data from Cruz, Keefer, and Scartascini (2018).

3.3.3 Control Variables

To test the alternative explanation that regime type drives policy adoption, I use the Polity 2 index (Marshall and Gurr 2015) to generate the variable *Democracy*, ranging from -10 (hereditary monarchy) to +10 (consolidated democracy). Partisanship (captured by the dichotomous variable *Left executive*) and *Term limits* might also be key factors driving variation in natural resource policy. To assess whether the choice to tie hands is motivated by election cycles, I control for *Election year*, which represents whether any election (legislative or executive) took place that year. Relatedly, *Turnover frequency* tracks the number of changes in the party controlling the legislative over the previous five years; more frequent turnover reflects higher political uncertainty. The source for all four variables is Cruz, Keefer, and Scartascini (2018).

To capture the effect of policy diffusion, the spatial lag $W \times$ *Policy adoption* indicates how many other resource-rich countries have passed natural resource policy so far, weighted by the row-standardized spatial weights matrix W, which represents the minimum distance between any two countries in the dataset (Neumayer and Plümper 2012). To avoid distorting the spatial lags, I only include nations that are within 1,000 kilometers of each other (Genovese et al. 2017).[17]

As the size of the extractive sector increases, the incentives to regulate this sector might increase. I operationalize the size of the extractive sector as *Resource rents* (as a percentage of the GDP, reported by the World Bank). *Field discovery* indicates whether a giant, super-

[16] Assembly-elected presidents are coded as zero.

[17] Chapter 5 discusses the predicted effects of policy diffusion in more detail.

giant, or megagiant oil and gas field – that is, a field with over 500 million recoverable barrels of oil or over 3 trillion cubic feet of gas – was discovered (Horn 2014). The discovery of such a field might compel governments to regulate their resource sector, as Guyana did. To assess whether tying hands is driven by overoptimism when commodity prices are high, I control for *Oil price* (West Texas Intermediate), which is the cost of a barrel of crude oil, in current US dollars, on December 31. Though not all countries in the analysis are oil producers, I use oil as a proxy for all commodities because different prices tend to be correlated and follow similar trends over time (World Bank 2014).

While developed nations have room to plan for long-term savings, developing countries are capital-scarce and need short-term investment. To assess whether a country is more likely to regulate its natural resource sector as it becomes wealthier or in times of economic expansion, models include *GDP per capita*, in current US dollars, and *GDP growth*, in percent, as reported by the World Bank. *IMF agreement* is a dichotomous variable indicating if the country-year in question was under an IMF agreement (using data from Bauer, Cruz, and Graham 2012; Kentikelenis et al. 2016; and the IMF MONA Database). I expect that governments under an IMF agreement will be more likely to tie hands, since stricter natural resource regulation is often one of the conditions for loan disbursement. Finally, since policymakers might reform the extractive sector in years of economic downturn, the dichotomous variable *Crisis* is coded one in years of banking, debt, or currency crisis and zero otherwise, using data from Laeven and Valencia (2020). To reduce simultaneity bias, all independent variables (including the spatial lags) are lagged at one year, apart from *Seat difference*, *Election year*, and *Turnover frequency*, which already refer to past political events.

3.4 Empirical Strategy and Results

3.4.1 Testing the Effects of Competition and Political System

Since the dependent variable *Policy adoption* is binary, I estimate logistic regressions,[18] with cubic polynomials instead of time dummies to avoid issues of quasi-complete separation (Carter and Signorino 2010). To control for unobserved unit-level heterogeneity, I include region-fixed effects. *Policy adoption* is a rare event, and fixed effects can be problematic for rare event binary time series cross sectional data: when units never experience the event, there is no variation in the dependent variable, so these observations drop from the sample, generating selection bias. To overcome this issue, I use the penalized maximum likelihood estimator proposed by Cook, Hays, and Franzese (2020), which includes fixed effects, but uses a modified score function to retain the units that have not experienced the event.

I predict that incumbents can afford to tie their own hands when they are certain that doing so will not jeopardize their political survival. Political competition should have a curvilinear effect on policy adoption: opposition parties must be weak enough that the government can afford to tie its hands, but strong enough that the government would rather institutionalize the distribution of benefits than distribute these benefits through patronage. Table 3.1 presents the results for three penalized logistic regressions with *Policy adoption* as the dependent variable, reporting the coefficients as log-odds. Model 1 supports Hypothesis 1: as the difference in the share of seats held by the two largest parties in the legislature increases, the odds of policy adoption increase significantly, but only up to a certain point. Figure 3.3 allows us to visualize this curvilinear effect, captured by the coefficients for *Seat difference* and *Seat difference* squared. According to Figure 3.3, there is an optimal margin of victory (between 40 and 60 percent) outside of which institutionalizing the regulation

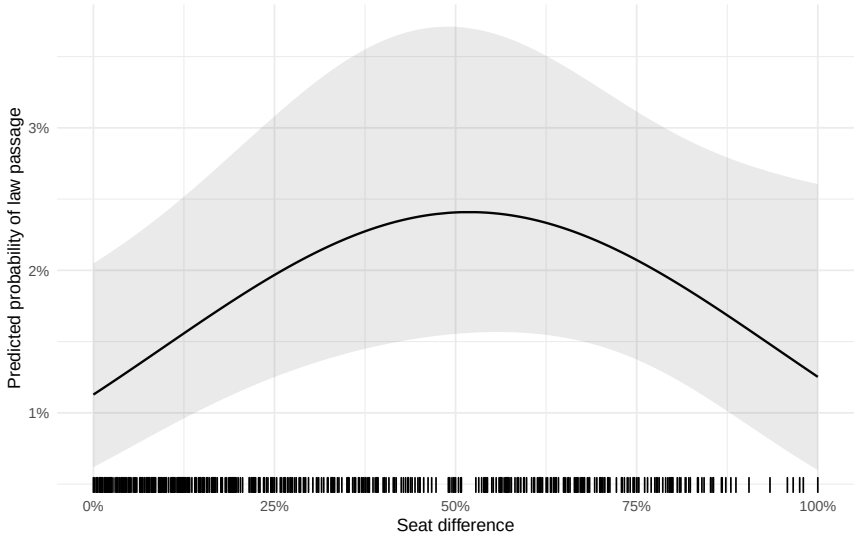
[18] As a robustness check, Appendix B reports the results of Cox proportional hazards models predicting the time until a government passes its *first* law. This survival analysis omits all country-years following passage of the first law, as countries are no longer at risk once they pass their first natural resource policy. While the results of proportional hazard models are equivalent to those of logistic regressions, I focus on the latter for two reasons: first, governments are permanently at risk of passing new natural resource policy; second, logistic coefficients are easier to interpret.

Table 3.1: Political Determinants of Policy Adoption Around the World, 1975-2018 (Penalized Logit, Yearly Data)

	Dependent variable:		
	Policy adoption		
	(1)	(2)	(3)
Seat difference	2.950**		3.007**
	(1.404)		(1.469)
Seat difference^2	−2.808*		−2.883*
	(1.501)		(1.574)
Presidential system		1.068***	0.843**
		(0.341)	(0.346)
Democracy (Polity)			−0.001
			(0.029)
Left executive			−0.306
			(0.268)
Term limits			−0.081
			(0.402)
Election year			0.364
			(0.231)
Turnover frequency			−0.308
			(0.325)
Resource rents (% GDP)			0.020*
			(0.010)
Field discovery			0.945***
			(0.323)
Oil price (USD)			−0.010*
			(0.006)
GDP per capita (log)			0.030
			(0.037)
GDP growth (%)			0.004
			(0.013)
IMF agreement			−0.036
			(0.270)
Crisis			0.288
			(0.415)
W × Policy adoption			−0.501
			(0.623)
Constant	−2.911***	−2.600***	−3.161**
	(1.115)	(0.975)	(1.392)
Observations	2,757	2,928	2,439
Log Likelihood	−342.517	−343.658	−307.343

This table reports the results of penalized likelihood models with third-order polynomials and region-fixed effects. The reported coefficients are log-odds. *p<0.1; **p<0.05; ***p<0.01

Figure 3.3: The Curvilinear Effect of Political Competition on Policy Adoption



Based on Model 1, this figure represents the predicted probability of *Policy adoption* at different values of *Seat difference*, with 90 percent confidence intervals.

of natural resources is less beneficial. When victory margins are too small, incumbents want to retain full discretion over the allocation of natural resource revenue to maximize their immediate political survival; when margins are too high, there is no public pressure to institutionalize the distribution of spoils, as rulers can do so informally.

Model 2 supports Hypothesis 2: presidential systems are nearly three times more likely to pass natural resource policy than parliamentary systems. This finding is robust to the inclusion of region-fixed effects, disproving concerns that policy variation is a function of geography, rather than political system. I find support for Hypotheses 1 and 2 even after controlling for regime type, partisanship, timing of elections, spatial interdependence, and macroeconomic indicators in Model 3.

Having examined how slow-moving, long-term institutional characteristics explain yearly variation in natural resource policy, I proceed to test how rapidly changing, short-term variables affect a ruler's propensity to tie their hands. To do so, I turn to an in-depth analysis of natural resource policy in presidential systems.

3.4.2 Testing the Effects of Public Support and Resource Revenue

Table 3.1 provides encouraging evidence connecting presidentialism and moderate competition to hand-tying mechanisms. However, *Seat difference* captures the seat distribution in the lower chamber after the *last* legislative election; it is a retrospective assessment of uncertainty. The political landscape of a country can change dramatically within a few years, or even months. *Seat difference* captures the strength of political alternatives between elections, but says nothing about public support for the ruler, which is a more immediate indicator of incumbent security. To measure incumbent security among comparable countries, holding regional characteristics constant, I examine the determinants of *Policy adoption* for ten[19] Latin American nations in every quarter between 1980 and 2018. Latin America is a region known for its resource nationalism: citizens value popular sovereignty over the extractive sector and are wary of agreements allowing foreign businesses to "steal" their resource wealth (Weyland 2009).

Since nearly all Latin American nations have presidential systems,[20] these governments should be particularly wary of electoral sanctioning, which is more widespread under separation of powers. Latin American presidents have the final say about the content of laws and the timing of policy adoption (Tsebelis and Alemán 2005), so their decision to sign a law allocating the proceeds of the extractive sector might depend on short-term variations in political uncertainty.

I operationalize incumbent security as the approval rating of the chief executive, that is, the percentage of support expressed for the president. *Executive approval* (Carlin et al. 2019) is the most direct measure of "the marginal benefit of winning additional votes" (Schultz 1995, p. 81), and hence the ideal measure to assess whether political uncertainty drives policy adoption. While *Seat difference* is a retrospective measure, *Executive approval*

[19] Argentina, Bolivia, Brazil, Colombia, Chile, Ecuador, Guatemala, Mexico, Peru, and Venezuela.

[20] Exceptions are Trinidad and Tobago (a parliamentary republic) and Guyana and Suriname (which have assembly-elected presidents). These countries are excluded from the analysis because no measure of executive approval is available for them.

Table 3.2: Political Determinants of Policy Adoption in Latin America, 1980-2018 (Penalized Logit, Quarterly Data)

	Dependent variable:		
	Policy adoption		
	(1)	(2)	(3)
Executive approval (3 mo.)	0.030**	0.023*	0.053***
	(0.013)	(0.014)	(0.018)
Oil production (log)		0.253*	−1.132**
		(0.143)	(0.479)
Executive approval × Oil production			0.029***
			(0.010)
Seat difference		0.822	−0.110
		(3.524)	(3.587)
Seat difference^2		−2.972	−1.713
		(6.458)	(6.441)
Democracy (Polity)		−0.051	−0.083
		(0.101)	(0.100)
Left executive		−0.276	−0.280
		(0.507)	(0.532)
Election quarter		0.500	0.500
		(0.509)	(0.516)
Turnover frequency		−0.844	−0.560
		(0.671)	(0.650)
Field discovery		−1.581	−1.871
		(1.422)	(1.455)
Oil price (USD)		0.027**	0.025**
		(0.012)	(0.012)
GDP per capita (log)		−0.166*	−0.184**
		(0.089)	(0.091)
GDP growth (%)		−0.003	−0.012
		(0.047)	(0.048)
IMF agreement		−0.795	−0.825*
		(0.489)	(0.498)
Crisis		1.376	1.353
		(1.029)	(1.049)
W × Policy adoption		−0.974	−1.483
		(0.920)	(0.955)
Constant	−51.056***	−73.382***	−70.127***
	(17.206)	(20.394)	(20.181)
Observations	1,265	1,229	1,229
Log Likelihood	−131.013	−121.765	−117.977

This table reports the results of penalized likelihood models with third-order polynomials and country-fixed effects. The reported coefficients are log-odds. *p<0.1; **p<0.05; ***p<0.01

is forward-looking: it captures not only the incumbent's assessment of their current public support, but also their expectations of future electoral performance, conditioning how much room to move they have when setting natural resource policy. There is a temporal gap between proposing a bill and passing a law; laws coming into effect today have been under consideration for many months. Given that the chief executive must consider their approval rating throughout this entire period, I lag *Executive approval* at one quarter (3 months).[21]

If Hypothesis 3 is correct and incumbents are more likely to regulate the extractive sector when they have strong public support, increases in *Executive approval* will increase the odds of *Policy adoption*. Hypothesis 4 predicts that the effect of public support on natural resource policy is moderated by the availability of resource revenue. Since *Resource rents* are not available on a quarterly basis, I proxy for this variation using *Oil production (log)*, which measures the production of petroleum and other liquids (including natural gas) in millions of barrels per day, logged, as reported by the US Energy Information Administration.[22]

Table 3.2 presents the results of this disaggregated analysis. *Policy adoption* now varies on a quarterly basis, as do most independent variables, which are lagged at one quarter and not one year.[23] Again, the reported coefficients are log-odds. The region-specific results align with the cross-regional results reported in Table 3.1. There is a positive and statistically significant relationship between executive approval and policy adoption: according to Model 1, a one percent increase in executive approval is associated with a two percent increase in the odds of passing a law reforming the extractive sector. These results are robust to the inclusion of control variables in Model 2. The effect of *Seat difference* is still curvilinear, but no

[21]The results are robust to using *Executive approval* in the quarter of policy adoption or in the previous 6, 9, 12, and 15 months, as reported in Appendix B.

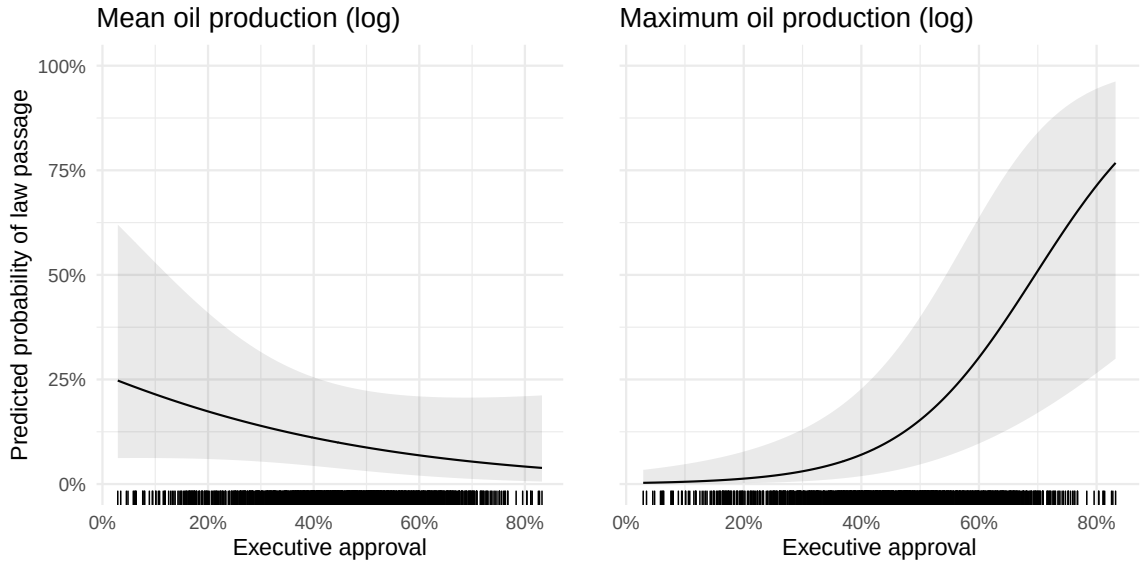
[22]Not all countries in the sample are oil producers; for example, Chile produces modest amounts of oil, as the foundation of its extractive sector is copper. *Oil production* offers a conservative estimate of the effect of resource wealth on policy adoption; robustness checks using *Resource rents* recover similar results.

[23]This excludes *Democracy*, *GDP per capita*, and *GDP growth*, which are only available on a yearly basis. Since Horn (2014) computes *Field discovery* on a yearly basis, I used LexisNexis to uncover the exact day each discovery was announced. *Seat difference*, *Turnover frequency*, and *Election quarter* are not lagged. *Term limits* drop out of the analysis because virtually all Latin American countries have executive term limits.

longer statistically significant – which makes sense: long-term variations in the composition of the legislative cannot explain short-term variations in the odds of law approval. This supports the prediction that incumbents tie their hands when they have public support in the short run and face moderate levels of political competition in the medium to long run. Job insecurity (due to low approval ratings) increases the perceived need for discretion over natural resources, as do very low or very high levels of structural political competition (because both extremes push the incumbent towards the delivery of particularistic benefits).

Models 1 and 2 provide compelling evidence that public support increases the odds of policy adoption, but is this effect unconditional? Model 3 investigates whether the relationship between approval ratings and policy adoption is mediated by resource revenue. The interaction between *Executive approval* and *Oil production (log)* has a positive and significant coefficient, which supports Hypothesis 4: incumbents are more likely to reform the extractive sector when they have surplus money from natural resources and do not need this money for short-term political survival. Figure 3.4 simulates the effect of this interaction at two different values of *Oil production (log)*. The average value of this variable (-2.9) corresponds to the production of 55 thousand barrels of oil and other liquids every day; at this point, an increase in executive approval is not associated with any meaningful change in the odds of policy adoption. As oil production increases, so does the effect of *Executive approval* on *Policy adoption*; when production peaks at 3.85 million barrels/day (as in Brazil, Mexico, and Venezuela during the early 2000s), it is all but certain that executive leaders with high popular approval will tie their own hands.

Figure 3.4: Predicted Probability of Policy Adoption at Different Values of Executive Approval, Conditional on Oil Production



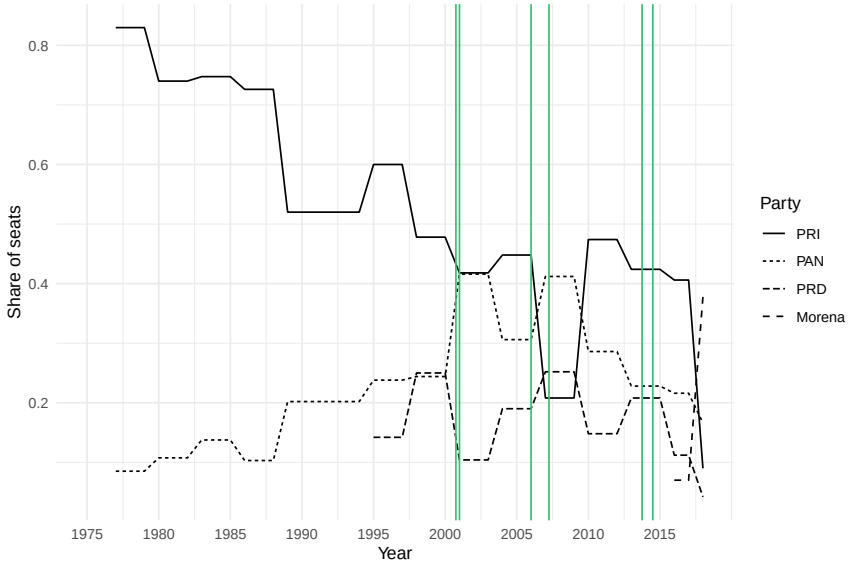
Based on Model 3 of Table 3.2, this figure simulates predicted probability of *Policy adoption* at different values of *Executive approval*, with 90 percent confidence intervals, conditional on *Oil production (log)* at its mean and maximum values (-2.9 and 1.3, respectively). The remaining variables are held at their means (with dichotomous variables held at zero).

3.5 Natural Resource Policy in Mexico

I argue that moderate political competition, presidentialism, and high public support increase the odds that resource-rich governments restrict their own discretion over the extractive sector. To probe this causal mechanism, I follow Seawright and Gerring (2008) and a typical case that best illustrates the argument. In 1901, Mexico discovered its first giant oil field, Panuco, in the state of Veracruz (Horn 2014). In response to public pressure and following several other discoveries in the states of Veracruz, Tamaulipas, Tabasco, and Chiapas, President Lázaro Cárdenas seized the assets of foreign companies, creating the national oil company Pemex in 1938. Cárdenas's Institutional Revolutionary Party (PRI)[24] – which won every presidential election from 1929 to 2000, held the majority in Congress until 1997, and controlled every state government until 1989 (Greene 2007) – struggled with subsequent

[24]The PRI was initially known as National Revolutionary Party (1929-1938) and Party of the Mexican Revolution (1938-1946).

Figure 3.5: Distribution of Seats in the Chamber of Deputies, 1975-2018



Using data from Cruz, Keefer, and Scartascini (2018), this figure depicts the share of seats in the lower chamber controlled by the three largest political parties in Mexico until July 2018: the Institutional Revolutionary Party (PRI), the National Action Party (PAN), and the Party of the Democratic Revolution (PRD). The PRD first ran in the 1994 election. The National Regeneration Movement (Morena) first ran in the 2015 election. Vertical lines indicate quarters in which natural resource policy was passed.

attempts to liberalize the oil sector, even though Pemex needed foreign capital to acquire technology and managerial expertise. The unionization rate in the Mexican oil sector is exceptionally high, and the Oil Workers Union (which has strong ties to the PRI) opposed reforms challenging popular sovereignty over the extractive sector (Jones Luong and Sierra 2015).

There was no political benefit to breaking with the status quo to modernize the oil sector, establish rules for public procurement, or determine the allocation of rents ahead of time. The PRI faced no oversight by opposition forces, international organizations, or the media, and had complete control over the Mexican bureaucracy. Consistent with my expectations, the PRI's dominance of all major political institutions generated little incentive to implement long-term, pro-development natural resource policies. Instead, the party used resource revenues to insulate itself from any real competition. Revenue from state-owned

enterprises (notably Pemex) was used to buy off key supporters, and fraudulent elections eliminated credible political rivals (Cantú 2019). Politicians from the PRI were secure in their seats and saw no need to develop extractive institutions that would carry unnecessary political costs.

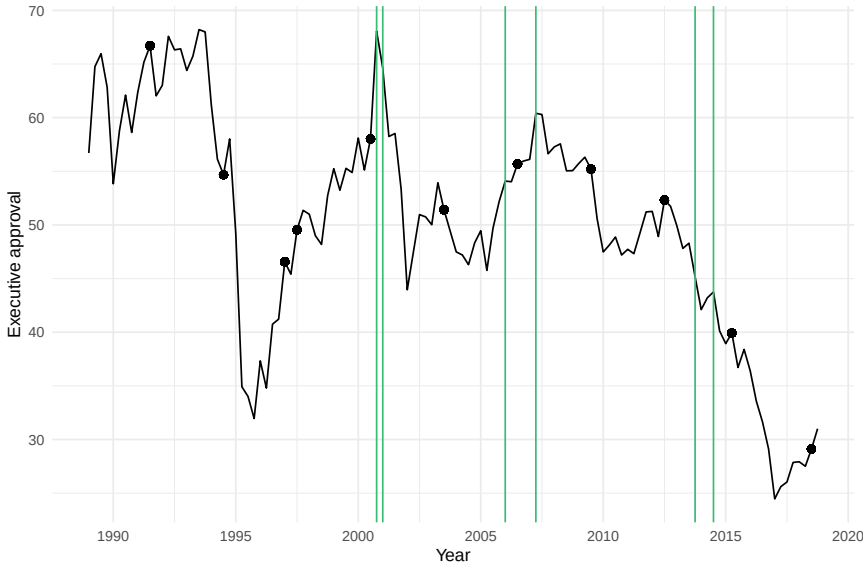
At the height of the PRI's dominance, in 1976, the party's presidential candidate ran unopposed and received 100 percent of the votes. As Figure 3.5 shows, this dominance declined in the 1980s and 1990s – partly because the 1982 debt crisis forced the government to privatize state-owned enterprises, reduce the size of the bureaucracy, and cut back on tariffs, depriving the PRI of funds for patronage (Greene 2010). The 1997 election was a critical juncture, as the party failed to win a majority in the Chamber of Deputies for the first time in history. In 2000, its presidential candidate lost the election to Vicente Fox from the conservative National Action Party (PAN). With the exception of the 2007-2009 legislative period, the PRI continued to be the largest party in the Chamber of Deputies, but its dominance was no longer absolute. In line with my theory, this decline in single-party dominance coincided with a series of reforms in the oil sector. The alternative choice – to leave the extractive sector unregulated – would have meant that resource wealth was up for grabs: any future ruler would have been able to spend this money at their discretion, even if this ruler was from a rival party.

At the beginning of every fiscal year, the government calculates its expected future revenue based on a reference price for a barrel of crude oil. At the end of the fiscal year, 40 percent of the surplus (if applicable) must be deposited into a fund to offset the negative effects of oil price fluctuation on public finances.[25] To fulfill this purpose, the Oil Revenues Stabilization Fund (FEIP) was created in December 2000,[26] the same month Vicente Fox took office. The fund's proceeds should be invested in low-risk financial instruments, and

[25]Presupuesto de Egresos de la Federación para el ejercicio fiscal del año 2000, Article 35. 31 December 1999.

[26]Acuerdo por el que se expiden las Reglas de Operación del Fondo de Estabilización de los Ingresos Petroleros. 31 December 2000.

Figure 3.6: Executive Approval in Mexico, 1989-2018



Using data from Carlin et al. (2019), this figure depicts the approval ratings of Mexican presidents between 1989 and 2018. The round markers indicate presidential elections, while vertical lines indicate quarters in which natural resource policy was passed.

the government could withdraw up to 50 percent of the fund if the actual price for an oil barrel fell at least 1.50 US dollars below the reference price. Fox could afford to make such reforms: he rose to power during an increase in oil prices and had high approval ratings, being the first president in 71 years who was not a member of the PRI. Though the FEIP represented an important first step in curtailing policymakers' ability to use resource revenue for political gain, it did not have clear regulations and the very definition of "revenue surplus" was unclear (Quiroz 2004, p. 53).. As a result, incumbents quickly rewrote the rules to meet their short-term needs: the share of revenue surplus to be deposited in the fund was reduced from 40 percent in 2000 to 33 percent and 25 percent in 2001 and 2003, respectively.

In March 2006, Fox signed a fiscal reform mandating a balanced budget for the federal public sector, including public enterprises like Pemex.[27] At the time, his approval rating was over 50 percent and his party faced meaningful competition – two conditions anticipated by

[27]Decreto por el que se expide la Ley Federal de Presupuesto y Responsabilidad Hacendaria. 30 March 2006.

my theory. In 2006, Fox's former Secretary of Energy and fellow member of the PAN, Felipe Calderón, won the presidential election by a narrow margin. Calderón continued the reforms of his predecessor, passing new regulation disclosing the FEIP's total asset value and creating a technical committee to manage the fund.[28] This regulation coincided with a period of high oil production and high executive approval. Between April and June 2007, Mexico produced 3.5 million barrels/day, selling each barrel for about 65 US dollars; during the same period, over 60 percent of all Mexicans approved of President Calderón's administration, as Figure 3.6 shows. His administration faced the optimal conditions to reform the extractive sector without risking the loss of public support.

The PAN controlled the presidency from 2000 to 2012, which could suggest that conservative presidents reform the extractive sector, rather than centrist or leftist presidents. But when the centrist PRI won the presidency in 2012 and regained its status as the largest party in the legislative, it deepened these reforms. In 2013 and 2014, President Enrique Peña Nieto signed legislation capping structural current spending, restructuring the oil sector, and replacing the FEIP with the Mexican Oil Stabilization and Development Fund (FMPED).[29] The FMPED is funded through revenue earned by Pemex from contracts for exploration and production of hydrocarbons. This revenue is managed by a technical committee that publishes monthly financial statements and meets at least five times every year; the minutes of each meeting are available online. By that point, oil prices and oil production were in decline, as was Peña Nieto's public approval, but the PRI was again the largest party in the Chamber of Deputies, with a 20 percent lead over the runner-up, the PAN. The timing of natural resource policy in Mexico suggests that administrations across the political spectrum can commit to tying their hands, provided there is credible competition in the legislature in the medium to long run and the executive has high approval rates in the short run.

[28] Acuerdo por el que se establecen las Reglas de Operación del Fondo de Estabilización de los Ingresos Petroleros. 31 May 2007.

[29] Decreto por el que se reforman, adicionan y derogan diversas disposiciones de la Ley Federal de Presupuesto y Responsabilidad Hacendaria. 13 December 2013. See also Ley del Fondo Mexicano del Petróleo para la Estabilización y el Desarrollo. 11 August 2014.

3.6 Conclusion

In this chapter, I find that incumbents are more likely to pass natural resource policy under moderate levels of political competition. Given that natural resources boost the political capital of incumbents, rulers dispense with this boost when they are secure in their incumbency, but not so secure that they can ignore public demands for accountability. The odds of passing natural resource policy also increase under presidentialism and when public approval is high, particularly if increases in public approval coincide with increased resource production.

Tying hands does not impede patronage and corruption. In fact, natural resource policy may be an efficient way to institutionalize side payments. Rulers might create a natural resource fund and place political allies on the investment board; they might amend extant measures, replace old measures with new measures, engage in creative accounting, or simply fail to comply altogether, without formally untying their hands. There is a gap between de jure policy and de facto behavior; good policy cannot implement itself. I identify an optimal level of political uncertainty at which rulers are safe enough to tie their hands without risking their seats, but unsafe enough that they would rather institutionalize the distribution of resource rents than distribute these rents informally. The central implication is that incumbents are more likely to institutionalize commitments in first place – even if these commitments are hollow – when they are safe in the knowledge that such commitment will satisfy demands for accountability in the long term without costing them their office in the short term. This chapter does not investigate the gap between law passage and law enforcement, and my findings cannot predict whether these laws will truly be implemented.

Nonetheless, evidence from Brazil suggests that electoral uncertainty decreases not only the odds of adopting a policy, but also of complying with it. Melo, Pereira, and Souza (2014) find that political volatility reduces compliance with fiscal rules: frequent turnover in the party controlling the state government and high party fragmentation in the legislative both motivate incumbents to resort to creative accounting to increase spending for electoral

purposes. This suggests that incumbents facing low political uncertainty are both more likely to pass natural resource legislation and more likely to comply with it. Even when incumbents do not follow through (either because they do not want to or because they lack the state capacity to do so), hand-tying policy increases the cost of non-compliance by drawing attention to misbehavior (Amick, Chapman, and Elkins 2020). Breaking rules to spend money freely carries economic and reputational costs; economic mismanagement may strengthen support for political alternatives, while non-compliance with fiscal rules might jeopardize the disbursal of IMF loans or prompt bondholders to charge higher risk premiums (Kelemen et al. 2014). Future research can examine how these commitments are implemented and under what circumstances, if any, they are formally reversed.

My findings, combined with those of Melo, Pereira, and Souza (2014), Amick, Chapman, and Elkins (2020), and others, paint an intriguing picture. Governments might tie their hands when they know that nobody is watching too closely. When resource revenue increases, public support is high, and political competition is low, rulers can afford to redesign extractive institutions, because there is no sense of urgency; these institutions will not deprive the incumbent of much needed political capital in times of election. Under these circumstances, rulers can afford to comply with pre-established commitments, as there is no political reward associated with non-compliance. However, competition cannot be too low, or there will be no incentives to design institutions in first place. Only leaders facing a modicum of political competition will be accountable to their citizenry, thus committing to adopting forward-looking natural resource policies. These dynamics suggest that bad politics can lead to good policies: moderate public scrutiny can maximize government accountability by minimizing the incentives to retain budgetary discretion. These results encourage further research on the role of watchdog institutions, which document and enforce compliance even in the absence of political uncertainty.

Chapter 4

The Effect of IMF Conditionality on Natural Resource Policy

Suppose a country discovers oil or copper in its subsoil and decides to sell these resources in international markets. What should it do with its windfalls?[1] It can use some of this money to invest in human capital and public goods. It can pay external debt obligations or set money aside in a rainy day fund. It can redistribute resource revenues at the subnational level to reduce regional disparities. But if history serves as a guide, most political leaders in resource-rich countries will use their newfound wealth for electoral or personal gain.

Between 1972 and 1974, the price of imported crude oil increased almost sixfold, from 1.84 to 10.77 US dollars per barrel. In the subsequent four years, the average oil-exporting country – like Algeria, Iran, or Venezuela – only saved 17.9 percent of its windfall gain; the rest was used for public sector investments that yielded minimal or even negative rates of return (Talvi and Végh 2005, p. 164). Non-renewable natural resources, like oil, natural gas, and minerals, can help developing countries meet their financing needs; but more often than not, these resources encourage fiscal profligacy in the short run and erode the quality of domestic institutions over the long run (Ross 2015).

To address these issues, the International Monetary Fund (IMF) provides technical assistance to resource-rich developing countries, which often "fail to realize the full development potential of their natural resources"[2] due to weak fiscal institutions, ineffective laws, and inexperienced bureaucrats who are ill-equipped to negotiate with oil or mining corporations.

[1] In nearly every country, with the exception of the United States (Goldberg, Wibbels, and Mvukiyehe 2008), subsoil assets belong to the government, which means that national or subnational authorities have the power to decide what to do with natural resource revenue.

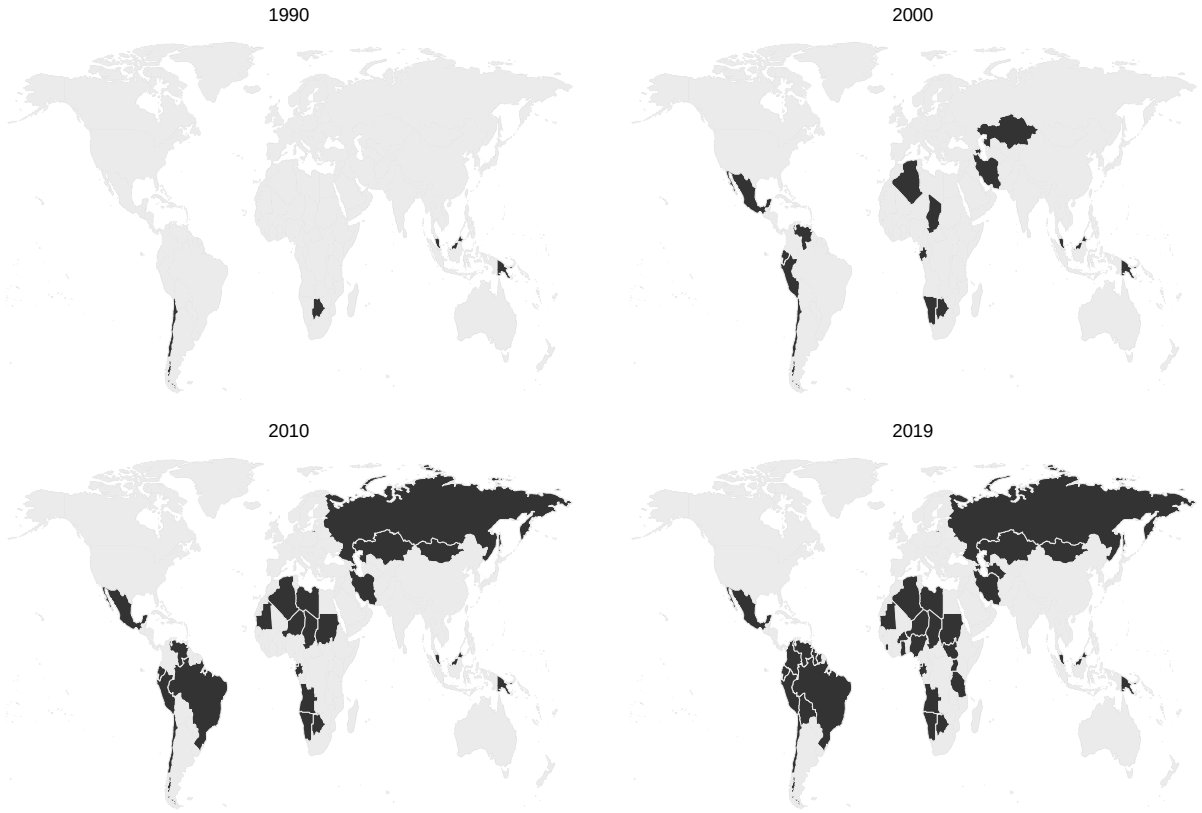
[2] International Monetary Fund. "A Multi-Partner Trust Fund for IMF Capacity Development in Managing Natural Resource Wealth Phase 2 (Program Document)." November 2016.

Given the Fund's mandate to stabilize the global economy and resolve economic crises, its interest in natural resource governance is unsurprising. When a significant share of public revenue comes from natural resources, institutions that smooth out commodity price volatility and set aside monies for rainy days or direct them to public investment can help countries develop economic fundamentals that avert future crises. But do external efforts to promote natural resource governance work? To what extent can international financial institutions like the IMF help mitigate the resource curse?

As the world's de facto lender of last resort, the IMF provides emergency liquidity to meet a country's financing gap, which is why it often has substantial leverage over the policy decisions of its borrowers. Still, there are three reasons for skepticism about the Fund's ability to positively influence a country's natural resource governance. First, there is a high rate of recidivism in lending: some countries are regular users of IMF credit, suggesting that this credit is not promoting the lasting economic recovery it aims to promote (Bird, Hussain, and Joyce 2004). Second, compliance with IMF-mandated policy reforms – a condition for loan disbursement – is often mixed at best: between 1973 and 1997, 65 percent of all loans were suspended due to non-compliance (Bird 2001). Third, domestic leaders are typically unwilling to regulate the natural resource sector, because resource windfalls allow for short-term increases in discretionary spending that can be used for political gain (Ross 2015). In light of these considerations, I identify the circumstances under which multilateral lending can drive the leaders of resource-rich countries to invest in extractive governance in one specific manner: by creating and regulating a natural resource fund. Though there are other ways to promote extractive governance, natural resource funds are explicitly supported by the IMF as tools to "support the implementation of sound fiscal policies" in contexts of resource wealth (Baunsgaard et al. 2012, p. 20). Over the past three decades, more and more countries have adhered to this recommendation, as Figure 4.1 shows.

I argue that IMF agreements can lead resource-rich countries to pass legislation creating and regulating a fund. While most agreements are conditional on policy reforms, these

Figure 4.1: Cumulative Creation of Natural Resource Funds, 1980-2019



This figure depicts all resource-rich countries in the developing world that have created at least one natural resource fund by the last day of every year. Since the map excludes high income nations, it does not depict the world's largest fund: Norway's Government Pension Fund Global.

conditions vary on a case-by-case basis. I use text analysis to classify the conditions included in 427 loan agreements signed with 74 resource-rich developing countries between 1980 and 2019, and subsequently examine the effect of conditionality on the emergence of natural resource funds during the same period. My empirical findings confirm the positive association between IMF program participation and natural resource fund legislation, but also highlight the importance of distinguishing between different types of conditionality. Fund legislation tends to be introduced not necessarily when conditions mention the natural resource sector, as one might expect, but rather when they highlight the salience of fiscal reforms. This effect is particularly pronounced when there is a credible threat of loan suspension in case

of non-compliance: borrowers who are closely aligned with the Fund's main principal – the United States – are less concerned about complying with conditions because they do not fear that the Fund will cut off financial support.

A long line of research has examined how international organizations affect domestic politics and law. The European Union, the United Nations, the World Bank, the IMF, and others have played a prominent role setting best practices for human rights (Simmons 2009), monetary law (Simmons 2000), money laundering (Findley et al. 2015), anti-corruption efforts (Kaczmarek and Newman 2011), climate policy (McLean and Stone 2012), transparency of elections (Hyde 2007), and the use of military force (Fang, Johnson, and Leeds 2014).[3] International organizations can also set standards for natural resource revenue management (for example, by endorsing the Extractive Industries Transparency Initiative, or EITI, as the World Bank and the IMF do), but it is unclear whether these standards succeed in promoting economic development and good governance (see Papyrakis, Rieger, and Gilberthorpe 2017 for evidence in favor and Sovacool et al. 2016 for evidence in contrary). This study contributes to extant research by identifying under what circumstances international reform efforts can lead to changes in domestic legislation, even in a sector that incumbents would prefer not to reform. To my knowledge, this is also one of the first studies to use automated text analysis to classify IMF conditions (see also Clark 2020).

The remainder of this chapter proceeds as follows. After reviewing the literature on IMF conditionality, I develop a theory of why and when multilateral lending can increase the odds of policy reform. Specifically, I predict that pressure from the IMF will drive impatient politicians to exercise self-restraint in the natural resource sector by creating a natural resource fund. I derive and test my hypotheses, discuss the empirical findings, and conclude with implications for future policy and research.

[3]However, Chaudoin, Hays, and Hicks (2018) show that many of these findings might be a function of false positives, because the unobservable factors driving membership in international organizations coincide with the unobservable factors driving compliance with best practices.

4.1 IMF Lending and Policy Conditionality

4.1.1 The Purpose of Policy Conditionality

Since 1952, virtually all IMF programs are conditional: in exchange for financial support, the borrowing government is expected to pass a series of policy reforms on issues like debt management, privatization, fiscal transparency, trade liberalization, and public spending (Gould 2003; Rickard and Caraway 2019). The specific conditions vary from country to country, in response to local circumstances (Stone 2008) and at the discretion of the Fund's staffers (Chwieroth 2013), but always under the assumption that the Fund's technical knowledge and advice is transferable across circumstances, in what Barnett and Finnemore (2004, p. 39) call "bureaucratic universalism." As a result, loan conditions align with the Fund's mandate to provide "policy advice and capacity development support to help countries build and maintain strong economies."[4] The purpose of a program is to *build* strong economies by providing immediate liquidity, and *maintain* strong economies by conditioning loan disbursement to the implementation of predetermined structural reforms. Compliance with these predetermined reforms may be rewarded with more loans, while non-compliance may be punished with interruption of payments (Babb and Carruthers 2008).

The threat of punishment is important because politicians are impatient and value immediate electoral benefits over future policy investments (Jacobs and Matthews 2012). This impatience mirrors the behavior of voters, who have more confidence in concrete short-term benefits than in longer-term policy promises, and thus have well-established short-term preferences: they want high real income, high growth, low inflation, and low unemployment (Schultz 1995). IMF programs, which often go against these preferences, are unpopular with the general public (Vreeland 2003). As a result, incumbents would rather increase current expenditure to improve their re-election prospects than comply with the terms of an IMF agreement, particularly ahead of elections (Dreher 2003). When the Fund threatens to inter-

[4]IMF. "The IMF and the World Bank." 25 February 2019. `https://www.imf.org/en/About/Factsheets/Sheets/2016/07/27/15/31/IMF-World-Bank`

rupt payments in case of non-compliance, it attempts to force incumbents to do something they would prefer not to do. Absent such conditions, incumbents would not feel compelled to follow through with the necessary policy reforms (Dreher 2009). Even incumbents who *want* to implement painful austerity measures would not have the political capital to do so if they could not claim that these reforms are "imposed" by the IMF (Vreeland 2003). In sum, politicians are more likely to commit to credible policy reforms and timely loan repayment when the threat of punishment prevents them from changing policies in the future.

The logic outlined above assumes that compliance can be attained and enforced. To be fair, compliance with IMF conditions is relatively low. Between 1973 and 1997, only 35 percent of all loans were fully disbursed; the remaining 65 percent were suspended at some point due to non-compliance (Bird 2001). 93 percent of all countries participating in an IMF program between 1993 and 2003 experienced at least one program suspension (Stone 2011). Non-compliance may be a function of low state capacity: some governments lack a trained bureaucracy capable of creating and maintaining transparent fiscal institutions. Others might fail to comply due to ethnic divisions, too many parties in the ruling coalition, or the existence of a divided government (Steinwand and Stone 2008). Yet, non-compliance may also be a deliberate political choice: given that the IMF is less likely to enforce compliance when the borrower has strong political relationships with the US (Dreher and Jensen 2007; Copelovitch 2010; Stone 2011), some incumbents might not want to comply with an agreement and risk losing popular support if punishment is unlikely in first place. Either way, these low compliance rates suggest that IMF conditionality might not have a meaningful or lasting influence on domestic policies.

Still, compliance is "a spectrum, not a binary variable" (Babb and Carruthers 2008, p. 21). Borrowers may comply with some conditions, if not with others. Just as full compliance is not equivalent to absolute success, failing to complete an arrangement is not indicative of absolute failure. It is difficult to assess when IMF programs succeed and when they fail, as countries choosing to enter an agreement tend to have worse economic indicators to begin

with (Bas and Stone 2014). Success is hard to quantify, because IMF lending has different effects on different issue areas: it can worsen labor rights (Lee and Woo 2020), exacerbate poverty and inequality (Nooruddin and Simmons 2006; Oberdabernig 2013), reduce public sector spending (Rickard and Caraway 2019), raise tax revenue (Crivelli and Gupta 2016), increase trade openness (Wei and Zhang 2010), increase capital inflows and reduce the risk of default (Bauer, Cruz, and Graham 2012), to name only a few issue areas (see Stubbs, King, et al. 2020 for an overview). One way to quantify success is by observing whether countries pass laws reforming fiscal practices in response to IMF programs. For example, after signing an agreement with the Fund, resource-rich countries might commit to domestic reforms that – at least on paper – ameliorate the negative consequences of the resource curse. Policymakers may still find creative ways to evade these reforms, but passing a law already makes it harder to behave in a completely unfettered manner. Even if the IMF cannot always enforce compliance or set rules of its own, it can propel a deeper institutional change that outlasts one credit line or one term of office.

4.1.2 Why IMF Lending Matters for Resource-Rich Countries

It is not immediately clear why resource-rich countries enter IMF programs in first place. Why would a country agree to the terms of a loan, revealing unfavorable information about the state of its economy and committing to costly policy reforms, when it can simply sell natural resources in global markets and accumulate international reserves instead? Indeed, there is some evidence that commodity producers borrow less from capital markets than non-producers because they can use resource rents to cover their financing needs (Brooks, Cunha, and Mosley 2015; Campello 2015). However, this does not mean that commodity producers can eschew external funding altogether.

Commodity producers still need external funding because the prices of oil, nickel, silver, copper, zinc, aluminum, gold, and other natural resources are volatile. During a price boom, resource exports might be sufficient to cover domestic financing needs, but most countries

do not use these windfall gains to save for times of price bust. Rather, most rulers respond to price booms by going on a public sector spending spree associated with low returns (Talvi and Végh 2005). After all, rulers are impatient and driven by short-term political incentives: they want to maximize their political capital today, instead of waiting for some uncertain tomorrow, when they might no longer be in power, oil prices might go down, and natural resources might be depleted. Resource windfalls enable immediate consumption; these windfalls can be used to lower taxes, increase spending, distribute spoils, and co-opt the opposition, thereby broadening the ruler's basis of support.

In the absence of a far-sighted natural resource policy, resource producers do not tend to save windfalls for difficult times. Since these countries tend to specialize in natural resources at the expense of other sectors, no other segment of the economy is competitive enough to offset the volatility of prices. As a result, they cut public spending and issue sovereign debt during a commodity price bust. Because resource producers have limited access to bond markets in times of economic downturn (Wibbels 2006), they frequently turn to the IMF, the world's de facto lender of last resort. IMF loans are meant to complement – not replace – extant sources of revenue. Even if these loans are small relative to the financial needs of a country (Steinwand and Stone 2008), the Fund's "seal of approval" can help secure additional capital flows and improve the investment climate, at least under some circumstances.[5] Given that the resource sector has the potential to help governments overcome fiscal imbalances and meet their financing gap, the IMF is interested in outlining loan conditions that maximize this potential. Thus, resource-rich countries – like resource-poor countries – might still agree to IMF conditions in exchange for financial support.

[5]While Rodrik (1995) finds no evidence for such effect, recent scholarship provides a more nuanced picture: IMF lending can catalyze private capital flows in democracies (Bauer, Cruz, and Graham 2012), under intermediate financial risk (Saravia and Mody 2003), and conditional on the amount of financing and conditionality (Chapman et al. 2017).

4.1.3 The Role of Natural Resource Funds

When the sources of public revenue are predictable, it is easier to set yearly spending goals and reconcile short-term spending with long-term planning. Governments know that they will always have a population to tax and can design the budget accordingly. However, when a significant part of the budget comes from natural resources, planning ahead is much harder, as public revenue is a function of many factors beyond most governments' control. Political actors do not know exactly how much money they will make off natural resources in the next year. They may be surprised by high prices in one given year, only to see these profits dwindle in the following year. To drive this point home, recall the volatility displayed in Figure 2.2, which shows the average yearly price for a barrel of crude oil from 1861 until 2018. In light of this persistent price volatility, the IMF encourages resource-rich countries to adopt numeric fiscal targets that insulate public spending from public revenue, avoiding stop-go cycles in public investment. These fiscal targets can limit the size of the public debt, impose a limit to public spending, or require that spending equals revenue, for example.

One tool to pursue these fiscal targets is a natural resource fund, which – in the words of IMF staff – can "support the implementation of sound fiscal policies" and "enhance the transparency and credibility of fiscal policy" (Baunsgaard et al. 2012, p. 20). Resource funds are a type of sovereign wealth fund: they are state-owned investment accounts that use revenue from the extractive sector to purchase international assets like private equity and real estate.[6] These funds serve as a precommitment mechanism that constrains incumbents' discretion over resource revenue by putting this revenue beyond their immediate reach.

As discussed in previous chapters, the IMF (2008) identifies five types of funds with five non-exclusive mandates. First, stabilization accounts mitigate budget volatility caused by unexpected fluctuations in resource prices. When revenue declines, countries can draw from their stabilization accounts to sustain current expenditures, instead of borrowing from

[6]Botswana, Chile, Ghana, Kazakhstan, Norway, and many others explicitly prohibit their funds from purchasing domestic assets. Iran is one of the few countries allowing for both (Bauer, Rietveld, and Toledano 2014).

international capital markets. Second, reserve investment corporations increase the return on foreign exchange reserves, which in turn serve to manage exchange rates and reduce the risk of Dutch disease. These "parking funds" (Venables 2016) work as a temporary storage unit for economies that cannot absorb the unexpected influx of foreign currency all at once. Third, development funds finance socio-economic projects, including durable physical assets like public infrastructure. Fourth, savings accounts benefit future generations. Since oil, natural gas, and minerals are not renewable, saving natural resource revenue can prolong the financial benefits of resource extraction. Finally, contingent pension reserve funds help finance pensions and social welfare liabilities. Since these funds have different time horizons, they pursue different investment strategies: stabilization funds have a short-term, low-risk investment profile, whereas savings or pension accounts have a long-term, high-risk investment profile due to their low liquidity needs.

Though nearly all extant natural resource funds are enshrined in legislation, they are institutionalized to different degrees: some are subject to public scrutiny, regular audits, and legislative oversight, while others are not. (Wang and Li 2016). The IMF has taken an active role in promoting and endorsing this institutionalization process. Timor-Leste's Petroleum Fund Law, passed on 3 August 2005, was drafted with the support of a resident advisor from the IMF Fiscal Affairs Department; according to an IMF staff report, "the creation of a Norwegian-style petroleum fund and the adoption of a cautious saving policy are major steps in the right direction" (IMF 2005). Similarly, a 2007 staff report urged Angola to consider the creation of "an oil fund that is based on well-defined flexible rules and fully integrated into the budget process, and buttressed by stringent procedures to ensure transparency" (IMF 2007). Unsurprisingly, the number of developing countries with at least one natural resource fund has soared over the past three decades, as Figure 4.1 shows.

When policymakers in Timor-Leste or Angola craft natural resource legislation, they face an intertemporal trade-off: they must balance short-term pain with long-term gain, enacting policies that impose political costs in the short term, but ensure that future generations will

benefit from resource wealth – long after oil, gas, or mining reserves are depleted. Many incumbents would prefer to not pass any such policy, instead maintaining full discretion over who benefits from resource windfalls, and when, to maximize their political capital.

4.2 A Theory of Policy Conditionality in Resource-Rich Countries

4.2.1 Main Hypotheses

There is a tension between domestic interests and international commitments; ruling parties need to respond to voters in order to win elections and stay in power, but they also need to meet the demands of international creditors (Ezrow and Hellwig 2014). Therefore, incumbents who enter an IMF program face a dilemma: though they want to retain full control over the allocation of resource windfalls, they also need to comply with the terms of the program to ensure that the funds are disbursed. First, I seek to establish whether or not participation in a program matters; after all, there is reason to suspect that program participation does not always result in reform. Hypothesis 1 predicts incumbents will be more likely to pass legislation related to a natural resource fund when they have an outstanding IMF program – even if doing so goes against their political interests.

> **Hypothesis 1 (IMF program):** *All else equal, governments are more likely to pass natural resource policy when they are under an IMF program.*

Going beyond program participation, I propose two competing hypotheses to test for the effect of specific program conditions. Several IMF programs include a targeted condition related to natural resources. For instance, a 2009–2012 loan agreement with Angola mandated the "submission to the cabinet of the approval documents of the Angola Sovereign Wealth Fund." In line with this condition, president José Eduardo dos Santos signed a decree creating an oil fund in March 2011. More recently, following a 2013–2016 arrangement mandating the "establish[ment of] a Natural Resource Revenue Fund with legal and procedural characteristics," the government of Sierra Leone created the Transformational

Development Stabilization Fund in 2016. Angola and Sierra Leone were each explicitly instructed to create a natural resource fund, and these instructions were written in a way that made non-compliance easily observable – and punishable. Having agreed to enter IMF programs, these countries did not have the leeway to develop alternative policies and would not have been able to deviate from their respective loan conditions without jeopardizing the disbursement of additional funds. The cases of Angola and Sierra Leone suggest that borrowers might be more likely to pass natural resource policy in response to targeted natural resource conditions, which highlight the salience of natural resources and the need to reform the extractive sector. This is what Hypothesis 2 predicts.

> **Hypothesis 2 (IMF resource conditionality):** *All else equal, governments are more likely to pass natural resource policy when they are under an IMF program that includes conditions related to natural resources.*

Though not all IMF programs are equal, nearly every program includes fiscal conditions setting fiscal targets (Rickard and Caraway 2019). These conditions mandate borrowers to cut back on aggregate spending, balance the budget, or reduce the size of the public deficit, without necessarily specifying where cuts should come from (Nooruddin and Simmons 2006). For example, a 1995–1998 agreement with Gabon stipulated the "issuance and strict implementation of a circular by the Minister of Finance to all government departments providing instructions for the proper procedures for budget preparation, expenditure control, and public accounting, in line with the existing legal framework." Ecuador's 2000–2001 agreement conditioned loan disbursement to "submission to congress of fiscal reform legislation that will eliminate all revenue earmarking not mandated by the constitution and reduce the fiscal impact of volatility in oil prices," while Suriname's 2016–2018 agreement mandated the Council of Ministers to issue a "decision announcing that the 2016 supplementary budget will be based on the Fund-supported program's macroeconomic assumptions and measures."[7]

[7]The source for all these citations is Kentikelenis et al. (2016), whose dataset reproduces the text of each condition for each Letter of Intent signed between 1980 and 2014, and the IMF MONA Database, which does the same for agreements signed between 2003 and 2020.

These terms highlight the importance of fiscal policy while giving Gabon, Ecuador, and Suriname some leeway to determine where to raise revenue, what sectors to cut from, or how to meet the agreed-upon fiscal deficit target.

Though Gabon, Ecuador, and Suriname are not explicitly instructed to create a natural resource fund, they might choose to do so in order to accomplish these fiscal targets. There is anecdotal evidence in support of such prediction: Gabon's Fund for Future Generations was created in 1998; Ecuador's Fund for Stabilization, Social and Productive Investment, and Reduction of Public Debt was created in 2000 (see Lledó, Sasson, and Acevedo 2019 for a history of Ecuador's oil funds); and Suriname's Savings and Stabilization Fund was created in 2017. It could be the case, then, that borrowers reform the extractive sector not when this sector is singled out, as Hypothesis 2 posits, but rather when made aware of the need to promote budget reforms across all sectors of the economy. This is what Hypothesis 3 predicts.

> **Hypothesis 3 (IMF fiscal conditionality):** *All else equal, governments are more likely to pass natural resource policy when they are under an IMF program that includes conditions related to fiscal policy.*

4.2.2 Moderating Hypothesis

Program participation and conditionality might not provide sufficient motivation to create and regulate a natural resource fund. Borrowers might not reform the natural resource sector simply because the IMF tells them to; after all, full compliance with conditions is relatively rare, and domestic politics also constrain policymakers' ability to implement reforms mandated by the IMF. The effect of Hypotheses 2 and 3 on natural resource policy may be moderated by additional factors.

According to extant research, compliance with conditionality depends on whether borrowers expect to be punished for non-compliance (Stone 2004). The credibility of such a threat is contingent upon the political interests of the Fund's largest shareholders (Stone 2008; Copelovitch 2010). It might be unfair to describe the Fund as an agent fully beholden

to the political interests of its principals, but it is true that US allies, in particular, tend to receive larger loans with fewer conditions that are enforced less rigorously (Stone 2011). Likewise, countries tend to receive larger loans when government officials and IMF staff share similar professional training (Chwieroth 2013); and the more a country's voting pattern in the UN General Assembly aligns with the voting pattern of the US, the better the terms of this country's loan agreements (Dreher and Jensen 2007). Borrowers that are strategically important to the US might fail to comply with IMF conditionality because they anticipate lax enforcement. If so, these countries will be less likely to pass natural resource policy in response to a loan condition, as they do not anticipate to be punished for their lack of compliance. This is what Hypothesis 4 predicts.

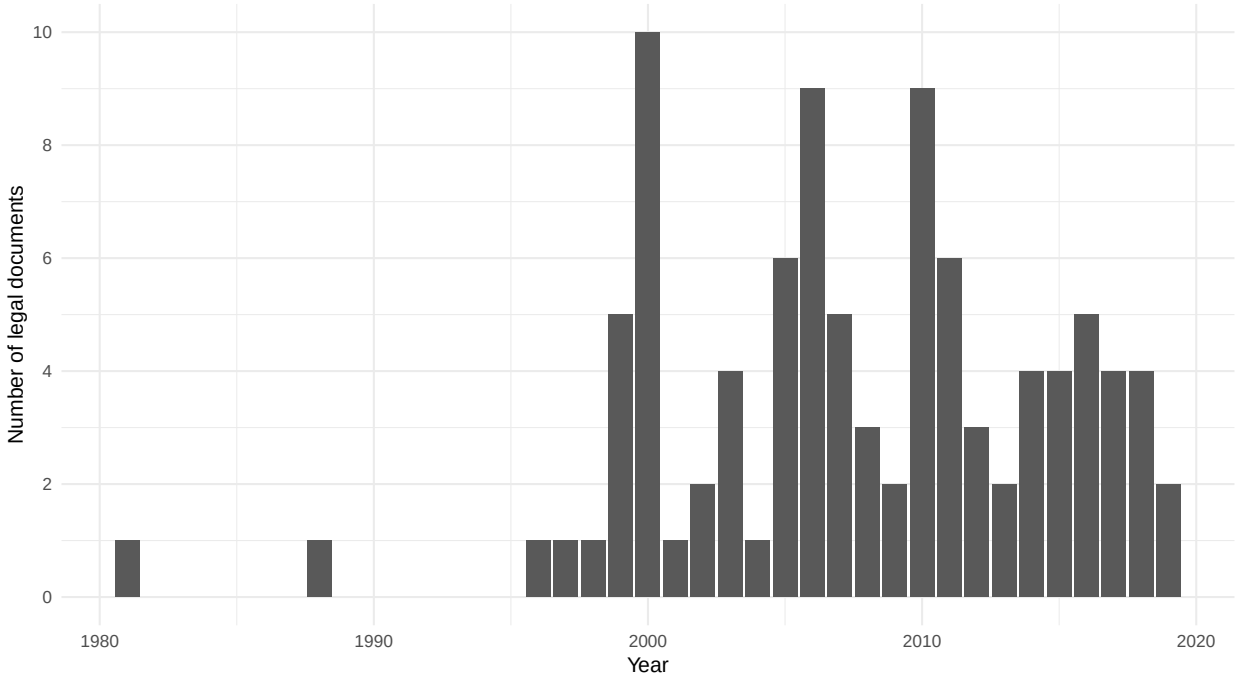
> **Hypothesis 4 (IMF conditionality and US allies):** *All else equal, governments are less likely to pass natural resource policy in response to IMF conditionality of any kind when they are closely allied with the United States.*

4.3 Data and Descriptive Analysis

4.3.1 Dependent Variable: Natural Resource Policy

I introduce original data on natural resource policy for 74 developing countries between 1980 and 2019 (see Appendix A for full country list). This corresponds to all developing countries classified as resource rich by the IMF (Venables 2016), the Natural Resource Governance Institute (2017), or both. The dependent variable is a binary indicator of whether each country-year pair passed a legal document (that is, a law, statute, act, code, or executive decree) creating or regulating a natural resource fund. To collect these data, I first use the Natural Resource Governance Institute (2017) and the IMF Fiscal Rules at a Glance Dataset (Lledó, Yoon, et al. 2017) to identify the precise country-year in which a legal document was passed. I then locate each legal document in its country's Official Gazette, available in the Foreign Official Gazette Database and the Global Legal Information Network (two initiatives sponsored by the US Library of Congress). During the period under study, 37 of the 74

Figure 4.2: Number of Legal Documents Passed Every Year, 1980-2019



This figure depicts the temporal distribution of 80 legal documents creating and regulating natural resource funds in 37 countries during the period covered in the analysis.

countries in the analysis passed a total of 80 legal documents pertaining to 60 distinct natural resource funds. The remaining 37 countries have not passed any natural resource policy during the period under study. Figure 4.2 shows the number of legal documents passed at the national level between 1980 and 2019, indicating that the vast majority was passed after 1995.

To illustrate the content of such legal documents, consider Angola, where president José Eduardo dos Santos signed the Executive Decree Number 48 creating the Sovereign Wealth Fund of Angola on 9 March 2011. The purpose of the fund is to "encourage and support, in the Republic of Angola and abroad, investment in the development of projects in the energy and water sectors and in other sectors considered strategic, including, in particular,

infrastructure projects."[8] Under the Santos administration, the 2011 Budget Law[9] (passed on 28 December 2010) also earmarked oil revenue for regional development and infrastructure, with budget projections based on an oil price of 68 USD per barrel; all revenue exceeding this projection should enter the treasury reserve. Both the Executive Decree Number 48 and the 2011 Budget Law count as natural resource policy.

Recall the IMF (2008) taxonomy of natural resource funds. At one extreme, stabilization funds have low-risk, fixed-income portfolios meant to provide immediate liquidity that offsets the losses caused by unexpected fluctuation in commodity prices. Reserve investment corporations and development funds have similarly short horizons, serving as temporary storage units until the domestic economy can absorb resource rents and use them to invest in socio-economic projects. At the other extreme, savings and pension funds have diversified portfolios and can finance riskier investments due to their long time horizons and low liquidity needs. As a consequence of these different time horizons, incumbents have more discretion over stabilization, investment, and development funds than over savings or pension funds. Chile has two funds, both created in 2006; the Economic and Social Stabilization Fund was made immediately available to cover current expenditures,[10] while the Pension Reserve Fund – earmarked for old-age and disability benefits – was off-limits to public officials for the first ten years after its creation.[11] Both funds represent precommitment mechanisms, but the degree of precommitment is different. I generate two binary variables to account for this distinction: *Short-term policy* measures the passage of legal documents related to stabilization, investment, or development funds, whereas *Long-term policy* indicates the passage of documents related to savings or pension funds.

Table 4.1 shows the number of funds, legal documents, and countries by type of policy. The numbers in this table do not add up to the totals (60 funds, 80 legal documents,

[8]Decreto Presidencial No. 48/11, 9 March 2011. Article 1, Paragraph 3.
[9]Lei do Orçamento Geral do Estado – Lei 26/10, 28 December 2010.
[10]Decreto con Fuerza de Ley 1, 11 December 2006.
[11]Ley 20128 Sobre Responsabilidad Fiscal, 22 September 2006.

Table 4.1: Natural Resource Funds and Corresponding Legal Documents, by Type

	Short-Term Policy			Long-Term Policy	
	Stabilization	Investment	Development	Savings	Pension
# of funds	33	10	15	19	1
# of legal documents	50	14	18	22	1
# of countries	26	8	14	18	1

37 countries) because one fund can fulfill multiple purposes. For example, in a Letter of Intent (LOI) submitted to the IMF in November 2009,[12] the government of Angola states: "we would welcome technical assistance from the IMF on the setting up [of] the Sovereign Wealth Fund *which will be both a stabilization and a savings fund*" (emphasis added). Thus, the Executive Decree Number 48 and the 2011 Budget Law, which create and regulate the Sovereign Wealth Fund of Angola, are coded as both *Short-term policy* and *Long-term policy*. The same applies to legal documents pertaining to Colombia's Savings and Stabilization Fund or Trinidad and Tobago's Heritage and Stabilization Fund, among others.

I focus on written legal documents because they are easier to enforce and harder to revoke than unwritten norms. Admittedly, these documents are often aspirational, rather than normatively binding; in Latin America, for example, governments often bend or evade formal rules (Weyland 2002), which could suggest that natural resource policy is not a credible precommitment mechanism. Still, it is useful to understand when and why de jure policy is enacted because this is a necessary first step toward explaining the effects of law on behavior. Even where formal rules are bent or evaded, they still approximate political behavior. For example, Amick, Chapman, and Elkins (2020) find that both constitutional and statutory rules mandating a balanced budget are associated with higher fiscal discipline, even in Latin American countries where formal rules are frequently disregarded. There is value in examining what states aspire to do and what they are willing to commit to on paper, regardless of their ability to actually comply with such aspirations.

[12]The full LOI is available under `https://www.imf.org/external/np/loi/2009/ago/110309.pdf`

Table 4.2: Characteristics of Countries With and Without Natural Resource Funds, 2019

	Natural Resource Fund	
Attribute	Yes	No
# of years under IMF program, 1980-2019	13.5	15.5
GDP per capita (in current US$)	5,807.19	2,605.80
Resource rents (% GDP)	16.05	11.30
N	37	37

Table 4.2 reports the average of selected variables for countries with and without natural resource funds in place in 2019, using World Bank data from the same year (or from the most recent year available). In that year, countries with natural resource funds tended to have a higher GDP per capita and a higher GDP share of natural resource rents than countries without such funds. In the previous four decades, states with funds also tended to be under an IMF agreement for fewer years: 13.5, as opposed to a mean of 15.5 years for countries without funds. This suggests that there is something qualitatively different about states that are able and willing to adopt precommitment mechanisms in the extractive sector.

4.3.2 Independent Variables: IMF Program Participation and Conditionality

Using data from Kentikelenis et al. (2016) (available for 1980–2014) and the IMF MONA Database (available for 1993–2019), I examine the content of 427 IMF programs signed with 64 of the 74 developing countries identified as resource rich. The remaining ten countries,[13] while included in the analysis, signed no agreement in the period under study. The terms of each agreement, including the conditions for loan disbursement, are stipulated in its Letter of Intent (LOI). On average, each agreement lasts for two years and includes 31 conditions, with a standard deviation of 29, totaling over 13,000 conditions.[14]

[13]Botswana, Eritrea, Iran, Libya, Malaysia, Namibia, South Sudan, Syria, Timor-Leste, and Turkmenistan.

[14]The LOI for each agreement is several pages long and includes an extensive discussion of the borrowing country's economic perils. In the following statistical analysis, I focus exclusively on the conditions for loan disbursement and disregard any additional content.

Extant research on the relationship between IMF conditionality and public policy tends to focus on the *number* of conditions pertaining to a specific issue area (e.g. Dreher and Jensen 2007; Woo 2013; Stubbs, King, et al. 2020). However, the number of conditions is an imperfect proxy for the stringency of an agreement, as it does not tell us anything about the denominator. The relative importance of one single condition covering one specific issue area is conditional on the total number of conditions covering all issue areas. Other researchers use a binary variable to indicate the presence or absence of a specific kind of condition – for example, a trade condition (Wei and Zhang 2010) or a labor condition (Rickard and Caraway 2019) –, but one single condition can address multiple issue areas, and a binary indicator might not capture this nuance. Given the limitations of extant approaches, I use automated text analysis to classify the 13,000 available conditions into different categories of interest.

Though there is no single best method for automated text analysis (Grimmer and Stewart 2013), probabilistic topic models are helpful in uncovering similarities between semantically comparable documents, by identifying the proportion of each document (in this case, an IMF condition) that addresses a specific topic. A topic is a distribution over a fixed vocabulary (Blei 2012); for example, the topic *natural resources* has a fixed vocabulary that includes words like *oil*, *mining*, and *hydrocarbon*. Like other methods of unsupervised learning, topic models do not require training sets and are suitable for new discoveries: they can parse the data to identify hidden patterns that are not immediately evident to the human eye (like the unobservable influence of IMF conditionality on domestic legislation). Researchers can use these models to make inferences about unobserved latent topics, with few a priori assumptions about the documents being analyzed.

One weakness of traditional topic models is their instability. Despite its name, automated text analysis is not entirely automated; researchers must specify the number of topics in advance, label each topic, and interpret the results, all of which are subjective decisions (Wilkerson and Casas 2017). Topic models tend to generate multiple topics with similar content, and the results are sensitive to the starting values of the estimation algorithm.

Table 4.3: Ten Most Common Words Per Topic

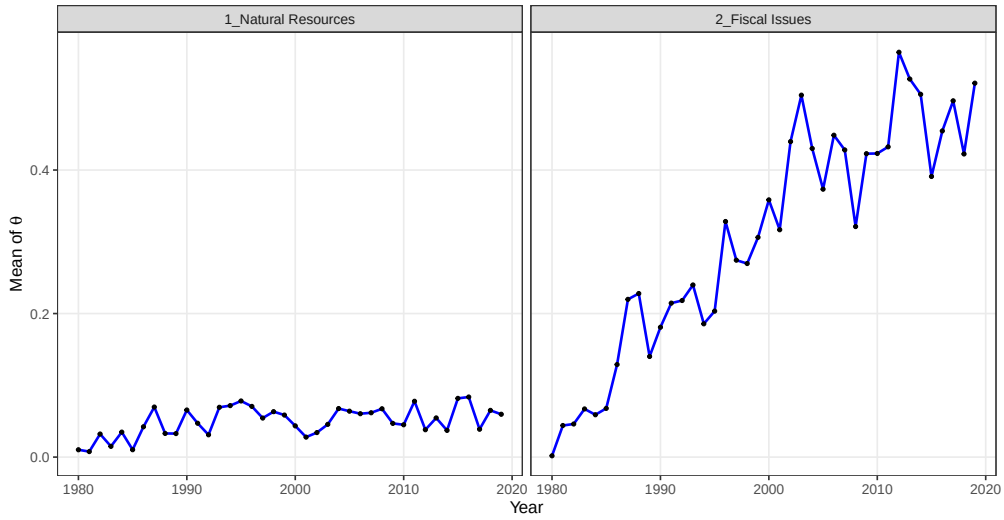
Topic 1: Natural Resources	Topic 2: Fiscal Issues
prices	**tax**
petroleum	**budget**
price	law
oil	government
percent	public
products	**fiscal**
gas	**revenue**
electricity	**expenditure**
increase	submit
fuel	parliament

To circumvent these issues, I use the dynamic keyword assisted topic model developed by Eshima, Imai, and Sasaki (2020), which allows me to specify a small number of keywords to label each topic ahead of estimation. The chosen keywords incorporate knowledge from previous research on IMF conditionality (e.g. Kentikelenis et al. 2016), from interviews I conducted with IMF officials in the Fiscal Affairs Department, and from non-binding recommendations that these officials issue to governments on a yearly basis (in the form of Article IV Consultations). This specification yields more interpretable topics and increases the stability of topic proportions across different specifications, enabling me to investigate how topic proportions change over time.

Using a dynamic keyword assisted topic model, I identify the share of each condition that addresses two topics: targeted natural resource policy and general fiscal issues. Table 4.3 displays the ten most frequent terms for each of these two topics; the pre-specified keywords appear in bold. The model identifies six additional topics (related to labor issues, state-owned enterprises, foreign debt, financial regulations, redistributive policies, and trade, plus a residual category), presented in more detail in Appendix C.

As the ten most common words for topic 1 suggest, natural resource conditionality frequently mandates an increase in the price of oil products and electricity tariffs. For example,

Figure 4.3: Topic Prevalence Over Time, 1980-2019

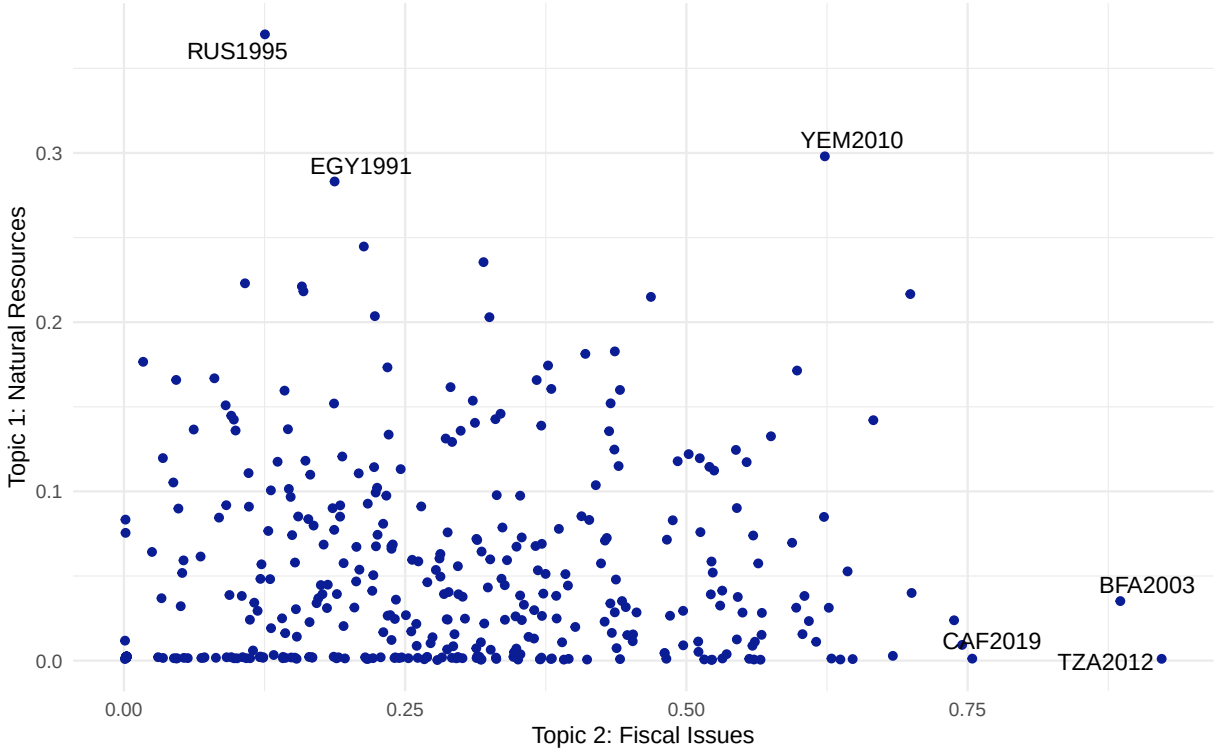


These plots display the prevalence of each topic over time, based on the year of program initiation (as indicated by the x-axis). The y-axis represents the relative proportion θ of each topic in each condition, averaged for all conditions over a year.

a condition issued to Burkina Faso in 1999 stipulated the "introduction of an automatic domestic price setting mechanism of petroleum products reflecting movements in international prices." This condition reflects the broader IMF stance against energy subsidies, with Fund staffers (e.g. Coady et al. 2019) finding that fossil fuels tend to be substantially underpriced in developing and developed nations alike.

Figure 4.3 presents the time trend for these two topics, based on the year in which an IMF program was initiated. For each year in the x-axis, the y-axis represents the average proportion of words associated with a given topic. In 1990, for instance, the IMF initiated six loan arrangements with a total of 183 conditions; on average, 6.5 percent of the words included in these conditions were related to natural resource policy, compared to 18.1 percent related to fiscal issues. The prevalence of fiscal issues increased linearly since 1980, peaking at 56.4 percent in 2012. The takeaway point is that since 1983, IMF programs in resource-rich countries have consistently spent more words on overall fiscal policy than on specific natural resource policy.

Figure 4.4: Topic Prevalence, by Agreement



For each IMF agreement signed between 1980 and 2019, the y-axis represents the relative proportion of topic 1 (natural resources) among all conditions of this agreement, while the x-axis represents the relative proportion of topic 2 (fiscal issues).

This does not mean that all IMF agreements signed with resource-rich countries cover these topics to the same extent. Topic proportions vary not only over time, but also across countries; for example, the prevalence of topic 1 in each agreement is significantly correlated with the magnitude of the borrowing country's resource rents.[15] To illustrate this variation, Figure 4.4 depicts each of the 427 agreements under study, according to the proportion of words associated with each topic. As this figure shows, 92.3 percent of the words included in Tanzania's 2012 agreement and 88.6 percent of the words included in Burkina Faso's 2003 arrangement pertain to fiscal issues; in both cases, less than 5 percent relates to natural resources. In contrast, 37 percent of the vocabulary in Russia's 1995 arrangement relates

[15]The correlation between topic 1 prevalence in each agreement and the size of resource rents in the same year (as a percentage of GDP, using World Bank data) equals $\rho = 0.13094$ ($p = 0.00982$).

to natural resources and 12.5 percent to fiscal issues. These differences are more than just semantics. They suggest that the IMF does not pursue an undifferentiated "one-size-fits-all" approach to reform in resource-rich countries, instead tailoring the conditions of each agreement to the different political and economic realities of countries like Tanzania or Russia. Some countries receive a diverse set of conditions related to other categories identified by the topic model (for example, monetary or trade policy), while others are instructed to raise revenue, cut expenditure, and balance the budget. Borrowers exposed to different kinds of conditionality are likely to respond differently, which is why the effect of IMF programs on natural resource policy should differ across countries.

I use this information to generate three independent variables. For every country and year, the binary variable *Program participation* (used to test Hypothesis 1) indicates whether a loan agreement was in place. After all, program participation has effects of its own: it increases technical assistance and policy advice, catalyzes foreign aid, and can undermine or improve perceived creditworthiness, depending on the context (Stubbs, Kentikelenis, and King 2016; Chapman et al. 2017; Lee and Woo 2020; Stubbs, King, et al. 2020). If *Program participation* equals one, I generate two additional independent variables, *Topic 1: natural resources* and *Topic 2: fiscal issues*, which indicate the prevalence of each topic among the program's conditions. These two variables are used to test Hypotheses 2 and 3, respectively, and take the value of zero for country-years without program participation.

4.3.3 Moderating and Control Variables

Hypothesis 4 predicts that borrowers are less likely to pass natural resource policy in response to IMF programs when they are closely aligned with the US. As the largest IMF shareholder, the US tends to push for less rigorous conditionality enforcement among its allies; thus, US allies should be less likely to pass natural resource policy in response to conditionality of any kind. To test this hypothesis, I employ an ideal point score computed by Bailey, Strezhnev, and Voeten (2017), who use voting patterns in the United Nations

General Assembly to calculate the absolute distance between the ideal points of two states. Several extant studies (e.g. Stone 2004; Dreher and Jensen 2007; Chapman et al. 2017) use equivalent measures to examine how each country relates to the ideal point of the US. Like Bailey, Strezhnev, and Voeten (2017), I multiply the ideal point distance by –1 for ease of interpretation, such that larger values of the resulting variable *Voting with US* represent closer positions. This variable is lagged by one year to avoid simultaneity bias.[16]

Models include a measure of whether countries have passed short-term or long-term policy in the past (*Previous short-term policy* and *Previous long-term policy*) and additional economic variables that are correlated with the timing of natural resource policy. *GDP per capita* (in current US dollars, logged), *GDP growth* (in percent), and *Resource rents* (as a percentage of the GDP) are reported by the World Bank. *Field discovery* indicates the discovery of a giant, supergiant, or megagiant oil and gas field (that is, a field with over 500 million recoverable barrels of oil or over 3 trillion cubic feet of gas) in a given country and year (Horn 2014). *Oil price* is the cost of a barrel of West Texas Intermediate crude oil, in current US dollars, on December 31 of every year. *Crisis* is coded one in years of banking, debt, or currency crisis and zero otherwise (Laeven and Valencia 2020). These economic variables are lagged by one year, corresponding to the budget cycle. Finally, I consider the effect of regime type using the Polity 2 index, which ranges from –10 to +10, from hereditary monarchy to consolidated democracy.

4.4 Results

4.4.1 Testing the Main Hypotheses

I begin by estimating logistic regressions with country fixed effects and cubic polynomials. Passing natural resource policy is a rare event that did not occur every single year between 1980 and 2019, and in fact never occurred in 37 of the 74 countries under study. These 37 countries are what Beck (2020) calls "homogeneous groups:" they are perfect predictors

[16] I also tested for effects of US foreign aid, but these effects are not significant and are not reported below.

Table 4.4: The Effect of IMF Program Participation on Natural Resource Policy, 1980–2019 (Penalized Logit)

	Dependent variable:	
	Short-term policy	Long-term policy
	(1)	(2)
Program participation = 1	1.040***	1.054**
	(0.334)	(0.440)
Voting with US	1.047**	−0.351
	(0.425)	(0.538)
Previous short-term policy = 1	−1.496***	0.190
	(0.434)	(0.654)
Previous long-term policy = 1	−0.590	−3.172***
	(0.567)	(0.710)
Resource rents (% GDP)	0.014	0.043**
	(0.015)	(0.021)
GDP per capita (log)	0.768*	2.476***
	(0.398)	(0.578)
GDP growth (%)	0.013	0.025
	(0.013)	(0.015)
Field discovery = 1	0.714*	0.687
	(0.383)	(0.549)
Oil price (USD)	−0.019***	−0.029***
	(0.007)	(0.010)
Crisis = 1	−0.002	0.515
	(0.485)	(0.625)
Democracy (Polity)	−0.030	0.040
	(0.055)	(0.070)
Constant	−1.596	3.098
	(2.877)	(3.378)
Observations	2,420	2,420
Log Likelihood	−215.611	−89.583

This table reports the results of penalized likelihood models with third-order polynomials and country fixed effects. Coefficients represent log odds.
*p<0.1; **p<0.05; ***p<0.01.

of event non-occurrence, because they show no variation in the dependent variable (which consists of all zeros). Since models estimated with maximum likelihood would drop these groups altogether, I adopt the penalized maximum likelihood approach proposed by Cook, Hays, and Franzese (2020) to retain the complete sample.

Table 4.4 tests Hypothesis 1. As Model 1 shows, participation in an IMF agreement

almost triples the odds of passing *Short-term policy* ($e^{1.040} = 2.83$), that is, of creating and regulating stabilization, investment, and development funds, which are suited for short- to medium-term crisis mitigation. Model 2 indicates that program participation has a similar effect on *Long-term policy*, which entails the creation and regulation of savings or pension funds. These results can be framed in terms of the Fund's two self-declared mandates: first, provide immediate liquidity to *build* strong economies; second, impose loan conditionality to *maintain* strong economies. Put together, Models 1 and 2 suggest that IMF agreements signed with resource-rich countries have the potential to serve both mandates: they promote short- to medium-term fiscal anchors in addition to long-term fiscal sustainability. In addition, these first results indicate that *Voting with US* has different effects on different kinds of funds: as proximity to the ideal point of the US increases, resource-rich countries are significantly more likely to embrace short-term policies, but there is no significant effect on long-term policy.

All else equal, governments that have already passed short-term or long-term policy are at least four times less likely to pass any additional policy of the same kind ($e^{1.496} = 4.46$). Furthermore, increases in *Resource rents*, *GDP per capita*, and *GDP growth* are significantly associated with increases in *Long-term policy*, suggesting that wealthier or fast-growing economies can afford to save for the future in a way that poorer or slow-growing economies cannot. This effect is absent for policies related to stabilization, investment, or development funds.

How, concretely, does the content of IMF agreements influence policy passage in resource-rich countries? To test Hypotheses 2 and 3, Table 4.5 isolates the potential consequences of program participation (including technical assistance, policy advice, and foreign aid catalysis) from the effects of conditionality. The two variables for conditionality – *Topic 1: natural resources* and *Topic 2: fiscal policy* – represent the relative prevalence of each topic among all conditions for all active IMF programs in a given country-year. As a reminder, these two variables take the value of zero for country-years without an IMF program, as they can only

Table 4.5: The Effect of IMF Conditionality on Natural Resource Policy, 1980–2019 (Penalized Logit)

	Dependent variable:	
	Short-term policy	Long-term policy
	(1)	(2)
Topic 1: natural resources	1.962	−1.575
	(3.498)	(4.733)
Topic 2: fiscal issues	2.503***	2.377**
	(0.836)	(1.032)
Voting with US	1.080**	−0.298
	(0.424)	(0.531)
Previous short-term policy = 1	−1.504***	0.077
	(0.435)	(0.652)
Previous long-term policy = 1	−0.547	−3.125***
	(0.575)	(0.712)
Resource rents (% GDP)	0.013	0.039*
	(0.015)	(0.021)
GDP per capita (log)	0.873**	2.531***
	(0.398)	(0.569)
GDP growth (%)	0.014	0.025*
	(0.013)	(0.015)
Field discovery = 1	0.706*	0.640
	(0.382)	(0.545)
Oil price (USD)	−0.020***	−0.031***
	(0.007)	(0.009)
Crisis = 1	−0.088	0.468
	(0.496)	(0.641)
Democracy (Polity)	−0.044	0.035
	(0.055)	(0.070)
Constant	−0.803	3.605
	(2.828)	(3.336)
Observations	2,420	2,420
Log Likelihood	−214.847	−89.855

This table reports the results of penalized likelihood models with third-order polynomials and country fixed effects. Coefficients represent log odds.
*p<0.1; **p<0.05; ***p<0.01.

be observed when *Program participation* equals one. Results suggest that increased coverage of natural resources has no significant effect on either *Short-term policy* or *Long-term policy*, providing no evidence to support Hypothesis 2. In contrast, increased coverage of fiscal issues is associated with a significant increase in the odds of passing short-term policies

and long-term policies, which provides support for Hypothesis 3. These results indicate that general fiscal concerns supersede concerns that are specific to the natural resource sector: governments are more inclined to enact policy reforms in response to fiscal conditions than in response to natural resource conditions.

One might be concerned that fiscal conditions are more likely to be binding than natural resource conditions. Binding conditions are hard conditions, meaning that loan disbursement can be interrupted in case of non-compliance. If this is the case, borrowers could simply be responding to binding fiscal conditionality, as opposed to non-binding natural resource conditionality. However, models that include only binding conditions return equivalent results (see Appendix D), suggesting that the distinction between fiscal issues and natural resources is not just a matter of binding versus non-binding. Rather, it is a matter of highlighting the salience of the public budget and the importance of fiscal reforms, as opposed to simply addressing the natural resource sector.

4.4.2 Testing the Moderating Hypothesis

Stone (2004), Dreher and Jensen (2007), and others show that the threat to interrupt loan disbursement is less credible when the borrowing nation is closely aligned with the Fund's largest shareholders. Specifically, borrowers whose voting pattern in the United Nations General Assembly is similar to that of the US should expect less rigorous enforcement of conditionality, thus being less likely to adopt policies that might work against their political self-interest. Building on these findings, Hypothesis 4 posits that borrowing countries are less likely to pass natural resource policy in response to IMF conditionality of any kind the closer they are to the US (that is, the higher their value of *Voting with US*).

Table 4.6 provides qualified support for this hypothesis, showing that incumbents are significantly less likely to pass long-term policies in response to general fiscal conditions the closer they are allied with the US. This effect is absent for short-term policies, that is, for stabilization, investment, or development funds, which are associated with lower political costs

Table 4.6: The Effect of IMF Conditionality and Voting with US on Natural Resource Policy, 1980–2019 (Penalized Logit)

	Dependent variable:	
	Short-term policy	Long-term policy
	(1)	(2)
Topic 1: natural resources	5.764	26.820
	(14.574)	(16.849)
Topic 2: fiscal issues	1.340***	0.582
	(0.461)	(0.584)
Voting with US	−5.396	−17.605**
	(4.827)	(7.195)
Voting with US × Topic 1	1.062	9.178
	(4.782)	(5.663)
Voting with US × Topic 2	−2.542	−6.205***
	(1.547)	(2.217)
Previous short-term policy = 1	−1.496***	−0.040
	(0.433)	(0.646)
Previous long-term policy = 1	−0.610	−3.151***
	(0.575)	(0.710)
Resource rents (% GDP)	0.012	0.033
	(0.015)	(0.021)
GDP per capita (log)	0.827**	2.406***
	(0.396)	(0.563)
GDP growth (%)	0.013	0.023
	(0.013)	(0.015)
Field discovery = 1	0.721*	0.669
	(0.384)	(0.548)
Oil price (USD)	−0.020***	−0.030***
	(0.007)	(0.009)
Crisis = 1	−0.069	0.483
	(0.495)	(0.632)
Democracy (Polity)	−0.048	0.032
	(0.054)	(0.069)
Constant	−0.420	4.851
	(2.828)	(3.344)
Observations	2,420	2,420
Log Likelihood	−214.565	−88.375

This table reports the results of penalized likelihood models with third-order polynomials and country fixed effects. Coefficients represent log odds.
*p<0.1; **p<0.05; ***p<0.01.

because they are more discretionary in nature. When the IMF cannot credibly threaten to interrupt a loan program, borrowers do not anticipate to be punished for lack of compliance,

so there is no need to create rigid, long-term natural resource institutions in response to fiscal conditionality, as would otherwise be the case. This indicates that resource-rich governments take advantage of their proximity to the US in order to evade policies with longer time horizons, but not policies with shorter time horizons. The interaction between *Voting with US* and *Topic 1* is not significant, suggesting again that borrowers do not respond to targeted natural resource conditions.

Natural resources generate well-known perverse incentives when it comes to fiscal governance, and IMF agreements might attempt to remediate this by making specific demands related to natural resources and fiscal issues. But given that the credibility of enforcement varies depending on a country's importance to major principals, Table 4.6 provides a discouraging implication: the interests of top IMF shareholders might undermine the Fund's ability to influence extractive reforms with long time horizons.

4.4.3 Examining the Inaugural Policy

The IMF might influence not just the passage of *any* legal document, but specifically the decision to pass the *first* legal document creating a natural resource fund. As a robustness check, I address this possibility by estimating Cox proportional hazards models that capture a series of binary outcomes, each representing whether or not an event occurred in a given month and year. Once a country experiences the event in question (that is, once it passes the first legal document creating a natural resource fund), it drops out of the dataset, as it is no longer considered to be at risk of passing new policy. Countries that did not experience the event until 2019 are included and considered right-censored; their contribution to the dataset is a vector of zeroes (Box-Steffensmeier and Jones 2004). This modeling strategy is admittedly imperfect, as governments are constantly at risk of passing new policy; they can, and do, create several different natural resource funds over time. Ecuador, for example, created five different funds between 2000 and 2018; a survival model only captures the creation of the first. But it is useful to examine whether the factors driving the adoption

of the *first* legal document are similar to the factors driving the adoption of the nth legal document.

Results of Cox proportional hazards models (reported in Appendix D) indicate that IMF conditionality affects the passage of the *first* policy much like it affects the passage of all other policies. The prevalence of *Topic 2* increases the odds of policy passage and the prevalence of *Topic 1* does not. The conditional effects of *Voting with US* are also consistent. One important difference is that program participation alone has no meaningful impact on the passage of the inaugural policy: the choice of words and the substance of IMF conditions are crucial in compelling countries to pass natural resource policy in first place.

4.4.4 Modeling Endogenous Policy Adoption

Participation in an IMF program is not randomly distributed: it is a function of unobservable factors that might also predict a government's willingness to reform its economy. Many countries entering IMF programs already need economic reforms and would likely pursue such reforms even in the absence of a loan. Furthermore, loan agreements are the product of month-long negotiations between government officials and the IMF staff. The negotiating government might select (or be selected) into greater degrees of conditionality, or specific kinds of conditionality, depending on domestic constraints and political willingness to reform. For example, some governments might be able to negotiate more favorable conditions ahead of a democratic election (Rickard and Caraway 2014). Democracies tend to receive fewer conditions, suggesting that the IMF is aware that democratic institutions constrain a borrower's ability to reform (Stone 2008). Policymakers might *want* to include certain kinds of conditions in the agreement, so as to have a credible excuse to push through unpopular economic reforms that they were already planning to implement anyway (Vreeland 2003). Finally, borrowers might withhold information about their future intentions, instead pushing for conditions that they know in advance they will be able to meet, securing the future disbursement of funds.

My theory and data suggest that there is limited danger of reverse causation: natural resource reforms are unlikely to be the driving force behind program participation or conditionality. This is because few conditions explicitly mention the resource sector, suggesting that few – if any – governments are actively selecting into this kind of conditionality. Furthermore, if policymakers were pushing to include natural resource conditions in their agreement, then compliance with these conditions would not be conditioned or moderated by *Voting with US*: governments would pass natural resource policy regardless of their affinity with the IMF's largest shareholder. Still, I address these concerns in robustness checks using instrumental variables, reporting the results in Appendix D.

To study the consequences of IMF programs, Stubbs, King, et al. (2020) propose to use two compound instruments, one for program participation and another for conditionality. These instruments rely on a measure developed by Lang (2016): the natural logarithm of the IMF liquidity ratio, that is, the amount of liquid resources divided by liquid liabilities, reflecting the budget constraints faced by the Fund. In any given year, these constraints affect the probability that the IMF will lend to a given country. To instrument for program participation, Stubbs, King, et al. (2020) interact the liquidity ratio with a country-specific proportion of years under IMF agreement; to instrument for conditionality, they interact the liquidity ratio with a country-specific average of conditions covering the issue area of interest. The Fund tends to have a regular clientele: many countries are recidivist borrowers (Bird, Hussain, and Joyce 2004). Therefore, prior program participation is a good predictor of present participation, and prior conditions are a good predictor of present conditions.

Instrumental variables generate consistent estimates under two conditions. First, the instrument must satisfy the exclusion restriction: it must affect the outcome (in my case, natural resource policy) exclusively through the treatment (program participation or conditionality), without being correlated with the error term. The validity of the exclusion restriction cannot be justified empirically (Sovey and Green 2011), but on theoretical grounds, the compound instruments described above arguably fulfill the exclusion restriction for several

country-specific outcomes, like income inequality (Forster et al. 2019), labor rights (Lee and Woo 2020), education spending (Stubbs, King, et al. 2020), and natural resource policy. Second, the instrument must be strongly correlated with the treatment variable in the first-stage equation, conditional on other covariates. As a rule of thumb, the first-stage for each instrument should have an F statistic of at least 10 (though this is contingent on sample size, as Sovey and Green 2011 show). This condition does not hold unequivocally for my models, reported in Appendix D. Thus, while these models substantiate some of the main findings of this study (in particular, the interactive effect between IMF conditionality and the ideal point distance to the US), they should not be viewed as confirmatory due to the potential weakness of instruments, which might lead to inconsistent estimates.

4.5 Conclusion

This study identifies under what circumstances the IMF can improve natural resource governance among developing nations, leveraging its influence as the world's lender of last resort to set standards for natural resource revenue management. To reiterate, IMF loans pursue two complementary goals: they provide immediate liquidity that reduces the short-term risk of default (what Chapman et al. 2017 call the *liquidity effect*) and promote fiscal reforms that improve long-term solvency (the *conditionality effect*). Among resource-rich borrowers, I identify both a liquidity effect and a conditionality effect. Borrowers are more likely to set short-term fiscal anchors or adopt long-term fiscal sustainability mechanisms when they enter a loan agreement with the IMF. Put differently, a loan agreement increases the odds that a borrowing country will create stabilization, investment, or development funds, but also savings or pensions funds. Under these circumstances, governments have incentives to model "good behavior" by adopting policy reforms that the IMF generally approves of, thereby securing loan disbursement. This is particularly the case when loan disbursement is conditional on fiscal reforms (*Topic 2*), though not when disbursement explicitly mentions natural resources (*Topic 1*). In sum, borrowers are most likely to reshape

the allocation of natural resource revenue (by creating institutions that smooth out commodity price volatility or setting aside monies for rainy days) when made aware of this revenue's potential to overcome fiscal setbacks.

My results suggest that governments do not reform the natural resource sector just because the IMF tells them to; rather, governments tend to pass legislation associated with natural resource funds when loan agreements highlight the importance of fiscal reforms that these funds can contribute to, that is, when these funds are framed as tools that serve a broader fiscal strategy. Borrowers are not equally responsive to IMF advice, either: in response to conditionality of any kind, they are less likely to adopt long-term natural resource institutions when they do not expect to be punished for "bad behavior" because they are closely aligned with the Fund's top shareholder, the US.

To be clear, this study does not seek to normatively distinguish between "good" or "bad" advice, or between what is "right" and "wrong" for the natural resource sector. IMF conditionality is contentious and international bureaucrats are frequently accused of promoting capital market liberalization at the expense of institutional regulations (Stiglitz 2002). My assumption is not that natural resource funds are objectively appropriate for every single borrowing country, only that they fit a global understanding of what good governance in the natural resource sector should entail. At the same time, given the widespread evidence that oil, gas, and minerals are associated with corruption and generate perverse incentives to engage in fiscal profligacy, international institutions like the IMF can motivate domestic actors to adopt mechanisms that increase short-term control over fiscal policy and prolong the benefits of natural resource wealth. Ultimately, there is substantial variation in the conditions associated with an agreement, suggesting that the IMF tailors its advice to what it considers most appropriate for each resource-rich country.

Future work can examine how the Fund's influence over natural resource governance extends to resource-rich countries that are *not* under an agreement. After all, the IMF provides advice to each of its 189 member countries, in the form of yearly Article IV con-

sultations. Admittedly the IMF has less leverage over non-borrowers; since these countries cannot be punished through loan interruption, they face fewer incentives to behave in line with IMF advice. In this sense, Article IV consultations are not hard conditions as much as soft suggestions. Still, a study of non-borrowers might reveal a country's true motivation to pass natural resource policy, by elucidating what drives policymakers to regulate the natural resource sector when they are not in need of immediate liquidity and are not urged by international organizations to do so.

Chapter 5

Sovereign Borrowing and Natural Resource Policy

In August 1982, Mexico defaulted on its sovereign debt. Within a year, Argentina, Brazil, Chile, Ecuador, Guyana, Peru, Uruguay, and Venezuela followed suit (Reinhart and Rogoff 2009). By the end of the "lost decade," three fourths of all Latin American countries were in arrears on interest payments, and their bond yields in secondary markets averaged 72 percent (Felix 1990). The ensuing debt restructuring process, spearheaded by the IMF and the US, aimed not only to promote economic growth and prevent an international banking crisis, but also to restore access to global capital markets. This seemed to work; in fact, by the mid-1990s, the composition of public debt in Latin America had shifted from predominantly commercial bank loans to predominantly bond financing (Kaplan and Thomsson 2017). Still, market access continued to be costly. In 1995, the average rate of short-term treasury bills for Mexico was still 48 percent.

Like most Latin American economies, Mexico is rich in natural resources. What if the Mexican government used oil revenues to enhance its credibility and reassure bondholders that it will repay its sovereign debt? In 2000, the Vicente Fox administration created the Oil Revenue Stabilization Fund to "mitigate the impact of ... abrupt movements in international oil prices ... on public finances and the national economy."[1] The stated goal of the fund was to "underpin fiscal solvency" by contributing "to eliminate public liabilities that will restrict the resources available to finance development." Though the law creating the Oil Fund made no explicit reference to credit markets, there is a strong chance that at least one of its intended consequences was to ease Mexico's access to foreign capital.

[1] Acuerdo por el que se expiden las Reglas de Operacion del Fondo de Estabilizacion de los Ingresos Petroleros, Preamble. 31 December 2000.

In this chapter, I argue that competition for credit propels nations like Mexico to regulate the natural resource sector, developing policies that stipulate who will benefit from natural resource revenue, and when. These policies are statutory commitments (that is, laws, executive decrees, acts, or codes) that curtail a government's discretion over natural resource revenue – for example, by earmarking resource rents for specific issue areas, dividing the money between national and subnational governments, or ensuring that natural assets are not depleted by current generations, instead saving a portion of resource windfalls in a sovereign wealth fund. In signaling to the international community that Mexico is committed to a sustainable management of oil revenues, the creation of the Oil Revenue Stabilization Fund can give this country an edge over others competing for similar sources of global capital.

I contend that Vicente Fox and his peers adopt natural resource policy with an eye on the response of international creditors: they aim to leverage expectations of good governance in the natural resource sector to project an image of fiscal prudence. In increasing the perceived credibility of a country and reducing its perceived risk of default, these policies intend to reduce sovereign borrowing costs. The mechanism is straightforward: when there is incomplete information about the state of a country's economy, regulations can serve as a screening device that allows creditors to distinguish between "good borrowers" and "bad borrowers," good risk and bad risk (Stiglitz and Weiss 1981). Consequently, credit markets influence the design of natural resource policy at the national level by increasing the likelihood that any given country will pass such policy.

Using novel data for natural resource policy in 85 countries between 1990 and 2019, I show that competition for private capital flows is associated with an increase in the odds of reforming the oil, gas, and mineral sector. I uncover mixed evidence that policy adoption succeeds in reducing borrowing costs, though. When countries have limited access to global capital markets, policy reforms provide information about the state of the domestic economy that might in fact trigger a short-term *deterioration* of borrowing conditions. One implication

of my findings is positive: capital markets can promote global policy convergence in sectors that typically lack transparency and would otherwise be difficult to reform, like the extractive sector. Another implication is less optimistic: low-income countries that are desperate for capital might be the ones least able to use policy reforms to signal creditworthiness in international markets.

Previous research has shown that incumbents can improve their reputation by tying their own hands through formal policy commitments, even if doing so has high electoral costs (Milesi-Ferretti 1995). In locking in certain policies through independent central banks (Bodea and Hicks 2018; Betz 2018), balanced budget rules (Kelemen et al. 2014), or bilateral investment treaties (Elkins, Guzman, and Simmons 2006), for example, incumbents can credibly signal a commitment to macroeconomic stability, debt repayment, and property rights protection. Building upon this literature, I examine the emergence of policy commitments in an issue area that is dear to developing nations: the natural resource sector. Natural resources are associated with a series of well-documented negative outcomes, like higher onset of civil war (Ross 2004), fewer women in the labor force (Ross 2008), and increased rent-seeking behavior (Andersen, Johannesen, et al. 2017; Mahdavi 2019), but they still account for much of the economic output of the developing world (Venables 2016). For small and undiversified economies, in particular, the commitment to regulate the natural resource sector and curtail the government's discretion over resource windfalls is exceptionally costly. My work examines the benefits resource-rich, capital-scarce leaders can derive from tying their own hands, identifying the circumstances under which these individuals are willing to overcome their electoral incentives.

In the remainder of this chapter, I discuss the preferences of international creditors and develop a theory connecting these preferences to natural resource wealth. After presenting my theoretical framework, I derive and test four hypotheses regarding the endogenous relationship between global credit markets and natural resource policy. I conclude with implications for research and policy.

5.1 Natural Resources, Debt Markets, and Investor Perceptions

All creditors have one main goal in common: they want to minimize the risk of debt default and the loss of real asset value (Brooks, Cunha, and Mosley 2015). Beyond this common goal, creditors in sovereign debt markets pursue different strategies. Private lenders (like commercial banks and decentralized bondholders) are willing to take higher risks than official creditors (like multilateral organizations and sovereign governments), but typically charge more for this risk. In other words, private creditors impose a higher risk premium than official creditors, by charging fees, demanding higher interest rates, and purchasing loans at a discount (Tomz 2007). To calculate the risk of lending to a country, investors tend to resort to the same cognitive shortcuts: they pay attention to specific macroeconomic indicators, such as the inflation rate and the size of the public deficit (Mosley 2000), as well as institutional fundamentals, such as central bank independence (Bodea and Hicks 2018) and balanced budget rules (Kelemen et al. 2014).

Another distinction between different creditors is that official lenders frequently provide debt relief, while private lenders are unlikely to do so. Granted, commercial banks might be willing to inject new money into a debtor's economy to safeguard their own balance sheets (Kaplan and Thomsson 2017; Akemann and Kanczuk 2005), and decentralized bondholders might agree to debt restructuring, but overall, private creditors – unlike official creditors – have a credible exit threat: they can withhold lending if they anticipate debt default. Given that bondholders have a credible exit threat, emerging markets need to send a wider range of signals than industrialized nations in order to be perceived as credible, reduce the risk of capital flight, and minimize borrowing constraints in times of need. After all, the risk of debt default is significantly higher in the developing world: these countries have smaller economies, fewer tools to fight inflation or invest in human capital in times of need, and are also, on average, less likely to be democratic (Wibbels 2006; Boix 2011). Thus, financial market participants willing to lend to developing nations base their risk calculations on

additional data points: the expected outcome of presidential elections (Jensen and Schmith 2005), the size and conditions of IMF loans (Chapman et al. 2017), and the creditworthiness of peer countries with similar sovereign credit ratings or similar levels of market development (Brooks, Cunha, and Mosley 2015), to name only a few.

As a consequence, capital markets have a disciplining effect. The more a country is exposed to world markets, the less responsive its policymakers can be to the demands of the citizenry, as they need to respond to market pressures in addition to domestic pressures (Ezrow and Hellwig 2014). As countries become more reliant on international bond markets (as opposed to, say, multilateral lending or foreign aid), they must adapt their behavior to signal credibility to would-be investors, thus ensuring access to future loans, at better conditions. For example, policymakers must commit to greater fiscal discipline and appear more willing to impose austerity (Kelemen et al. 2014; Kaplan and Thomsson 2017). These signals are particularly important for developing economies; in times of economic downturn, when investors tend to be less tolerant of risk, Nigeria faces far more borrowing constraints than Norway (Ballard-Rosa, Mosley, and Wellhausen 2019).

In parallel to this need to signal creditworthiness, developing nations tend to specialize in commodities with volatile prices and subject to terms of trade shocks (Wibbels 2006). This is another data point that private lenders need to consider. Resource price volatility is associated with volatility in terms of trade, less foreign direct investment, lower growth rates, and reduced economic diversification. These problems are particularly severe among landlocked countries with poorly developed financial systems (Ploeg and Poelhekke 2009). Consequently, creditors systematically change their lending standards over the commodity price cycle: even controlling for other factors, resource-rich borrowers pay a lower risk premium in expansionary phases and a higher risk premium in contractionary phases (Goes and Kaplan 2020). In order to attract more external finance, these borrowers need to mitigate the political risk associated with natural resources and counteract the negative effects of price volatility. In the following section, I discuss a strategy that enables borrowing governments

to do this.

5.2 A Competitive Theory of Natural Resource Policy

5.2.1 Main Hypotheses

Two countries compete for capital when they are so closely substitutable that private creditors are indifferent between lending to one or another (Elkins, Guzman, and Simmons 2006). In contexts of such competition, a country can attract bondholders by signaling that it is a reliable economic partner who is both willing and able to honor outstanding debt commitments.[2] One potential strategy to signal creditworthiness to bondholders and boost one's credibility in global credit markets is to pass legislation regulating the natural resource sector. I define *natural resource policy* as a statutory commitment that imposes constraints to governments' discretion over natural resources, by determining the spatial and temporal ownership of these resources ahead of time (Collier 2017). Natural resource policy stipulates who will benefit from oil, gas, or mining revenue, and when. It might divide the money between national and subnational governments, or between private companies and the state; alternatively, it may ensure that resource windfalls are not depleted in the short run, but rather invested or saved for the benefit of future generations. In all cases, this kind of policy indicates that the country in question is committed to managing its resource endowments with discipline and self-restraint, resisting the temptation to engage in wasteful spending or increased rent-seeking behavior. Therefore, I contend that a resource-rich country *with* natural resource policy has an edge over a resource-rich country *without* such policy; all else equal, the former is better able to manage creditors' expectations, which is why it is likely to be more competitive in capital markets than the latter. In this context, *more competitive* translates into attracting more capital, at better conditions.

Natural resource policy can credibly manage creditors' expectations because it creates a visible "red line" that draws attention to incumbent misbehavior. If the government

[2]This desire to capture the attention of bondholders should not be understated; Ballard-Rosa, Mosley, and Wellhausen (2019) show that many governments issue sovereign debt simply to remind investors of their existence.

passes such policy and then reneges on its commitments, it will jeopardize its reputation not only with sovereign bondholders and multilateral organizations like the IMF, but also with domestic audiences. After all, citizens care about the international reputation of their leader and disapprove of leaders who make empty threats (Tomz 2007). Hard legalization of natural resource policy serves as a focal point around which citizens and opposition can coordinate to confront the incumbent (Amick, Chapman, and Elkins 2020). Therefore, this kind of policy helps limit – if not prevent – opportunistic behavior by giving international creditors, citizens, and opposition parties the tools to name and shame any incumbent who breaks with this policy.

Elkins, Guzman, and Simmons (2006) identify a similar commitment mechanism: bilateral investment treaties provide a reputational advantage over otherwise comparable rivals in the competition for foreign capital, by indicating that the signatory party is committed to protecting property rights (see also Kerner 2009). Relatedly, Kelemen et al. (2014) find that fiscal rules serve as a focal point to coordinate the behavior of otherwise uncoordinated market actors: even if these rules are practically never enforced in court, they serve as a public signal that reveals information about a country's budget, providing individual investors with "a shared understanding of the point at which other bond buyers are likely to withhold further financing (i.e., the point when the balanced budget rules are violated)" (Kelemen et al. 2014, p. 356). Much like a bilateral investment treaty or a fiscal rule, I argue that natural resource policy is a written commitment that can help governments overcome their credibility gap by reducing ambiguity over future behavior.

I derive two predictions from this theory. First, the expected risk premium demanded by private lenders will be lower for countries with natural resource policy than for countries without. All else equal, the choice to regulate the natural resource sector will be followed by a reduction in political risk and an increase in investor confidence, exerting a downward pressure on bond yields. In fact, given that borrowing costs vary along the commodity price cycle, policies smoothing out this cycle might reduce not only the levels, but also the

volatility of bond yields. Second, competition for external financing will reduce policymakers' autonomy to allocate natural resource revenue at will. After all, creditors' preferences explicitly shape how much access to credit a country has in times of need, and thus what share of assets this country must set aside during a bonanza. Therefore, I expect that resource-rich countries will take creditors' preferences into account when making domestic policy decisions, such that the need to attract external financing will affect the likelihood of adopting natural resource policy.

Three countries illustrate my argument that market interests affect the design of natural resource policy. In Guyana, the Natural Resource Fund Act was passed in 2019 to ensure that "natural resource revenues do not lead to a loss of economic competitiveness" and that "volatility in natural resource revenues do[es] not lead to volatile public spending."[3] Similarly, one of the stated objectives of Tanzania's Oil and Gas Fund, created in 2015, is to ensure that "fiscal and macroeconomic stability is maintained."[4] Finally, the Nigeria Sovereign Investment Authority, created by an act of the same name in 2011, is responsible for managing and investing the country's oil wealth so as to "attract co-investment from other investors, including strategic investors, sovereign and internationally recognised investment funds and private companies, to enhance the Authority's capital and maximize risk adjusted returns."[5] These three legal documents highlight that policymakers in Guyana, Tanzania, Nigeria, and elsewhere are not only aware of the resource curse, but also willing to pass legislation that explicitly addresses this curse. In smoothing out commodity price cycles and reducing economic volatility, these governments aim to secure continued access to global capital markets. My predictions are summarized by Hypotheses 1 and 2.

> **Hypothesis 1 (competition for capital):** *All else equal, competition for private capital flows is associated with an increase in the odds of adopting natural resource policy.*

[3] Act No. 12 of 2019 – Natural Resource Fund Act, Article 3. 23 January 2019.
[4] Oil and Gas Revenues Management Act, Article 8. 4 August 2015.
[5] Act No. 15 of 2011 – Nigeria Sovereign Investment Authority Act, Article 4. 3 June 2011.

Hypothesis 2 (risk premium): *All else equal, adopting natural resource policy is associated with a reduction in the risk premium demanded by private lenders.*

Both hypotheses assume a high level of ex ante financial market integration – whether in the form of limited restrictions on cross-border financial transactions (Chinn and Ito 2006) or frequent issuance of sovereign debt, in large amounts (Ballard-Rosa, Mosley, and Wellhausen 2019). The implication is that natural resource policy can hold doors open: upon regulating the natural resource sector, governments that already issue debt might be able to do so at better conditions, with lower risk premiums. This expectation, as I argue, is what drives many governments to pass natural resource policy in first place.

5.2.2 Conditional Hypotheses

The mechanism I propose does not work equally well for all countries: not every government can use natural resource policy to secure continued access to global capital markets. Even if policy adoption has reputational benefits for resource-rich borrowers, I expect that the efficacy of these benefits will be moderated by country-specific characteristics. Credit ratings tend to reflect the quality of a country's political, social, and legal institutions (Bodea and Hicks 2018); thus, countries with weak institutions tend to receive unfavorable ratings, and natural resource regulations can only do so much to reverse this. Investors are less likely to view natural resource policy as a credible commitment when states lack the institutional capacity to implement such policy reforms to begin with. To underscore this point, consider the case of Ecuador, an oil producer downgraded to *SD* (selective default) by S&P on April 2020, with ten-year bonds yielding over 50%.[6] Between 1999 and 2018, the Ecuadorian government passed several legal documents regulating the natural resource sector. Ecuador might have passed these regulations in order to signal creditworthiness and attract foreign capital, but it is unlikely that such regulations will be associated with a meaningful reduction in the risk premium demanded by private lenders. After all, the Ecuadorian economy

[6]Paul Wallace. "Bond Yields of 50% Mark Ecuador and Zambia as the Next Lebanon." *Bloomberg*. 24 March 2020. For current credit ratings, see `https://www.spratings.com/sri/`

is small enough and its institutions are weak enough that a commitment to regulating the natural resource sector might not be perceived as credible; in itself, this commitment does not provide enough information to shift creditors' negative perception of Ecuador.

In contrast, Canada has the highest possible credit rating assigned by S&P (AAA), with ten-year bonds yielding just over 0.5% in 2020. Canada has no country-wide natural resource policy and nor does it need to. Given the size of the Canadian economy and the stability of its institutions, the government has other tools to reassure investors of its creditworthiness. Put simply, Canada's reputation in international capital markets is firmly established and does not hinge upon isolated policy choices (like the adoption of natural resource policy). As the cases of Ecuador and Canada suggest, countries with high sovereign risk will be more likely to pass natural resource policy, but less likely to reap the resulting reputational benefits. Therefore, Hypothesis 1 is more likely to hold for countries where sovereign risk is high (Ecuador) than for countries where sovereign risk is low (Canada). The reverse applies to Hypothesis 2: natural resource policy will be least effective in reducing risk premiums when sovereign risk is highest. This expectation is captured by the two conditional hypotheses below.

> **Hypothesis 3 (first conditional hypothesis):** *Competition for private capital flows is associated with an increase in the odds of adopting natural resource policy, but this effect is stronger when sovereign credit risk is high.*
>
> **Hypothesis 4 (second conditional hypothesis):** *Adopting natural resource policy is associated with a reduction in the risk premium demanded by private lenders, but this effect is weaker when sovereign credit risk is high.*

5.3 When Do States Pass Natural Resource Policy?

5.3.1 Data

To test the hypotheses outlined above, I examine natural resource policy in 85 countries on a monthly basis between 1990 and 2019. This corresponds to all countries classified as resource rich by the IMF (Venables 2016), the Natural Resource Governance Institute

(2017), or both. For every month, the dependent variable, *Policy adoption*, indicates whether the country in question passed a legal document (for example, a law, statute, code, or executive decree) regulating the spatial and temporal ownership of natural resource revenue at the national level – by creating a natural resource fund, earmarking natural resources, or setting resource-related fiscal rules. To collect these data, I first use the Natural Resource Governance Institute (2017) and the IMF Fiscal Rules at a Glance Dataset (Lledó, Yoon, et al. 2017) to identify the precise country-date of law passage, and subsequently locate each legal document in its country's Official Gazette, available in the Foreign Official Gazette Database and the Global Legal Information Network.

Figure 5.1 shows the rate of policy adoption across regions and over time, excluding countries where natural resource policy exists only at the subnational or supranational level.[7] As seen in this figure, most governments adopting natural resource policy did so after 2000.

The main independent variable used to test Hypothesis 1 is *Competition*, which the denotes the "competitive distance" between two countries (Simmons 2000; Elkins, Guzman, and Simmons 2006). It is calculated for each country i at time t as follows:

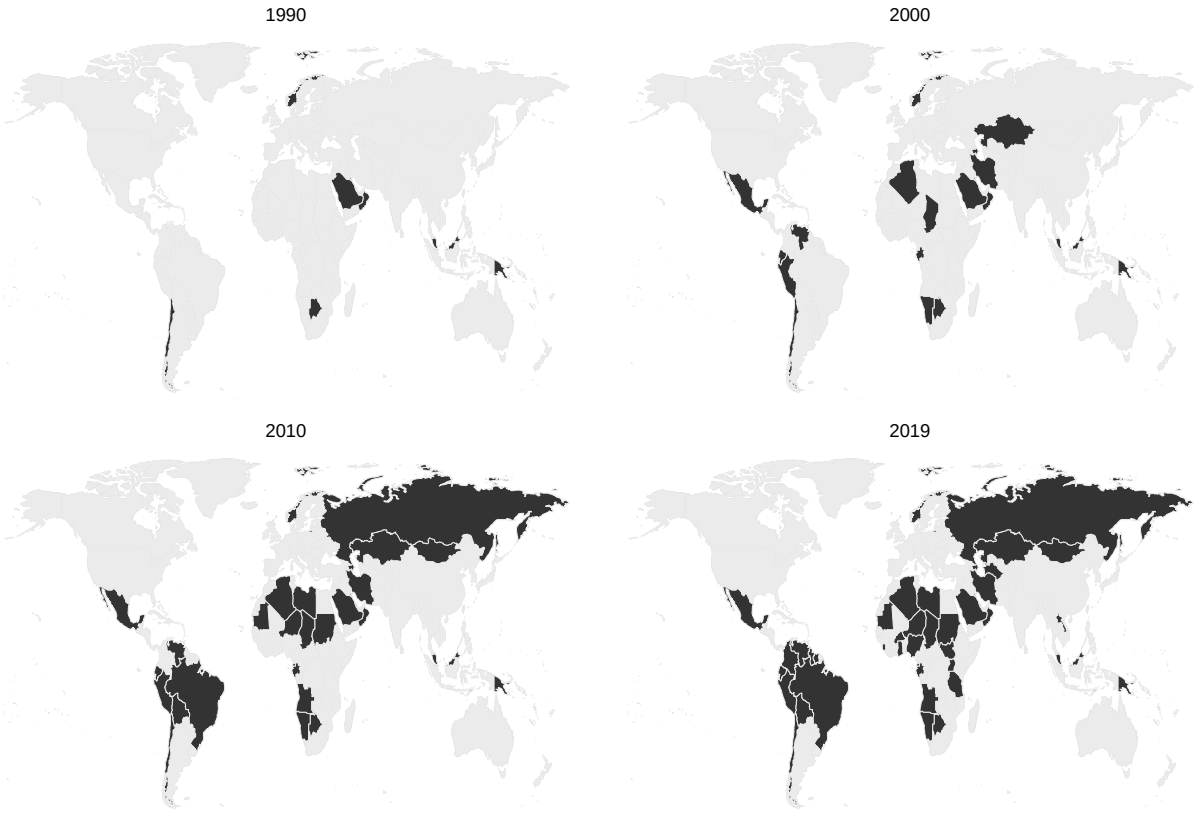
$$Competition_{i,t} = \sum_{j} W_{ijt}\, Policy\, adoption_{jt-1} \tag{5.1}$$

The right-hand side of Equality (1) represents the sum of all resource-rich countries that have passed at least one legal document regulating the natural resource sector by time $t-1$ (as indicated by Figure 5.1).[8] The value of *Policy adoption* for each country j is weighted by the row-standardized spatial weights matrix $\mathbf{W}$, which captures the distance w between any two countries i and j in the dataset:

[7]There are 34 documents passed by subnational entities in four federations (Australia, Canada, the United Arab Emirates, and the United States), and two documents adopted by members of the Central African Economic and Monetary Community (CEMAC). I exclude these subnational and supranational documents from the analysis because they are not directly comparable to national-level legislation.

[8]Like Elkins, Guzman, and Simmons (2006, 829, footnote), I assume that "it is the accumulation of treaties among peers, not the 'event' of their recent signing, that provokes a response." Put differently, the competition variable indicates the cumulative number of countries with natural resource policy, as opposed to the "event" of policy passage at time $t-1$.

Figure 5.1: Cumulative Adoption of Natural Resource Policy, 1990-2019



This figure depicts all resource-rich countries that have passed at least one legal document regulating the natural resource sector by the last day of every year.

$$W_{ijt} = \frac{w_{ijt}}{\sum_j w_{ijt}}. \tag{5.2}$$

This variable captures the *past* behavior of other countries, which is why it covers the period until $t-1$ and not until t, thereby reducing the risk of simultaneity bias (Franzese, Hays, and Cook 2016). Like Brooks, Cunha, and Mosley (2015) and Ballard-Rosa, Mosley, and Wellhausen (2019), I measure the concept of "competitive distance" in two ways. First, I measure it as the geographic proximity between two countries, or *Competition (region)*. Economic competition tends to be geographically clustered, as investors frequently concentrate their portfolio on one specific region (Brooks, Cunha, and Mosley 2015). Burkina Faso and Nigeria are more likely to compete for capital than Burkina Faso and Bolivia; therefore,

if Hypothesis 1 is correct, then Nigeria's decision to pass natural resource policy will have a stronger impact on Burkina Faso than Bolivia's decision to do so.

Second, I measure "competitive distance" using a yearly indicator of market development compiled by the investment firm MSCI, which uses input from market participants to rate countries as *Developed Markets* (coded as 4), *Emerging Markets* (3), *Frontier Markets* (2), and *Standalone Markets* (1).[9] As of 2019, most resource-rich countries in the developing world are unrated by MSCI. I treat these unrated countries as a separate category (0) because they are particularly important for my analysis – after all, they have no external investment rating to go by and need natural resource policy in order to signal credibility to capital markets. Using this ordinal measure of MSCI ratings, I generate the spatial lag *Competition (MSCI)*, which is the weighted average of law adoption among countries with the same rating. The assumption is that countries with a shared MSCI rating (or lack thereof) compete for capital against each other; law adoption in Nigeria, for example, is more likely to have an effect on Burkina Faso (a fellow frontier market) than on Canada (a developed market).

In sum, I use two measures of "competitive distance" to calculate the weights matrix **W** in different ways. Since the two resulting spatial lags are highly correlated, models only include one measure at a time. In line with Hypotheses 1 and 3, I expect that increases in competition will correlate with increases in the odds of policy adoption.

I control for domestic political variables that are correlated with the timing of natural resource policy. *Democracy* represents the Polity index, which ranges from -10 to +10, from hereditary monarchy to consolidated democracy, as calculated by Marshall and Gurr (2015). *Election year* (which captures legislative and executive elections) and partisanship (indicated by the dichotomous variable *Left executive*) are reported by Cruz, Keefer, and Scartascini

[9] *Standalone markets* are either "newly eligible markets" or countries going through "severe deterioration in market accessibility." The *Frontier* category was introduced in 2008 (Ballard-Rosa, Mosley, and Wellhausen 2019); several countries belonging to this category (like Burkina Faso and Nigeria) were previously unrated. MSCI ratings were first introduced in 1987, which is why my empirical analysis begins in 1990. See Appendix E for a list of ratings as of 2019, the last year included in the analysis.

(2018). In addition, models include seven economic variables. *GDP per capita* (in current US dollars, logged), *GDP growth* (in percent), and *Resource rents* (as a percentage of the GDP) are reported by the World Bank. *Field discovery* indicates the discovery of a giant, supergiant, or megagiant oil and gas field (that is, a field with over 500 million recoverable barrels of oil or over 3 trillion cubic feet of gas) in a given country and year (Horn 2014). *IMF agreement* is a measure of whether the country in question was under an IMF program in each month and year, using data drawn from Kentikelenis et al. (2016) and the MONA database. Finally, *Crisis* is coded 1 in years of banking, debt, or currency crisis and 0 otherwise (Laeven and Valencia 2020). These seven economic variables are only available on a yearly basis and lagged by one year, corresponding to the budget cycle.

5.3.2 Empirical Strategy

Hypothesis 1 posits that competition for capital is associated with an increase in the odds of passing natural resource policy, while Hypothesis 3 conditions this effect to variation in sovereign credit risk. I test these hypotheses using Cox proportional hazards models, which capture a series of binary outcomes, each representing whether or not an event occurred in a given month and year. Once a country experiences the event in question (that is, once it passes natural resource policy), it drops out of the dataset, as it is no longer considered to be at risk of passing new policy. This assumption is admittedly imperfect; after all, countries are *constantly* at risk of passing new natural resource policy, and indeed might do so repeatedly (Ecuador, for example, passed eight different legal documents between 1999 and 2018). Still, the focus on the inaugural policy for each country allows me to identify how these legal documents reflect the desire to *attract* capital in first place, as opposed to the desire to *retain* capital, which is what the n-th policy could represent.

I estimate the following model for each country i at time t:

$$h(t) = h_0(t) + e^{\beta Competition_i + \phi \mathbf{X}_i} \tag{5.3}$$

In this model, $h(t)$ is the estimated hazard of policy adoption at time t, $h_0(t)$ is the

unspecified baseline hazard, and $\mathbf{X}$ is a vector of control variables discussed previously. Countries that did not experience the event until 2019 are included and considered right-censored; their contribution to the dataset is a vector of zeroes (Box-Steffensmeier and Jones 2004). The advantage of Cox proportional hazards models is that they do not assume any functional form for the baseline hazard; in other words, the baseline risk of experiencing the event is left unspecified (Singer and Willett 2003), and the models capture the accumulated risk that may or may not ultimately lead to policy adoption (Simmons 2000).

Though the analysis begins in 1990 for reasons of data availability, it is important to note that a few countries are left-censored: as Figure 5.1 shows, they experienced the event before the start of the analysis. (This is the case of Chile, for example, which first passed natural resource policy in 1976.) Proportional hazard models can accommodate left-censoring, but given that left-censored observations might lead to biased estimates (Box-Steffensmeier and Jones 1997), I also report the results of Weibull-distributed accelerated failure time models in Appendix F.

5.3.3 Results

Table 5.1 presents the results of Cox proportional hazards models, with standard errors clustered by region. For each model, the coefficient represents the effect of a one-unit change in the independent variable on the hazard rate, which is the rate of event occurrence at time t, conditional on the event not occurring before time t. A coefficient above one indicates a positive effect on the odds of adopting natural resource policy; conversely, a coefficient below one represents a negative effect.

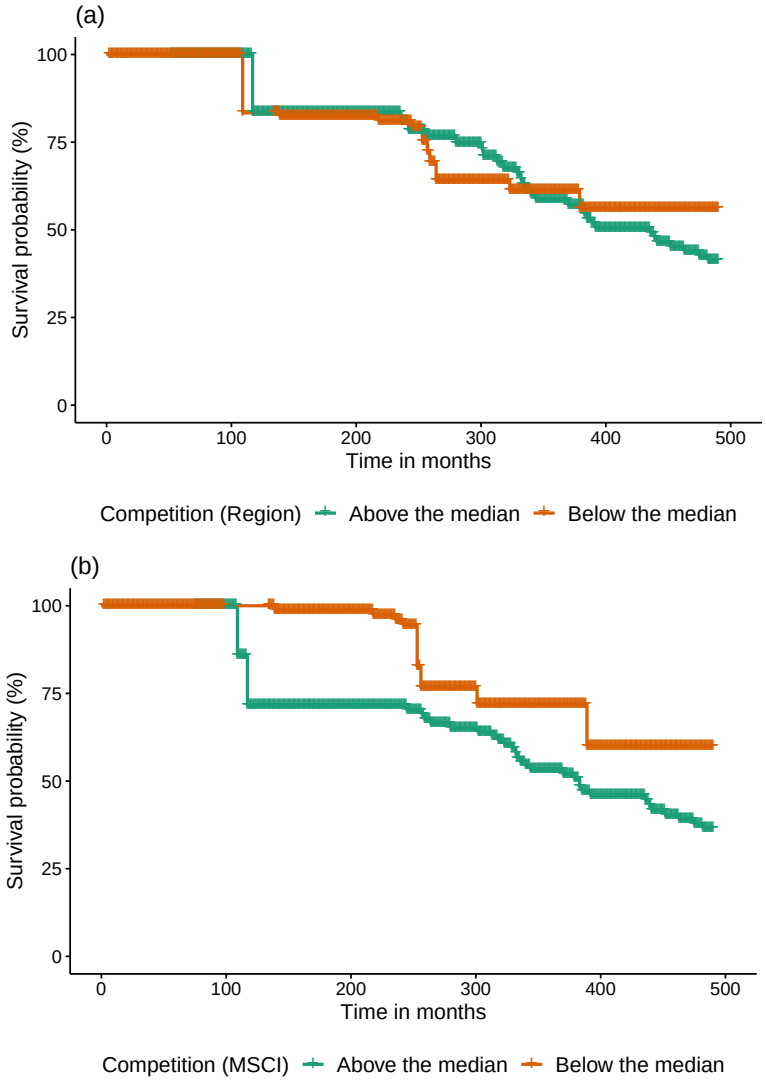
Models 1 and 2 identify the determinants of natural resource policy adoption for all 85 resource-rich countries examined in this study. Model 1 measures "competitive distance" as geographic proximity, whereas Model 2 operationalizes it as similarity in MSCI ratings. Regardless of how competition is measured, both models show that governments are more likely to regulate the resource sector when their competitors have previously done so. Given

Table 5.1: Competition for Capital and Policy Adoption Around the World, 1990-2019 (Cox Proportional Hazard Models, Monthly Data)

	Dependent variable:		
	Time to policy adoption		
	(1)	(2)	(3)
	All countries	*All countries*	*Unrated countries*
Competition (region)	6.803**		
	(6.226)		
Competition (MSCI)		3.941	2.702***
		(3.011)	(5.818)
Democracy (Polity)	0.080***	0.077***	0.083***
	(0.035)	(0.033)	(0.041)
Left executive	−0.451*	−0.379	−0.109
	(0.382)	(0.379)	(0.441)
Election year	0.124	0.105	−0.134
	(0.378)	(0.378)	(0.461)
Resource rents (% GDP)	0.043***	0.039***	0.037***
	(0.014)	(0.014)	(0.016)
Field discovery	0.690	0.699	0.586
	(0.485)	(0.485)	(0.667)
GDP per capita (log)	0.010	0.012	0.073***
	(0.020)	(0.020)	(0.025)
GDP growth (%)	0.002	0.002	0.003
	(0.016)	(0.018)	(0.018)
IMF agreement	0.105	0.147	0.532*
	(0.397)	(0.392)	(0.457)
Crisis	0.340	0.373	0.743
	(0.758)	(0.759)	(0.776)
Observations	18,936	18,936	13,645
Log Likelihood	−125.075	−124.815	−83.724

This table reports the results of Cox proportional hazard models, with standard errors clustered by region. The coefficients are reported as hazard rates. *p<0.1; **p<0.05; ***p<0.01

Figure 5.2: Probability of Policy Adoption



I re-estimate Models 1 and 2 of Table 5.1 in bivariate form and use the results to generate these survival curves, which indicate the probability of passing natural resource policy at any given point in time, conditional on policy adoption among countries (a) in the same region or (b) with the same MSCI rating. The median value of *Competition (Region)* is 0.024, while the median value of *Competition (MSCI)* is 0.048. The higher the share of peers with natural resource policy in place (that is, the higher the value of *Competition (Region)* or *Competition (MSCI)*), the higher the odds that a country will also adopt such policy, indicating that these decisions are interdependent. For better visualization, these curves exclude three outliers for which fewer than 100 time periods are available (Namibia, Timor Leste, and South Sudan).

how difficult it is to interpret the coefficients of spatial lags, I re-estimate Models 1 and 2 in bivariate form and use these results to generate survival curves (see Figure 5.2) that depict the probability of passing natural resource policy (that is, of *not* surviving) over time, conditional on the values of *Competition (Region)* as well as *Competition (MSCI)*. Both spatial lags indicate that these decisions are interdependent: the odds that a country will adopt natural resource policy increase as more of this country's peers adopt such policy. In indicating that competition for private capital flows is associated with an increase in the odds of regulating the resource sector, these survival curves provide support for Hypothesis 1.

To test Hypothesis 3, Model 3 excludes all countries that are rated by MSCI, instead focusing on competition among those that are unrated – in other words, those that are less integrated into global capital markets and for whom such an institutionalized metric of creditworthiness is not available. As of 2019, unrated nations include Angola, Bolivia, and Mongolia, where the perceived risk of default is comparatively high (see Appendix E for full list). These governments have strong incentives to signal their commitment to good governance (as represented by natural resource policy) in order to make themselves more palatable to investors and develop a competitive advantage over their peers. Indeed, Model 3 uncovers evidence in favor of a competitive theory of policy adoption within this narrower sample. Other than these competition measures, only regime type and *Resource rents* have a consistently significant effect on the dependent variable, showing that democracies with a high share of rents to GDP are most likely to regulate the natural resource sector. The coefficient for *Crisis*, while positive, is not statistically significant, showing that countries do not tend to reform the natural resource sector when they are on an economic downward spiral.

5.4 When Does Natural Resource Policy Reduce Risk Premiums?

5.4.1 Data

Hypothesis 2 posits that natural resource policy adoption is associated with an improvement in borrowing conditions, as represented by a reduction in the risk premium charged by private creditors. Meanwhile, Hypothesis 4 conditions this effect to variation in sovereign credit risk. To test these two propositions, *Policy adoption* now moves from the left-hand side to the right-hand side, from dependent to independent variable. It is possible that the effect of policy adoption on borrowing conditions is not observed immediately, but rather months or even years afterwards; to probe whether this is the case, I lag *Policy adoption* by one month as well as one, two, three, four, and five years.

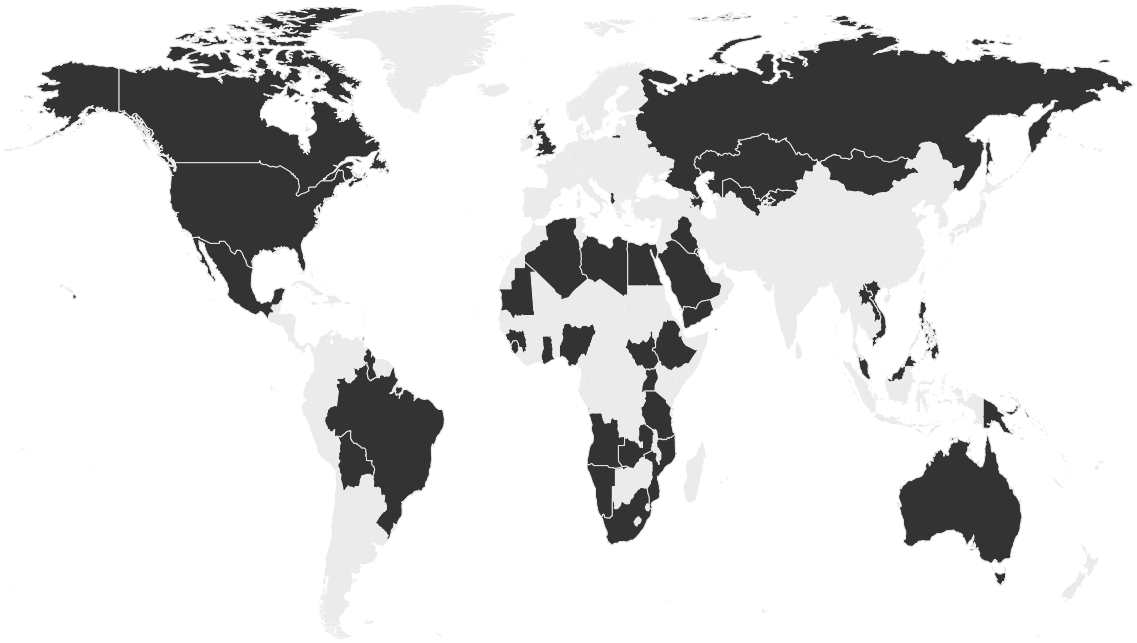
The outcome of interest is now *Treasury rate* (log), which measures the weighted average rate of short-term treasury bills (typically three months), using monthly data from the IMF International Financial Statistics.[10] The median value for this variable is 8.2 percent, but this value can range from 0 (the United States in 2011) to 298.7 percent (Kazakhstan in 1994). I use logged values to address this skewness. If my argument is correct, then past policy adoption will be associated with a decrease in present treasury rates, though less so among nations that are not rated by MSCI.

Treasury rate is only available for 54 of the 85 countries of interest (see Figure 5.3), and there are significant gaps in its coverage: while US treasury bill rates are available for every single month between 1980 and 2019, Angolan rates are only available since 2004, as this is when the Bank of Angola first issued short and long-term treasury bills.[11] There is limited information available for low income countries because much of their public external debt

[10]The exceptions are Kazakhstan and Russia, for which only quarterly data are available. In addition, rates for Botswana, Burkina Faso, Ivory Coast, Guatemala, Mali, Morocco, Myanmar, Niger, Togo, and Venezuela are only available for long-term bonds. Results are robust to the exclusion of these observations.

[11]For a discussion of monetary developments in Angola, see IMF. "Angola: Staff Report for the 2004 Article IV Consultation." 6 July 2005. https://www.imf.org/en/Publications/CR/Issues/2016/12/31/Angola-Staff-Report-for-the-2004-Article-IV-Consultation-18390

Figure 5.3: Countries for Which Information on Treasury Bill Rates Is Available



This figure depicts all 54 resource-rich countries for which information on treasury bill rates is available from the IMF International Financial Statistics, on a monthly basis, for at least some period between 1990 and 2019.

is bilateral or multilateral (Mecagni et al. 2018), though there are exceptions (like South Sudan, which began to issue treasury bills in 2012, the year after its independence).

To ensure that these results are robust, I also evaluate how policy adoption impacts two additional, indirect measures of borrowing conditions. First, JP Morgan's Emerging Market Bond Index (EMBI) Global sovereign spread represents the weighted average of 10-year yield spreads for US dollar-denominated bonds with outstanding face value of at least $500 million over comparable US Treasury bonds. The median value is 542, and the highest value is 7078 (for Argentina in 2002); higher spreads represent higher risk. Second, the average credit rating for each country, as issued by the big three credit rating agencies (S&P, Fitch, and Moody's), is calculated by Ballard-Rosa, Mosley, and Wellhausen (2019) and operationalized

on a scale from one to 23, where 23 represents the highest possible rating (corresponding to AAA for S&P and Fitch, or Aaa for Moody's).

I control for the same political and economic factors included in the previous section: regime type, timing of elections, and ideology of the executive at time t; and GDP per capita, GDP growth, resource rents as a percentage of GDP, discovery of oil and natural gas fields, participation in IMF agreements, and incidence of an economic crisis at time $t-1$. I also control for the cost of a barrel of West Texas Intermediate crude oil, in current US dollars, on December 31 of each year (*Oil price*).

5.4.2 Empirical Strategy

Having previously employed event history analysis to determine what drives governments to adopt natural resource policy, I now use linear regression models to establish how policy adoption affects macroeconomic outcomes. Specifically, I test Hypotheses 2 and 4 using a finite distributed lag model, with country and time fixed effects to control for heterogeneity across units and over time. In its simplest form, a distributed lag model is specified as follows:

$$Treasury\,rate\,(log)_{it} = \beta_1 Policy\,adoption_{it} + \beta_2 Policy\,adoption_{it-1} + \phi \mathbf{X}_{it} + \delta_t + \mu_i + z_{it} \tag{5.4}$$

In this specification, *Policy adoption* impacts *Treasury rate* for two periods (t and $t-1$), after which this impact dissipates completely (Beck and Katz 2011). I build upon Equation (4), but include higher-ordered lags to account for the impact of policy adoption over the years. The model includes the same vector of control variables $\mathbf{X}$ used in the previous analysis. In addition, μ_i and δ_t are country and time fixed effects, respectively, and z_{it} represents the error term. One potential problem with distributed lag models is the correlation of *Policy adoption* and its lags (Beck and Katz 2011), which is why I also estimate models with each lag separately and report the results in Appendix F.

5.4.3 Results

Table 5.2 presents the results of three distributed lag models, estimated using OLS. These models investigate how natural resource policy impacts present and future bill rates, EMBI spreads, and credit ratings. Overall, Table 5.2 provides consistent support for Hypothesis 2: policy adoption is associated with a decrease in the risk premium demanded by private lenders, as denoted by lower treasury rates and EMBI spreads as well as higher credit ratings. These effects are not immediate, though: across all three models, the beneficial effects of policy adoption are most pronounced after two to five years. In other words, the commitment to regulate natural resource revenue can improve creditworthiness and lower borrowing rates across all countries, but policymakers willing to make such commitment need to be patient, as the perception of market actors might shift at a slow pace.

Recall the central implication of Hypothesis 4: debtors that need to improve their reputation the most are also the ones least likely to accomplish this through natural resource policy, because their commitment to regulate the extractive sector is typically seen as less credible to begin with. To drive this point home, I discussed the cases of a low-risk country, Canada, and a high-risk country, Ecuador, predicting that the latter would be more likely to pass natural resource policy than the former, but less likely to reap the resulting reputational benefits. After all, the promise of policy reform can only do so much to shift investors' perceptions of a country already considered to be under selective default. To test this prediction, I estimate the same three models of Table 5.2 on a smaller sample, including only the country-years that are not rated by MSCI. Table 5.3 presents these results.

Many countries that are not rated by MSCI are similarly not rated by JP Morgan, S&P, Moody's, or Fitch. Correspondingly, data on EMBI spreads and sovereign credit ratings are available on a limited basis, which is why the following discussion focuses on Model 1 of Table 5.3, with the dependent variable *Treasury rate*. According to this model, reforms in the extractive sector do not have a consistent effect on risk premiums among countries without an MSCI rating. In the short to medium run, these reforms are associated with a

Table 5.2: Policy Adoption and Borrowing Conditions Around the World, 1990-2019 (Ordinary Least Squares, Monthly Data)

	Dependent variable:		
	Treasury rate (log)	EMBI Global	Credit rating
	(1)	(2)	(3)
	All countries	*All countries*	*All countries*
Policy adoption (same month)	0.199	−78.942*	0.216*
	(0.136)	(44.810)	(0.127)
Policy adoption (previous month)	0.147	−53.029	0.157
	(0.144)	(43.688)	(0.124)
Policy adoption (1 year prior)	0.036	−65.282***	0.201***
	(0.067)	(21.557)	(0.071)
Policy adoption (2 years prior)	0.040	−103.600***	0.238***
	(0.081)	(25.995)	(0.044)
Policy adoption (3 years prior)	−0.060	−56.279*	0.157
	(0.089)	(29.056)	(0.122)
Policy adoption (4 years prior)	−0.199*	−80.532***	0.104**
	(0.107)	(25.988)	(0.047)
Policy adoption (5 years prior)	−0.358**	−131.761***	0.239***
	(0.149)	(23.990)	(0.082)
Democracy (Polity)	−0.030***	−34.721***	−0.026
	(0.005)	(7.352)	(0.023)
Left executive	−0.277***	122.988	−0.182
	(0.051)	(117.420)	(0.121)
Election year	0.014	−48.591***	0.031
	(0.020)	(12.427)	(0.041)
Resource rents (% GDP)	−0.024***	6.081***	0.035***
	(0.008)	(2.248)	(0.011)
Field discovery	−0.054	−57.833	−0.013
	(0.076)	(48.914)	(0.100)
GDP per capita (log)	−0.058***	−28.901	0.037***
	(0.005)	(27.737)	(0.004)
GDP growth (%)	0.006	−37.566***	0.041***
	(0.008)	(9.306)	(0.011)
Oil price (USD)	−0.009***	−2.625***	0.009***
	(0.001)	(0.807)	(0.001)
IMF agreement	0.090**	273.820***	−0.706***
	(0.038)	(60.701)	(0.269)
Crisis	0.247***	414.447***	−0.250
	(0.078)	(57.130)	(0.198)
Observations	10,323	5,776	11,685
R^2	0.383	0.202	0.216

This table reports the results of linear regressions, with country and time fixed effects as well as standard errors clustered by region. *p<0.1; **p<0.05; ***p<0.01

Table 5.3: Policy Adoption and Borrowing Conditions for Unrated Countries, 1990-2019 (Ordinary Least Squares, Monthly Data)

	Dependent variable:		
	Treasury rate (log)	EMBI Global	Credit rating
	(1)	(2)	(3)
	Unrated countries	*Unrated countries*	*Unrated countries*
Policy adoption (same month)	0.191	38.720	−0.130
	(0.213)	(95.248)	(0.088)
Policy adoption (previous month)	0.236**	101.825	−0.132
	(0.115)	(166.682)	(0.196)
Policy adoption (1 year prior)	0.182***	−87.537*	−0.287***
	(0.039)	(50.127)	(0.061)
Policy adoption (2 years prior)	0.219***	−151.492***	−0.420***
	(0.052)	(52.163)	(0.025)
Policy adoption (3 years prior)	−0.033	148.249*	−0.578***
	(0.040)	(81.936)	(0.042)
Policy adoption (4 years prior)	−0.499***	33.453	−0.321***
	(0.062)	(39.520)	(0.080)
Policy adoption (5 years prior)	−0.727***	−193.196***	−0.066
	(0.076)	(25.697)	(0.046)
Democracy (Polity)	−0.025***	6.178	0.203***
	(0.001)	(4.488)	(0.013)
Left executive	−0.442***	913.905***	−0.247***
	(0.029)	(82.300)	(0.034)
Election year	0.020	−116.641***	0.017
	(0.019)	(35.578)	(0.027)
Resource rents (% GDP)	−0.026***	5.765***	0.026***
	(0.002)	(1.014)	(0.001)
Field discovery	0.120***	191.593***	0.131***
	(0.020)	(50.375)	(0.033)
GDP per capita (log)	−0.103***	−28.598**	0.118***
	(0.005)	(14.453)	(0.004)
GDP growth (%)	−0.002	−35.643***	0.031***
	(0.002)	(2.375)	(0.003)
Oil price (USD)	−0.009***	−8.121***	0.009***
	(0.0004)	(0.341)	(0.001)
IMF agreement	0.069***	52.005*	−0.082***
	(0.010)	(28.013)	(0.031)
Crisis	0.272***	−69.392**	0.270***
	(0.037)	(27.989)	(0.090)
Observations	6,396	1,832	4,795
R^2	0.366	0.377	0.341

This table reports the results of linear regressions, with country and time fixed effects as well as standard errors clustered by region. *p<0.1; **p<0.05; ***p<0.01

significant *increase* in risk premiums, as indicated by the positive coefficients for the variable *Policy adoption* when lagged by one month, one year, and two years. To be clear: this does not mean that governments like Ecuador have nothing to gain from natural resource policy. Four or five years after policy adoption, bill rates decline significantly, as shown by the negative coefficients for *Policy adoption (4 years prior)* and *Policy adoption (5 years prior)*. Still, the reputational benefits of policy reform appear to be less pronounced for countries that, like Ecuador, are not fully integrated into global capital markets; in these contexts, policy reforms that provide information about the state of the domestic economy might in fact *worsen* borrowing conditions in the short run.

Models 2 and 3, which replace treasury rates with EMBI spreads and credit ratings, offer similarly mixed results that corroborate the prediction of Hypothesis 4. These results hold even after controlling for factors identified in previous research as important predictors of risk premiums, like regime type, size of the economy, participation in IMF programs, and occurrence of a banking, debt, or currency crisis (Brooks, Cunha, and Mosley 2015; Chapman et al. 2017).

5.4.4 A Brief Illustration: Ecuador

Between 1999 and 2018, Ecuador passed eight different legal documents regulating its hydrocarbon sector, more than any other country included in the analysis. I use the case of Ecuador to illustrate how natural resource policy adoption has mixed effects for economies that are not fully integrated into global capital markets. Since treasury bill rates are not available for Ecuador (as Figure 5.3 shows), I discuss risk premiums in terms of EMBI spreads.

In April 1999, Ecuador created a sovereign wealth fund to save oil windfalls in excess of yearly revenue targets.[12] Five months later, the government defaulted on its sovereign debt. As part of the debt restructuring process, Ecuador adopted the US dollar as its official

[12]Ley para la reforma de las finanzas públicas (Ley 24). 30 April 1999.

currency on 13 March 2000, recognizing that the new monetary scheme required "additional substantial changes in the areas of telecommunications, electricity and hydrocarbons in order to attract foreign investment and revive the national economy."[13] To accomplish these changes, the government promoted a major fiscal overhaul over the subsequent years, passing fiscal rules to reduce the central non-oil primary deficit and creating a series of additional oil funds to stabilize the economy and reduce the size of the public debt (Lledó, Sasson, and Acevedo 2019).[14] After a period of hesitation, these reforms were met with support from capital markets. Between March and May 2000, EMBI spreads rose from 3,111 to 4,499 basis points; by August of the same year, though, they had fallen to 1,340 points, as Figure 5.4 shows. S&P's credit rating for Ecuador was upgraded from *SD* (selective default) to *B-* (highly speculative) in August 2000. Several Latin American nations, like Bolivia, Mexico, Peru, or Venezuela, passed similar reforms in the following months and years.

By 2008, 92% of the central budget of Ecuador was earmarked for education, health, infrastructure, wages, fuel or electricity subsidies, and debt amortization, among other spending targets, leaving policymakers with discretion over just 8% of the central budget. Since oil was (and is) the primary source of revenue for Ecuador, all these expenditures were conditional on oil revenue, so the government found itself spending considerably more when oil prices were high and considerably less when prices were low (Acosta, Albornoz, and Araujo 2009).[15] This defeated the original purpose of its natural resource policy, which was to shield public expenditure from volatility in commodity revenues.

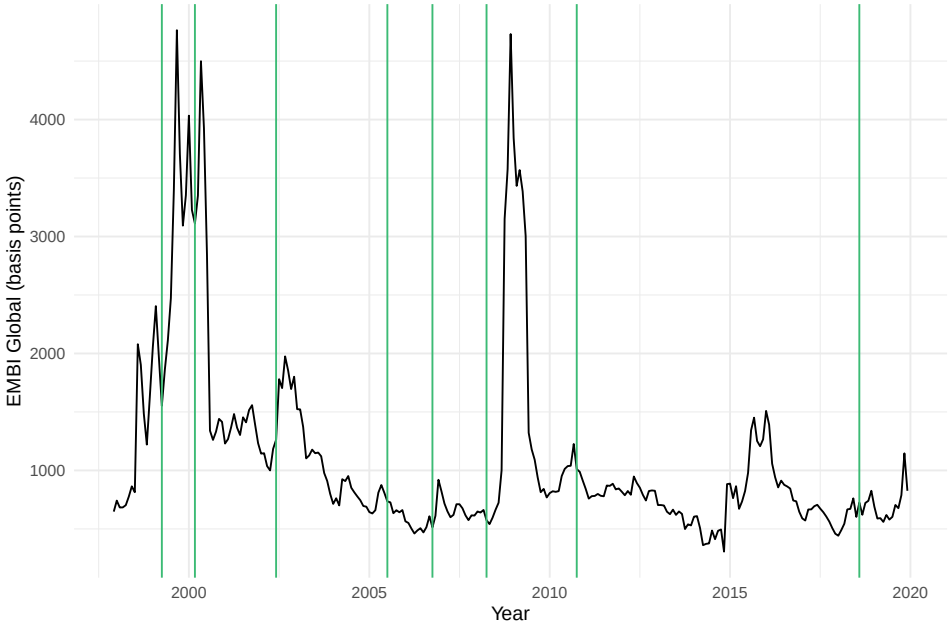
Following the promulgation of a new constitution in 2008, the Rafael Correa administration eliminated all oil funds, prohibited the use of non-permanent revenue (including oil windfalls) to finance current spending, and imposed limits to the public debt-to-GDP ratio

[13]Ley para la transformación económica del Ecuador (Ley 4), Preamble. 13 March 2000.

[14]Ley orgánica de responsabilidad, estabilización y transparencia fiscal (Ley 72). 23 May 2002. See also its amendment, Ley orgánica reformatoria a la ley de responsabilidad, estabilización y transparencia fiscal (Ley 4). 13 July 2005.

[15]Ley orgánica para la recuperación del uso de los recursos petroleros del estado y racionalización administrativa de los procesos de endeudamiento. 2 April 2008.

Figure 5.4: EMBI Global Spreads for Ecuador, 1997-2019



This figure depicts EMBI Global spreads for Ecuador from 1997 to 2019. Vertical lines indicate months in which natural resource policy was passed.

of the non-financial public sector (Lledó, Sasson, and Acevedo 2019). Later that year, Correa announced his country's second debt default in less than a decade (though he did so for ideological, not financial, reasons). The new fiscal framework was subsequently amended in 2010, 2016, and 2018 to change the methodology measuring the size of public debt, re-introduce earmarks, and re-create a natural resource fund that guarantees "the sustainability of public accounts" and "the ability to execute spending on education and health."[16] Despite these reforms, Ecuador defaulted again in 2020, with Finance Minister Richard Martínez declaring his intent to pursue a "friendly restructuring."[17]

The frequency with which Ecuador has adopted natural resource policy is remarkable, as is the fact that these reforms tend to coincide with periods of increased investment risk (as denoted by the values for EMBI spreads in Figure 5.4). This supports the argument

[16]Ley orgánica para el fomento productivo, atracción de inversiones, generación de empleo, y estabilidad y equilibrio fiscal. 21 August 2018.

[17]Ben Bartenstein. "Ecuador Starts Debt Talks as Economic Strains Mount." *Bloomberg*. 2 June 2020.

that nations like Ecuador pass natural resource policy to improve their standing in credit markets, hoping to attract external financing at better rates than they otherwise would. In Ecuador, oil sector reforms even appear to foreshadow sovereign defaults, which could be seen as an attempt to gain goodwill from bondholders and secure a "friendly restructuring" in the future. But does this strategy work? My cross-country analysis found that it might work in the long run – a finding substantiated by the Ecuadorian legislation, where oil funds were explicitly earmarked for debt repayment. In the short run, though, reforms in the extractive sector are associated with an increase in risk premiums – particularly among markets without an MSCI rating, like Ecuador –, as they draw investors' attention to the need to reform in first place. When risk premiums are high, policy adoption is not enough to convince investors of the government's commitment to fiscal prudence; rather, these investors tend to wait and see the policies in action before extending more generous rates.

5.5 Conclusion

Though resource-rich countries have many reasons to adopt natural resource policy, I contend that the desire to attract foreign capital plays an important role in this decision-making process. This is particularly the case for small economies with weak institutions, like Ecuador, which are particularly interested in improving their international reputation because they have limited tools to attract foreign capital to begin with. As previous research has shown, market actors base their investment decisions on a few cognitive shortcuts, including macroeconomic indicators (the size of the public deficit) and institutional fundamentals (central bank independence). By these metrics, Ecuador is a "bad borrower:" it is not rated by MSCI, never had an investment-grade credit rating, regularly runs budget deficits, and its central bank issues no currency, as its legal tender is the US dollar. In passing natural resource policy, the government of Ecuador can make up for these shortcomings by reassuring foreign investors that it is committed to a disciplined management of its oil wealth. In a first analysis, I use event history models to test this theory, finding that competition for capital is

indeed associated with a significant increase in the odds of adopting natural resource policy.

In a second analysis, I find that policy adoption does not provide a sufficiently strong signal to improve borrowing conditions, at least not in the short term. Natural resource policy has countervailing effects: even if it reduces risk premiums in the long run, it is associated with negative market responses in the short run. This might happen for two reasons: first, these policies serve as a focal point that highlights the need for reform in first place; second, they are not perceived as a credible commitment when countries appear to lack the institutional capacity to implement these reforms. Either way, the analysis developed in this chapter has discouraging implications: the choice to regulate the natural resource sector might reinforce pre-existent patterns of market integration, making credit cheaper for "good borrowers" and more expensive for "bad borrowers."

Chapter 6

Conclusion

Under what conditions do political leaders create formal institutions that promote sustainable development through natural resource revenue, instead of spending this revenue immediately to maximize political support? This is the overarching question I answer in this study. Over the course of the previous chapters, I developed a framework to explain variation in how governments manage their resource wealth, providing three answers to this question. First, I advanced the argument that policymakers are more likely to tie their hands (that is, to adopt statutory commitments that constrain their own discretion over resource windfalls) in political arenas with moderate contestation. When political uncertainty is low, the marginal benefit of using resource windfalls to win additional votes in the short run is negligible; rulers who are safe in their seats can afford to adopt long-run development strategies that are at odds with popular demands for lower taxes and increased current spending. Still, political uncertainty cannot be too low, or else rulers will not be held accountable and will face no incentives to institutionalize the long-term allocation of resource windfalls in first place, instead delivering private benefits to strengthen their grip on power.

Second, I proposed that international organizations have substantial leverage over the adoption of natural resource policy at the domestic level. This is because most commodity producers are low or medium income countries with undiversified economies. In times of commodity price bust, no other segment of the economy is competitive enough to offset the losses, so these countries frequently turn to the IMF – the world's lender of last resort – for emergency liquidity. This puts the IMF in a powerful position: it can condition loan disbursement to policy reforms in the natural resource sector, and borrowing countries must comply with such reforms in order to secure continued loan disbursement. However, I

identified two mechanisms that condition this relationship: the IMF threat to suspend loan disbursement must be credible, and political leaders in the borrowing country must have the institutional capacity to implement such reforms.

Third, I investigated how competition for credit propels nations to regulate the natural resource sector. In adopting policies that stipulate who will benefit from natural resource revenue, and when, governments can signal to the international community that they are committed to fiscal prudence, good governance, and self-restraint, thereby earning a competitive edge over countries without such measures. Consequently, natural resource policy has the potential to enhance the perceived creditworthiness of a sovereign borrower, exerting a downward pressure on bond yields. Again, my predictions are conditional: when credit risk is high, countries have more incentives to adopt natural resource policy (because they need more tools to reassure investors of their creditworthiness), but derive fewer benefits from policy adoption (because their commitment to regulating the natural resource sector might not be perceived as credible).

In order to test the observable implications derived from these claims, I constructed a novel dataset consisting of 163 legal documents regulating the natural resource sector, passed by 87 resource-rich countries between 1854 and 2019. Despite the limitations imposed by data availability, results consistently corroborate my expectation that resource-rich governments are more likely to tie their hands at intermediate levels of competition, when they have outstanding IMF loans, and in order to enhance their reputation in global credit markets. My findings confirm that the reality is more nuanced than this, though. Even if the IMF explicitly conditions loan disbursement to changes in extractive policy, borrowers are not all equally responsive: they are more likely to comply when they have the institutional capacity to do so, and less likely when they are closely aligned with the Fund's top shareholders (particularly the US), as they do not expect to be punished for non-compliance. The "disciplining effect" of credit markets is similarly conditional: competition for capital is less likely to result in natural resource policy adoption among countries like Canada, whose reputation in international

markets is firmly established and does not hinge upon isolated policy choices.

6.1 Who Matters When?

Globalization complicates domestic politics. According to Ezrow and Hellwig (2014), the more a country is exposed to world markets, the more its political parties need to respond to market pressures in addition to domestic pressures. Since these pressures are often competing, political parties in open economies end up being less responsive to the preferences of the median voter as a result. Though Ezrow and Hellwig develop their argument with regards to advanced capitalist democracies, their logic could well apply to the universe of resource-rich countries I examine here. I have argued that political competition and sovereign borrowing influence natural resource policy adoption, but this does not mean that both factors matter equally for all countries: to use Ezrow and Hellwig's vocabulary, natural resource policy might be a "response to voters" in some contexts and a "response to markets" in others. In this section, I adjudicate between different aspects of my theory and speculate when natural resource policy is a response to voters as opposed to a response to markets, acknowledging that the three separate analyses conducted in the previous chapters do not allow me to make this distinction with certainty.

The decisions of developing and developed nations are grounded in distinct patterns of integration into world markets. Markets impose more constrains on the former than on the latter, because rich states have the resources to compensate their citizenry for losses in times of economic downturn, while poor states do not (Wibbels 2006). Therefore, in contexts of capital scarcity, the preferences of creditors probably matter more than the preferences of domestic actors. For example, IMF staffers should have considerable leverage over how a recidivist borrower like Ecuador designs its natural resource policy. Bondholders, too, likely have a strong influence on Ecuador, a country that defaulted on its public debt four times over the past 21 years and whose repeated attempts to pass natural resource policy could be interpreted as a strategy to gain goodwill from bondholders, as discussed in Chapter 5.

In countries like Ecuador, natural resource policy is more likely to be a response to markets (with markets broadly construed as international creditors) than a response to voters (and domestic opposition forces more generally). In contrast, in contexts of capital abundance, I expect domestic actors to have a stronger say in natural resource management decisions than multilateral or private creditors. Norway is not dependent on multilateral finance, and its reputation in bond markets does not hinge upon individual policy decisions; its choice to pass natural resource policy in 1990, 2001, and 2005 was likely a response to domestic audiences, rather than to international creditors.

In all probability, the relative influence of creditors is also a function of economic diversification. When countries have a strong non-resource sector, they are more likely to withstand commodity price busts without the need to turn to external finance, which should reduce the influence of multilateral organizations and foreign creditors vis-à-vis domestic actors. For example, in 2018, mineral fuels accounted for 13.4 percent of all US exports and 95.3 percent of all South Sudanese exports. An exogenous shock in oil prices would no doubt be felt in the US, particularly in oil-producing states like Texas, but it would be attenuated by the fact that the bulk of US exports is coming from the non-resource sector. In South Sudan, however, less than 5 percent of the total export value in 2018 came from the non-resource sector.[1] In diversified economies like the US, natural resource policy is arguably less exposed to the influence of creditors because these countries can weather contractionary phases in a way that undiversified economies like South Sudan cannot. Therefore, South Sudan's Oil Revenue Stabilization Account, created in 2011,[2] is likely a response to markets more than a response to voters. In times of economic downturn, developing economies like South Sudan are more likely to enter multilateral loan agreements and more likely to issue debt in capital

[1]These export figures come from the UN Comtrade Database. At that point, trade was South Sudan's only source of revenue; the national tax agency only began to operate eight years after independence, in January 2019. See Okech Francis. "South Sudan's New Tax Body Collects $12.3 Million in First Month." *Bloomberg.* 22 February 2019.

[2]The Transitional Constitution of the Republic of South Sudan, Article 176. 9 July 2011. See also the Petroleum Act. 6 July 2012.

markets, two factors that should increase the odds of overhauling regulations for the natural resource sector – and the influence that capital markets and the IMF will have over the design of such regulations.

6.2 Future Research

This study focuses on the determinants and implications of natural resource policy *adoption*. Future research should examine diversity in the *content* of such policies. In Chapter 2, I already discussed how these policies typically include a mix of strategies: earmarks, funds, fiscal rules, and – to a lesser extent – citizen dividend schemes. What makes governments pursue one strategy over another? Why do some policymakers create stabilization accounts, while others create funds for future generations and others, still, focus on "parking funds" to temporarily store the excess influx of foreign currency? To answer these questions, future work should systematically examine the content of the 163 legal documents I collected.

Additional work might account not only for the role of the IMF, as I do in Chapter 4, but also for the role of the World Bank. Since 1984, the World Bank has funded over 2,300 projects related to energy and extractive industries.[3] In examining how multilateral organizations influence the design of domestic institutions, political scientists and economists tend to focus on the IMF (e.g. Stone 2004; Nooruddin and Simmons 2006; Wei and Zhang 2010; Crivelli and Gupta 2016; Rickard and Caraway 2019; Lee and Woo 2020) – which is understandable, given that the Fund lends money in a more systematic manner than the Bank. Still, a separate study of the World Bank can also be valuable to understand how the international community affects the content of natural resource policy.

In discussing further avenues for future research, I return to the case of Guyana. In 1982, Guyana defaulted on its external debt, which at the time exceeded 214 percent of the GNP (Reinhart and Rogoff 2009). With the exception of a small bond in 1994, the Bank of Guyana did not issue any long-term debt for over three decades. However, in October 2015,

[3] `https://projects.worldbank.org/`

Finance Minister Winston Jordan expressed interest in re-entering bond markets,[4] just five months after ExxonMobil had announced its first oil discovery. Given that oil discoveries are associated with massive inflows of foreign currency, it is not obvious why Winston Jordan would want his country to re-enter bond markets just after striking oil. Could it be that natural resources open doors to global credit markets, allowing countries to enter markets they were never a part of (or re-enter markets after a long absence)? Could Guyana's 2019 Natural Resource Fund Act be an attempt to lure bondholders to Guyana in first place?

What about Ghana, which discovered oil in June 2007 (Bawumia and Halland 2017) and issued its inaugural bond just three months later (Olabisi and Stein 2015)? In April 2011, the Petroleum Revenue Management Act came into force to "regulate the collection, allocation and management by [the] government of petroleum revenue derived from upstream and midstream petroleum operations."[5] In parallel, the Ghanaian Ministry of Finance has issued fixed rate bonds yearly since 2013, and these issues are consistently oversubscribed.[6] Would Ghana issue bonds had it not discovered oil, and would its bonds be consistently oversubscribed had it not passed any natural resource policy? The sequence of events in Guyana and Ghana suggests that it would be fruitful to examine whether countries pass natural resource policy not only to increase their competitiveness in global capital markets and lower the cost of borrowing, as Chapter 5 proposes, but also to enable borrowing in first place.

6.3 Policy Implications and Concluding Remarks

In 2016, one year after discovering oil off the coast of Guyana, ExxonMobil sat down with the government to negotiate an extension of drilling leases that were about to expire. A report by Global Witness (2020) finds that the Guyanese Minister for Natural Resources,

[4]Lucien Chauvin. "Guyana Poised to Return to Bond Market After Two Decade Gap." *Global Capital*. 11 October 2015.

[5]Act 815 Petroleum Revenue Management Act, Article 1. 11 April 2011.

[6]Nikou Asgari. "Ghana Plots 50-Year Bond After 30-Year Flies Off Shelves." *Financial Times*. 21 March 2019. See also Moses Mozart Dzawu. "Ghana Gets $14 Billion of Orders as It Issues 40-Year Eurobond." *Bloomberg*. 4 February 2020.

Raphael Trotman, failed to capitalize on his country's strong bargaining position, instead giving in to Exxon's pressures and signing an unfavorable deal on 27 June. Though experts had advised Trotman to negotiate a 10 to 15 percent royalty for his country, he settled for just 2 percent.[7] Days later, on 30 June, Exxon publicly announced the results of the Liza 2 exploration well and quantified the size of Guyana's oil reserves for the first time: up to 1.4 billion barrels. In the aftermath, Guyanese authorities justified the unfavorable deal as necessary to get oil flowing as quickly as possible, given the expected future decline in global demand for oil.

Like Guyana, most of the world's developing markets depend on the export of non-renewable natural resources, as shown in Chapter 2. It is important to be realistic: this dependence will not disappear overnight. Even as industrialized nations move away from fossil fuels and towards clean energy, an abrupt transition to renewable energy will harm the economy of countries that, like Guyana, have limited alternative sources of revenue. The most important policy implication of my work is the need to promote a gradual energy transition, developing institutions that prolong the benefits of resource wealth and allow countries to use this wealth to invest in non-resource sectors – if not in the short run, then at least in the long run. This highlights the need to equip bureaucrats with the necessary knowledge to negotiate with oil or mining corporations, establish rules for public procurement, stipulate the subnational distribution of resource rents, determine how much of these rents should be saved or spent, and create regulatory bodies that can enforce compliance. In adopting natural resource policy, governments signal their intent to accomplish all of this, even if there is considerable variation in the extent to which these goals can truly be met.

In particular, the case of Guyana merits additional investigation because, along with its neighbor Suriname, it is one of the world's last oil frontiers. Today, these two countries are making decisions that other oil producers already made decades ago. What can Guyanese

[7] Christopher M. Matthews and Kejal Vyas. "World's Biggest New Oil Find Turns Guyana Upside Down." *The Wall Street Journal*. 28 February 2020.

and Surinamese public officials learn from Saudi Arabia, Norway or the US? In Guyana, production began in January 2020, just before the price of crude oil collapsed due to a decline in global demand. How can the strategies identified in my study help Guyanese officials overcome the challenge of managing a large, volatile, and finite source of revenue? "It's too simple to say we have just got to stop exploring," says a former chief executive of BP.[8] But well-designed natural resource policy can ensure that developing countries will be able to stop exploring at some point.

[8]Anjli Raval. "The Last Frontier: Oil Industry Scales Back Exploration." *Financial Times*. 21 July 2020.

Appendices

Appendix A

Data and Dependent Variable

I collected data for the following 87 resource-rich countries:

Afghanistan, Albania, Algeria, Angola, Argentina, Australia, Azerbaijan, Bahrain, Bolivia, Botswana, Brazil, Brunei, Burkina Faso, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Congo, Democratic Republic of the Congo, Ecuador, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Ghana, Guatemala, Guinea, Guyana, India, Indonesia, Iran, Iraq, Ivory Coast, Kazakhstan, Kyrgyzstan, Laos, Liberia, Libya, Malaysia, Mali, Mauritania, Mexico, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nauru, Niger, Nigeria, Norway, Oman, Papua New Guinea, Peru, Philippines, Qatar, Russia, São Tomé e Príncipe, Saudi Arabia, Sierra Leone, South Africa, South Sudan, Sudan, Suriname, Syria, Tanzania, Timor-Leste, Togo, Trinidad and Tobago, Tunisia, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uzbekistan, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe.

Table A.1 lists all country-years in which a national policy was adopted; this information is used to generate the dependent variable for the main analysis. Table A.2 lists countries with supranational policies, while Table A.3 lists subnational entities with policies of their own. Note that countries might pass multiple policies in one same year.

Table A.1: Countries that Adopted Natural Resource Policy at the National Level, With Years of Passage

Country	Year
Algeria	2000
Angola	2010, 2011
Azerbaijan	1999, 2000
Bahrain	2006

Bolivia	2005, 2015
Botswana	1975, 1997, 2003, 2009
Brazil	2010
Brunei	1983
Burkina Faso	2015
Chad	1999, 2003, 2006
Chile	1976, 1981, 2006, 2019
Colombia	2011, 2012
Ecuador	1999, 2000, 2002, 2005, 2006, 2008, 2010, 2018
Equatorial Guinea	2006
Gabon	1998, 2010, 2011
Ghana	2011, 2016, 2018
Guyana	2019
Iran	2000, 2010
Kazakhstan	2000, 2005, 2010, 2014, 2016, 2017
Kuwait	1976, 1982
Laos	2018
Liberia	2009
Libya	2006, 2010
Malaysia	1988
Mauritania	2006, 2008
Mexico	2000, 2001, 2007, 2013, 2014
Mongolia	2010, 2016
Namibia	1996
Nauru	1968
Niger	2010
Nigeria	2007, 2011, 2017
Norway	1990, 2001, 2005
Oman	1980, 2006
Papua New Guinea	1975, 2000, 2012, 2014
Peru	1999, 2002, 2003, 2013
Qatar	2005
Russia	2003, 2006, 2007, 2008, 2009, 2017
São Tomé and Príncipe	2004
Saudi Arabia	1952, 1957, 1971
Sierra Leone	2016
South Sudan	2011, 2012
Sudan	2004, 2005
Suriname	2017
Tanzania	2015
Timor-Leste	2005
Trinidad and Tobago	2007

Turkmenistan	2014, 2018
Uganda	2015, 2016
Venezuela	1999, 2000, 2005

Table A.2: Countries that Adopted Supranational Natural Resource Policy, With Years of Passage

Country	Year
Cameroon	2001, 2016
Central African Republic	2001, 2016
Chad	2001, 2016
Congo	2001, 2016
Equatorial Guinea	2001, 2016
Gabon	2001, 2016

Table A.3: Subnational Entities that Adopted Natural Resource Policy, With Years of Passage

Country	Year
Western Australia, Australia	2012
Alberta, Canada	1976, 2013
Northwest Territories, Canada	2012
Abu Dhabi, United Arab Emirates	1976, 1981, 1984, 1986, 2002, 2017
Dubai, United Arab Emirates	2006
Alabama, USA	1982, 1985, 1992
Alaska, USA	1976
Idaho, USA	1890
Louisiana, USA	1978, 1986
Montana, USA	1976
New Mexico, USA	1927, 1976, 1983, 2010
North Dakota, USA	2010
Texas, USA	1854, 1876
Utah, USA	1894, 2016
West Virginia, USA	2014
Wyoming, USA	1974, 2000, 2015

The empirical analysis in Chapters 3 and 4 excludes the following high income nations: Australia, Bahrain, Canada, Kuwait, Norway, Oman, Qatar, Saudi Arabia, United Arab Emirates, United Kingdom, United States. Brunei and Nauru also drop out of all empirical

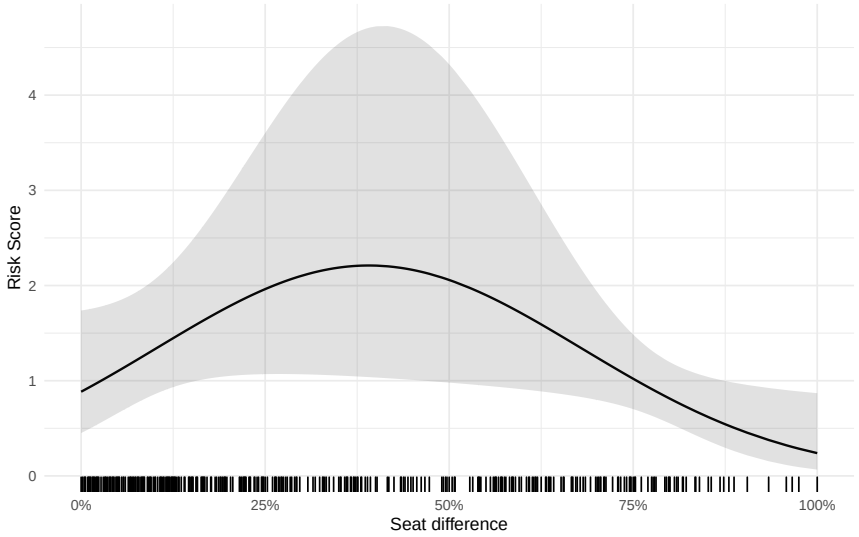
analyses (including those in Chapter 5) due to missing data for the covariates. Finally, I exclude the supranational and subnational policies listed in Tables A.2 and A.3, out of belief that these legal documents are not directly comparable to country-level policy.

Appendix B

Alternative Specifications for Chapter 3

Table B.1 reports the results of three Cox proportional hazards models, which predict the time until a government passes its *first* law. This survival analysis omits all country-years following passage of the first law, as it assumes that countries are no longer at risk once they pass their first natural resource policy. To visualize the results of Model 1, Figure B.1 plots the predicted risk score of *Policy adoption*. While the results of proportional hazard models are equivalent to those of the logistic regressions, I present the logistic regressions (see Table 3.1) in the main text, rather than the survival models, out of belief that governments are permanently at risk of passing new natural resource policy.

Figure B.1: Predicted Risk Score of Policy Adoption



Based on Model 1 of Table B.1, this figure plots the risk score, $exp(x_i\beta)$, which allows us to understand how *Seat difference* and its squared term change the estimated hazard of *Policy adoption* $h(t_i)$ relative to the baseline hazard $h_0(t)$.

Table B.1: Political Determinants of Policy Adoption Around the World, 1975-2018 (Cox Proportional Hazard Models, Yearly Data)

	Dependent variable:		
	Time to policy adoption		
	(1)	(2)	(3)
Seat difference	4.488*		5.690*
	(2.295)		(2.476)
Seat difference^2	−5.723**		−7.079**
	(2.675)		(2.848)
Presidential system		1.095**	1.308**
		(0.531)	(0.618)
Democracy (Polity)			−0.010
			(0.042)
Left executive			−0.389*
			(0.438)
Term limits			−0.073
			(0.544)
Election year			0.196
			(0.386)
Turnover frequency			−0.183
			(0.504)
Resource rents (% GDP)			0.041*
			(0.015)
Field discovery			1.308***
			(0.503)
GDP per capita (log)			0.339***
			(0.074)
GDP growth (%)			−0.056**
			(0.030)
IMF agreement			0.508***
			(0.413)
Crisis			0.347
			(0.647)
W × Policy adoption			−3.779***
			(1.321)
Observations	2,198	2,371	1,914
Log Likelihood	−135.940	−138.352	−106.613

This table reports the results of Cox proportional hazard models, with standard errors clustered by region. The coefficients are reported as hazard rates. *p<0.1; **p<0.05; ***p<0.01

The models in Table B.2 measure political competition not as *Seat difference*, but as the Polity indicator *Polcomp* (Marshall and Gurr 2015), which ranges from 1 (no political organizations or oppositional activity) to 10 (stable and enduring groups regularly competing for political influence). The results are robust to this alternative specification.

Table B.3 replicates the main results of this paper (Table 3.1), but including eleven high income countries (Australia, Bahrain, Canada, Kuwait, Norway, Oman, Qatar, Saudi Arabia, United Arab Emirates, United Kingdom, and United States) that were omitted from the main analysis.

The main results were estimated exclusively with natural resource legislation passed at the national level: the dependent variable *Policy adoption* was calculated using the country-years listed in Table A.1. However, Table A.2 identifies two additional documents adopted by members of the Central African Economic and Monetary Community (CEMAC). Table A.3 identifies 38 additional documents passed by subnational entities in four federations (Australia, Canada, United Arab Emirates, and United States). The models in Table B.4 include these subnational and supranational laws and are very similar to the main results.

Table B.5 distinguishes between earmarks, funds, and fiscal rules. Recall Tanzania's Oil and Gas Revenue Management Act (passed on 4 August 2015), which created a fund, earmarked natural resources for strategic development expenditure, and set limits for the total public expenditure as well as the size of the fiscal deficit. For the Tanzania-2015 country-year pair, the values of *Earmark*, *Fund*, and *Fiscal rule* are all one. Table B.5 suggests that political competition and presidentialism matter most for the creation of earmarks and funds, less so for the creation of fiscal rules.

Finally, Table B.6 presents the results for Latin America using *Executive approval* for the quarter of policy adoption (Model 1) or averaging *Executive approval* over the 6, 9, 12, and 15 months prior to policy adoption.

Table B.2: Political Determinants of Policy Adoption Around the World, 1975-2018 (Penalized Logit, Yearly Data), Using an Alternative Measure of Political Competition

	Dependent variable:		
	Policy adoption		
	(1)	(2)	(3)
Polcomp	0.388**		0.398*
	(0.190)		(0.232)
Polcomp^2	−0.035**		−0.041**
	(0.017)		(0.019)
Presidential system		1.068***	1.051***
		(0.341)	(0.367)
Democracy (Polity)			0.049
			(0.045)
Left executive			−0.402
			(0.279)
Term limits			−0.549
			(0.384)
Election year			0.360
			(0.234)
Turnover frequency			−0.308
			(0.328)
Resource rents (% GDP)			0.027***
			(0.010)
Field discovery			0.855***
			(0.323)
Oil price (USD)			−0.012**
			(0.006)
GDP per capita (log)			0.067*
			(0.037)
GDP growth (%)			0.012
			(0.012)
IMF agreement			0.063
			(0.273)
Crisis			0.344
			(0.417)
W × Policy adoption			−0.651
			(0.657)
Constant	−2.940***	−2.600***	−2.904**
	(0.779)	(0.975)	(1.285)
Observations	2,801	2,928	2,431
Log Likelihood	−347.663	−343.658	−303.152

This table reports the results of penalized likelihood models with third-order polynomials and region-fixed effects. The reported coefficients are log-odds. *p<0.1; **p<0.05; ***p<0.01

Table B.3: Political Determinants of Policy Adoption Around the World, 1975-2018 (Penalized Logit, Yearly Data), Including High Income Countries

	Dependent variable:		
	Policy adoption		
	(1)	(2)	(3)
Seat difference	2.974**		2.869**
	(1.372)		(1.439)
Seat difference^2	−2.739*		−2.739*
	(1.467)		(1.554)
Presidential system		1.172***	0.886***
		(0.314)	(0.339)
Democracy (Polity)			−0.003
			(0.029)
Left executive			−0.360
			(0.257)
Term limits			−0.155
			(0.385)
Election year			0.460**
			(0.223)
Turnover frequency			−0.427
			(0.319)
Resource rents (% GDP)			0.022**
			(0.010)
Field discovery			0.888***
			(0.309)
Oil price (USD)			−0.009
			(0.006)
GDP per capita (log)			−0.00001
			(0.013)
GDP growth (%)			0.003
			(0.013)
IMF agreement			−0.087
			(0.262)
Crisis			0.306
			(0.413)
W × Policy adoption			−0.744
			(0.558)
Constant	−3.023***	−2.517***	−3.469**
	(1.123)	(0.926)	(1.363)
Observations	2,990	3,401	2,667
Log Likelihood	−363.996	−389.363	−324.022

This table reports the results of penalized likelihood models with third-order polynomials and region-fixed effects. The reported coefficients are log-odds. *p<0.1; **p<0.05; ***p<0.01

Table B.4: Political Determinants of Policy Adoption Around the World, 1975-2018 (Penalized Logit, Yearly Data), Including High Income Countries in Addition to Subnational and Supranational Laws

	Dependent variable:		
	Policy adoption		
	(1)	(2)	(3)
Seat difference	2.125*		2.630**
	(1.086)		(1.153)
Seat difference^2	−2.094*		−2.295*
	(1.147)		(1.222)
Presidential system		0.750***	0.634***
		(0.213)	(0.244)
Democracy (Polity)			0.014
			(0.023)
Left executive			−0.405**
			(0.203)
Term limits			0.129
			(0.343)
Election year			0.413**
			(0.180)
Turnover frequency			−0.190
			(0.220)
Resource rents (% GDP)			0.019**
			(0.008)
Field discovery			0.675***
			(0.255)
Oil price (USD)			−0.009**
			(0.004)
GDP per capita (log)			−0.002
			(0.010)
GDP growth (%)			−0.003
			(0.013)
IMF agreement			0.108
			(0.213)
Crisis			0.001
			(0.378)
W × Policy adoption			−0.073
			(0.435)
Constant	−2.683***	−1.822**	−2.867***
	(0.933)	(0.725)	(1.106)
Observations	2,990	3,401	2,667
Log Likelihood	−538.118	−605.838	−493.764

This table reports the results of penalized likelihood models with third-order polynomials and region-fixed effects. The reported coefficients are log-odds. *p<0.1; **p<0.05; ***p<0.01

Table B.5: Political Determinants of Policy Adoption Around the World, 1975-2018 (Penalized Logit, Yearly Data), Including High Income Countries, by Kind of Policy

	Dependent variable:		
	Earmark	Fund	Fiscal rule
	(1)	(2)	(3)
Seat difference	4.709**	4.023***	3.550**
	(2.252)	(1.537)	(1.770)
Seat difference^2	−4.684*	−4.333**	−2.664
	(2.456)	(1.711)	(1.848)
Presidential system	2.413***	1.147***	0.427
	(0.780)	(0.342)	(0.375)
Democracy (Polity)	0.0003	0.023	0.014
	(0.044)	(0.029)	(0.035)
Left executive	0.200	−0.199	−0.306
	(0.352)	(0.250)	(0.298)
Term limits	−0.858	−0.064	−0.380
	(0.549)	(0.416)	(0.449)
Election year	0.564*	0.495**	0.477*
	(0.322)	(0.223)	(0.267)
Turnover frequency	−0.659	−0.386	−0.622
	(0.484)	(0.298)	(0.393)
Resource rents (% GDP)	0.012	0.028***	0.033***
	(0.016)	(0.010)	(0.011)
Field discovery	0.336	0.724**	0.726*
	(0.461)	(0.302)	(0.378)
Oil price (USD)	−0.001	−0.005	−0.011
	(0.008)	(0.006)	(0.007)
GDP per capita (log)	0.019	0.003	0.001
	(0.022)	(0.013)	(0.015)
GDP growth (%)	0.019	0.008	0.0003
	(0.016)	(0.012)	(0.015)
IMF agreement	0.707*	0.005	0.220
	(0.400)	(0.275)	(0.322)
Crisis	0.272	0.167	0.284
	(0.622)	(0.458)	(0.552)
W × Policy adoption	−0.367	−0.617	−0.092
	(0.872)	(0.570)	(0.681)
Constant	−4.628**	−3.180**	−3.538*
	(1.933)	(1.275)	(1.812)
Observations	2,667	2,667	2,667
Log Likelihood	−143.333	−321.191	−229.014

This table reports the results of penalized likelihood models with third-order polynomials and region-fixed effects. The reported coefficients are log-odds. *p<0.1; **p<0.05; ***p<0.01

Table B.6: Political Determinants of Policy Adoption in Latin America, 1975-2018 (Penalized Logit, Quarterly Data), with Executive Approval at Different Periods

	Dependent variable:				
	Policy adoption				
	(1)	(2)	(3)	(4)	(5)
Executive approval (same quarter)	0.018				
	(0.014)				
Executive approval (6 mo.)		0.030**			
		(0.015)			
Executive approval (9 mo.)			0.033**		
			(0.015)		
Executive approval (12 mo.)				0.034**	
				(0.016)	
Executive approval (15 mo.)					0.035**
					(0.016)
Seat difference	1.170	0.697	0.687	0.726	0.805
	(3.552)	(3.502)	(3.490)	(3.487)	(3.483)
Seat difference 2	−3.522	−2.779	−2.739	−2.798	−2.944
	(6.522)	(6.395)	(6.364)	(6.365)	(6.366)
Democracy (Polity)	−0.059	−0.046	−0.043	−0.041	−0.041
	(0.099)	(0.103)	(0.104)	(0.105)	(0.105)
Left executive	−0.209	−0.357	−0.401	−0.420	−0.432
	(0.508)	(0.512)	(0.515)	(0.517)	(0.520)
Election quarter	0.473	0.510	0.516	0.513	0.506
	(0.508)	(0.510)	(0.510)	(0.510)	(0.510)
Turnover frequency	−0.895	−0.818	−0.810	−0.820	−0.836
	(0.674)	(0.668)	(0.666)	(0.664)	(0.663)
Oil production (log)	0.256*	0.250*	0.248*	0.247*	0.249*
	(0.143)	(0.143)	(0.144)	(0.144)	(0.144)
Field discovery	−1.620	−1.557	−1.498	−1.457	−1.417
	(1.425)	(1.423)	(1.424)	(1.418)	(1.420)
Oil price (USD)	0.027**	0.027**	0.026**	0.026**	0.025**
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
GDP per capita (log)	−0.168*	−0.163*	−0.162*	−0.163*	−0.165*
	(0.090)	(0.089)	(0.089)	(0.089)	(0.089)
GDP growth (%)	0.002	−0.006	−0.008	−0.008	−0.008
	(0.046)	(0.047)	(0.048)	(0.048)	(0.048)
IMF agreement	−0.834*	−0.772	−0.755	−0.746	−0.746
	(0.489)	(0.489)	(0.490)	(0.490)	(0.490)
Crisis	1.386	1.399	1.387	1.370	1.334
	(1.025)	(1.026)	(1.027)	(1.028)	(1.029)
W × Policy adoption	−0.922	−1.034	−1.063	−1.072	−1.078
	(0.914)	(0.931)	(0.937)	(0.938)	(0.940)
Constant	−75.450***	−73.910***	−73.905***	−73.698***	−73.976***
	(21.076)	(20.275)	(20.199)	(20.147)	(20.186)
Observations	1,234	1,219	1,209	1,199	1,189
Log Likelihood	−122.002	−121.061	−120.704	−120.656	−120.606

This table reports the results of penalized likelihood models with third-order polynomials and country-fixed effects. The coefficients are reported as log-odds. *p<0.1; **p<0.05; ***p<0.01

Appendix C

Topics and Topic Models for Chapter 4

This appendix presents a brief overview of topic models. The simplest kind of topic model is a latent Dirichlet allocation (LDA), which treats documents as a random mixture over topics. Each topic z_n follows a multinomial distribution

$$z_n|\theta \sim \text{Multinomial}(\theta) \tag{C.1}$$

with

$$\theta|\alpha \sim \text{Dir}(\alpha), \tag{C.2}$$

where θ is the topic proportion for a given document and follows a Dirichlet distribution with parameter α, a k-vector with $\alpha_i > 0$. Each topic z_n is a random mixture over N terms like those in Table 4.3:

$$N|\xi \sim \text{Poisson}(\xi). \tag{C.3}$$

Each of the N terms w_n has the multinomial probability $p(w_n|z_n, \beta)$ of belonging to a topic (Blei, Ng, and Jordan 2003). A single term w_n can belong to multiple topics, since topics are not strictly independent from one another. Only $w_1, w_2, ..., w_N$ are observed; all other variables are latent, hence the model's name. The outcome of interest is θ, that is, how much a topic z_n contributes to any given document.

Eshima, Imai, and Sasaki's (2020) keyword assisted topic model (keyATM), which outperforms the LDA both qualitatively and quantitatively and is used in my study, adopts a similar framework, though it distinguishes between keyword topics and no-keyword topics. Keywords topics are topics I explicitly instruct the model to look for (by providing the keywords in bold), while non-keywords topics are "residual" topics that the model identified on its own. The keyATM is based on a mixture of two distributions: one distribution with positive probabilities for keywords and another with positive probabilities for all words.

Note that one word can belong to multiple topics; for example, the word "government" is associated with fiscal issues, labor issues, financial sector, and the residual category.

Where do the keywords come from? In addition to collecting all IMF conditions between 1980 and 2014, Kentikelenis et al. (2016) also manually code these conditions into 13 different categories. These categories and their corresponding descriptions provide the keywords for the topic model, though I combine similar categories and add a separate category for natural resources (as shown in Table C.1), incorporating information from interviews I conducted with IMF officials in the Fiscal Affairs Department as well as from non-binding recommendations that these officials issued to governments in annual Article IV Consultations.

Because pre-processing decisions can be arbitrary and misleading (Denny and Spirling 2018; Schofield et al. 2017), I deliberately undertake as little pre-processing as possible. I remove stopwords, punctuation, numbers, and symbols, but do not stem words and do not remove infrequent terms.

Table C.1: Topics in My Analysis and Categories in Kentikelenis et al. (2014)

Topic in My Analysis	Five Most Common Words Identified by Topic Model	Corresponding Category in Kentikelenis et al. (2014)
Natural resources	prices, **petroleum**, price, **oil**, percent	–
Fiscal issues	**tax**, **budget**, law, government, public	Fiscal issues Revenue and tax issues
Labor issues	civil, service, government, **payroll**, **wage**	Labor issues
State-owned enterprises	**privatization**, **enterprises**, **sale**, **companies**, bank	State-owned enterprise reform and pricing State-owned enterprise privatization
External debt issues	**debt**, **arrears**, domestic, net, long-term	External debt issues
Financial sector	**bank**, **banks**, financial, government, **audit**	Financial sector, monetary policy, central bank issues
Social policy	**health**, **social**, security, **education**, plan	Redistributive policies Social policy
Trade	percent, **exchange**, rate, foreign, **import**	External sector (trade and exchange system)
Residual category	credit, government, public, sector, money	Institutional reforms Land and environment Residual category

Appendix D

Alternative Specifications for Chapter 4

Though the main models in Chapter 4 include all kinds of IMF conditionality, only conditions classified as prior actions (PA), quantitative performance criteria (QPC), or structural performance criteria (SPC) are typically binding (Kentikelenis et al. 2016). Table D.1 presents the results when including only these kinds of conditions.

Table D.2 presents the results of survival models. The dependent variable measures the time until event occurrence (that is, until passage of the first *Short-term policy* or *Long-term policy*), whereas the coefficients represent time-dependent hazard rates. As discussed in the main text, program participation alone has no meaningful impact on the passage of the inaugural policy. The prevalence of *Topic 2* increases the odds of policy passage and the prevalence of *Topic 1* does not, as indicated by the positive and significant hazard rate for the former and the negative and non-significant hazard rate for the latter.

Finally, Table D.3 presents the results of instrumental variables estimation. Year fixed effects are included, but country fixed effects are omitted because their inclusion would reduce the F statistic below the acceptable threshold of 10. Following the advice of Angrist and Pischke (2009), these models are estimated using two-stage least squares (2SLS)[1] and substantiate some of the main findings of this study. In particular, they highlight how the effect of IMF conditionality is itself highly conditional on the ideal point distance between the

[1]Since the outcome of interest (natural resource policy adoption) is discrete, one could quantify the endogenous effects of program participation and conditionality using instrumental probit models, estimated with maximum likelihood. However, when paired with fixed effects, this estimation strategy would drop all homogeneous groups (Beck 2020), and there is no straightforward penalized approach that accounts for endogenous variables. For this reason, I use 2SLS to ensure that all years are included, even those that did not experience the event. The downside of using a linear method to predict a discrete outcome of interest is that the effect sizes are harder to interpret, as the predicted probabilities are often out of bounds (that is, they are greater than one or less than zero).

borrowing country and the US. These models also identify meaningful differences between short- and long-term policy; for instance, the former is influenced by extant legislation in a manner that the latter is not. Still, these results should not be viewed as confirmatory due to the absence of country fixed effects, which would otherwise control for unobserved heterogeneity at the national level.

Table D.1: The Effect of IMF Program Participation and Conditionality on Natural Resource Policy, Using Only Binding Conditions 1980–2019 (Penalized Logit)

	Dependent variable:			
	Short-Term Policy		Long-Term Policy	
	(1)	(2)	(3)	(4)
Topic 1: natural resources	0.764	−4.555	2.410	28.992*
	(1.869)	(13.242)	(2.402)	(15.078)
Topic 2: fiscal issues	1.012	−1.751	1.459*	−18.805**
	(0.670)	(4.841)	(0.809)	(7.507)
Voting with US	1.065**	1.197***	−0.244	0.548
	(0.419)	(0.451)	(0.537)	(0.597)
Voting with US × Topic 1		−1.726		8.276*
		(4.212)		(4.726)
Voting with US × Topic 2		−0.918		−6.190***
		(1.572)		(2.277)
Previous short-term policy = 1	−1.483***	−1.482***	0.151	0.161
	(0.431)	(0.430)	(0.658)	(0.654)
Previous long-term policy = 1	−0.553	−0.593	−3.185***	−3.230***
	(0.564)	(0.563)	(0.717)	(0.711)
Resource rents (% GDP)	0.015	0.014	0.044**	0.035*
	(0.015)	(0.015)	(0.021)	(0.021)
GDP per capita (log)	0.705*	0.704*	2.440***	2.063***
	(0.390)	(0.389)	(0.567)	(0.557)
GDP growth (%)	0.014	0.013	0.023	0.018
	(0.013)	(0.013)	(0.015)	(0.015)
Field discovery = 1	0.717*	0.715*	0.675	0.739
	(0.378)	(0.378)	(0.546)	(0.544)
Oil price (USD)	−0.020***	−0.020***	−0.031***	−0.027***
	(0.007)	(0.007)	(0.010)	(0.009)
Crisis = 1	−0.044	−0.047	0.355	0.346
	(0.487)	(0.486)	(0.664)	(0.675)
Democracy (Polity)	−0.035	−0.038	0.005	0.017
	(0.054)	(0.054)	(0.070)	(0.071)
Constant	−0.426	−0.020	3.878	4.859
	(2.820)	(2.831)	(3.404)	(3.420)
Observations	2,377	2,377	2,377	2,377
Log Likelihood	−218.758	−219.095	−89.726	−88.067

This table reports the results of penalized likelihood models with third-order polynomials and country fixed effects. Coefficients represent log odds. *p<0.1; **p<0.05; ***p<0.01.

Table D.2: The Effect of IMF Program Participation and Conditionality on Natural Resource Policy, 1980–2019 (Cox Proportional Hazards Model)

	Dependent variable:					
	Time to First Short-Term Policy			Time to First Long-Term Policy		
	(1)	(2)	(3)	(4)	(5)	(6)
Program participation = 1	0.614			0.601		
	(0.424)			(0.613)		
Topic 1: natural resources		−5.519	19.756		−2.634	12.116
		(5.301)	(23.004)		(6.551)	(28.956)
Topic 2: fiscal issues		2.725***	−8.819		2.672*	−27.723**
		(0.980)	(6.813)		(1.389)	(12.900)
Voting with US	−0.208	−0.305	0.133	0.062	−0.049	1.211
	(0.394)	(0.393)	(0.507)	(0.572)	(0.566)	(0.759)
Voting with US × Topic 1			7.872			4.959
			(7.508)			(9.276)
Voting with US × Topic 2			−3.581*			−9.595**
			(2.065)			(3.930)
Resource rents (% GDP)	0.029**	0.030**	0.030**	0.048**	0.047**	0.061***
	(0.013)	(0.013)	(0.013)	(0.020)	(0.019)	(0.022)
GDP per capita (log)	0.566***	0.645***	0.692***	0.664**	0.767**	0.897***
	(0.197)	(0.204)	(0.210)	(0.304)	(0.314)	(0.345)
GDP growth (%)	0.014	0.012	0.010	0.020	0.020	0.015
	(0.017)	(0.017)	(0.018)	(0.016)	(0.016)	(0.016)
Field discovery = 1	0.829*	0.806	0.864*	0.574	0.568	0.500
	(0.492)	(0.491)	(0.495)	(0.779)	(0.784)	(0.782)
Crisis = 1	0.345	0.496	0.577	0.160	0.114	0.286
	(0.656)	(0.668)	(0.664)	(1.089)	(1.091)	(1.103)
Democracy (Polity)	0.031	0.022	0.020	0.124**	0.109*	0.119*
	(0.037)	(0.038)	(0.038)	(0.058)	(0.059)	(0.063)
Observations	2,020	2,020	2,020	2,230	2,230	2,230
Log Likelihood	−115.049	−112.535	−110.855	−59.277	−58.037	−53.734

This table reports the results of Cox proportional hazards models. Coefficients represent time-dependent hazard rates. *p<0.1; **p<0.05; ***p<0.01.

Table D.3: The Effect of IMF Program Participation and Conditionality on Natural Resource Policy, 1980–2019 (2SLS)

	Dependent variable:					
	Short-Term Policy			Long-Term Policy		
	(1)	(2)	(3)	(4)	(5)	(6)
Program participation	0.020	0.074**	0.063*	0.002	−0.033	−0.043**
	(0.016)	(0.035)	(0.036)	(0.009)	(0.020)	(0.021)
Topic 1: natural resources		−0.370	1.037		−0.059	0.149
		(0.240)	(1.306)		(0.137)	(0.745)
Topic 2: fiscal issues		−0.112	−0.625**		0.115**	−0.179
		(0.086)	(0.267)		(0.049)	(0.152)
Voting with US	0.002	0.001	0.011	0.001	0.002	0.012*
	(0.007)	(0.008)	(0.012)	(0.004)	(0.004)	(0.007)
Voting with US × Topic 1			0.439			0.056
			(0.411)			(0.234)
Voting with US × Topic 2			−0.168**			−0.098**
			(0.085)			(0.049)
Previous short-term policy = 1	0.052***	0.048***	0.046***	−0.003	−0.0005	−0.001
	(0.010)	(0.011)	(0.011)	(0.006)	(0.006)	(0.006)
Previous long-term policy = 1	−0.031**	−0.030**	−0.035**	0.007	0.004	0.0001
	(0.013)	(0.013)	(0.014)	(0.007)	(0.008)	(0.008)
Resource rents (% GDP)	0.001*	0.001**	0.001**	0.0005***	0.0004***	0.0004**
	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0002)	(0.0002)
GDP per capita (log)	0.010**	0.008*	0.010**	0.003	0.005*	0.006**
	(0.004)	(0.004)	(0.005)	(0.002)	(0.003)	(0.003)
GDP growth (%)	0.0003	0.0002	0.0002	0.001**	0.001**	0.001**
	(0.0005)	(0.0005)	(0.0005)	(0.0003)	(0.0003)	(0.0003)
Field discovery = 1	0.025**	0.027**	0.028**	0.008	0.004	0.005
	(0.013)	(0.013)	(0.013)	(0.007)	(0.007)	(0.007)
Oil price (USD)	0.0004	0.001	0.001	−0.0002	−0.0004	0.00001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Crisis = 1	0.0002	0.0005	0.0004	0.001	0.0003	0.0002
	(0.001)	(0.001)	(0.001)	(0.0003)	(0.0004)	(0.0004)
Democracy (Polity)	0.003	0.001	0.002	0.002	0.003	0.004
	(0.012)	(0.013)	(0.013)	(0.007)	(0.007)	(0.007)
Constant	−0.012	−0.023	−0.007	0.0002	0.007	0.022
	(0.047)	(0.048)	(0.049)	(0.027)	(0.027)	(0.028)
Observations	2,420	2,420	2,420	2,420	2,420	2,420
F stat for participation instrument	630.028	210.367	127.436	630.028	210.367	127.436
F stat for topic 1 instrument		171.291	105.627		171.291	105.627
F stat for topic 2 instrument		248.267	150.858		248.267	150.858

This table reports the results of 2SLS regressions with year fixed effects.
*p<0.1; **p<0.05; ***p<0.01.

Appendix E

MSCI Ratings as of December 2019

Developed markets: Australia, Canada, Norway, United Kingdom, United States.

Emerging markets: Argentina, Brazil, Chile, China, Colombia, Egypt, India, Indonesia, Malaysia, Mexico, Philippines, Peru, Qatar, Russia, Saudi Arabia, South Africa, United Arab Emirates.

Frontier markets: Bahrain, Bangladesh, Burkina Faso, Ivory Coast, Kazakhstan, Kuwait, Lebanon, Mali, Morocco, Niger, Nigeria, Oman, Togo, Tunisia, Vietnam.

Standalone markets: Botswana, Trinidad and Tobago, Ukraine, Zimbabwe.

Unrated markets: Afghanistan, Albania, Algeria, Angola, Azerbaijan, Bolivia, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Ecuador, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Ghana, Guatemala, Guinea, Guyana, Iran, Iraq, Kyrgyz Republic, Laos, Liberia, Libya, Mauritania, Mongolia, Mozambique, Myanmar, Namibia, Papua New Guinea, São Tomé e Príncipe, South Sudan, Sudan, Suriname, Syria, Tanzania, Timor Leste, Turkmenistan, Uganda, Ukraine, Uzbekistan, Venezuela, Yemen, Zambia.

Appendix F

Alternative Specifications for Chapter 5

An alternative to Cox proportional hazards model is the Weibull model, which allows for more flexible baseline hazards and time-dependent hazards (that is, non-proportional effects). Table F.1 presents the results of such alternative specifications. The results are substantively and statistically similar to those presented in Chapter 5, though the effect sizes are different.

While the distributed lag models in Tables 5.2 and 5.3 include multiple lags of *Policy adoption*, Tables F.2 and F.3 present alternative specifications with only one lag at a time. The results are largely similar.

Table F.1: Competition for Capital and Policy Adoption Around the World, 1990-2019 (Weibull-Distributed Accelerated Failure Time Models, Monthly Data)

	Dependent variable:		
	Time to policy adoption		
	(1)	(2)	(3)
	All countries	*All countries*	*Unrated countries*
Competition (region)	2.768***		
	(0.438)		
Competition (MSCI)		1.179*	2.065***
		(0.473)	(0.320)
Democracy (Policy)	−0.007	−0.009	−0.009
	(0.007)	(0.008)	(0.009)
Left executive	0.091	0.115	0.024
	(0.100)	(0.100)	(0.074)
Election year	−0.067	−0.084	−0.013
	(0.084)	(0.083)	(0.064)
Resource rents (% GDP)	−0.008	−0.010*	−0.004
	(0.005)	(0.004)	(0.003)
Field discovery	−0.220**	−0.235***	−0.109
	(0.075)	(0.067)	(0.078)
GDP per capita (log)	0.006	0.006	−0.012**
	(0.004)	(0.004)	(0.004)
GDP growth (%)	−0.002	−0.002	−0.002
	(0.004)	(0.004)	(0.003)
IMF agreement	−0.146	−0.121	−0.077
	(0.082)	(0.092)	(0.059)
Crisis	−0.105	−0.114	−0.129
	(0.152)	(0.168)	(0.160)
Constant	7.215***	7.365***	6.622***
	(0.469)	(0.485)	(0.583)
Log(scale)	−1.455***	−1.379***	−1.741***
	(0.271)	(0.258)	(0.467)
Observations	18,936	18,936	13,645
Log Likelihood	−424.411	−427.238	−320.987

This table reports the results of Weibull-distributed accelerated failure time models, with standard errors clustered by region. The coefficients are reported as hazard rates. *p<0.1; **p<0.05; ***p<0.01

Table F.2: Policy Adoption and Treasury Bill Rates Around the World, 1990-2019 (Ordinary Least Squares, Monthly Data)

	Dependent variable:						
	Treasury rate (log)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Policy adoption (same month)	0.192*						
	(0.101)						
Policy adoption (previous month)		0.152					
		(0.101)					
Policy adoption (1 year prior)			0.104				
			(0.064)				
Policy adoption (2 years prior)				0.101			
				(0.070)			
Policy adoption (3 years prior)					−0.064		
					(0.094)		
Policy adoption (4 years prior)						−0.225**	
						(0.099)	
Policy adoption (5 years prior)							−0.365***
							(0.132)
Democracy (Polity)	−0.033***	−0.033***	−0.034***	−0.034***	−0.032***	−0.031***	−0.031***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Left executive	−0.289***	−0.288***	−0.288***	−0.288***	−0.287***	−0.286***	−0.280***
	(0.059)	(0.059)	(0.057)	(0.059)	(0.059)	(0.058)	(0.050)
Election year	0.015	0.015	0.016	0.018	0.015	0.013	0.020
	(0.018)	(0.018)	(0.017)	(0.018)	(0.017)	(0.020)	(0.019)
Resource rents (% GDP)	−0.025***	−0.025***	−0.025***	−0.025***	−0.025***	−0.025***	−0.024***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.008)
Field discovery	−0.067	−0.067	−0.065	−0.063	−0.066	−0.057	−0.059
	(0.073)	(0.073)	(0.073)	(0.072)	(0.075)	(0.073)	(0.078)
GDP per capita (log)	−0.058***	−0.058***	−0.058***	−0.059***	−0.059***	−0.059***	−0.058***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
GDP growth %)	0.002	0.002	0.002	0.002	0.001	0.004	0.007
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Oil price (USD)	−0.009***	−0.009***	−0.009***	−0.009***	−0.009***	−0.009***	−0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
IMF agreement	0.095**	0.095**	0.091**	0.095**	0.093**	0.099**	0.097***
	(0.042)	(0.042)	(0.041)	(0.041)	(0.043)	(0.044)	(0.037)
Crisis	0.211**	0.211**	0.216***	0.206**	0.210**	0.216***	0.253***
	(0.083)	(0.083)	(0.080)	(0.082)	(0.084)	(0.078)	(0.081)
Observations	10,435	10,435	10,435	10,426	10,402	10,363	10,323
R^2	0.374	0.374	0.374	0.375	0.374	0.377	0.380

This table reports the results of linear regressions, with country and time fixed effects as well as standard errors clustered by region. *p<0.1; **p<0.05; ***p<0.01

Table F.3: Policy Adoption and Treasury Bill Rates for Unrated Countries, 1990-2019 (Ordinary Least Squares, Monthly Data)

	Dependent variable:						
	Treasury rate (log)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Policy adoption (same month)	0.289						
	(0.197)						
Policy adoption (previous month)		0.347***					
		(0.083)					
Policy adoption (1 year prior)			0.274***				
			(0.030)				
Policy adoption (2 years prior)				0.265***			
				(0.044)			
Policy adoption (3 years prior)					−0.057		
					(0.049)		
Policy adoption (4 years prior)						−0.491***	
						(0.056)	
Policy adoption (5 years prior)							−0.757***
							(0.066)
Democracy (Polity)	−0.026***	−0.026***	−0.026***	−0.025***	−0.025***	−0.025***	−0.025***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Left executive	−0.453***	−0.453***	−0.462***	−0.456***	−0.452***	−0.446***	−0.438***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.026)	(0.027)
Election year	0.028*	0.028	0.026	0.032*	0.030*	0.022	0.030*
	(0.017)	(0.017)	(0.017)	(0.018)	(0.018)	(0.018)	(0.018)
Resource rents (% GDP)	−0.027***	−0.027***	−0.027***	−0.028***	−0.027***	−0.026***	−0.026***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Field discovery	0.064***	0.063***	0.058***	0.056***	0.062***	0.099***	0.100***
	(0.018)	(0.020)	(0.019)	(0.019)	(0.018)	(0.017)	(0.014)
GDP per capita (log)	−0.092***	−0.092***	−0.096***	−0.093***	−0.092***	−0.094***	−0.096***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
GDP growth (%)	−0.005***	−0.005***	−0.004***	−0.005***	−0.007***	−0.003*	−0.003*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Oil price (USD)	−0.009***	−0.009***	−0.009***	−0.009***	−0.009***	−0.009***	−0.009***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
IMF agreement	0.074***	0.075***	0.063***	0.070***	0.076***	0.086***	0.083***
	(0.011)	(0.011)	(0.011)	(0.009)	(0.010)	(0.010)	(0.009)
Crisis	0.159***	0.159***	0.169***	0.173***	0.155***	0.178***	0.263***
	(0.027)	(0.027)	(0.026)	(0.026)	(0.028)	(0.028)	(0.040)
Observations	6,508	6,508	6,508	6,499	6,475	6,436	6,396
R^2	0.331	0.331	0.334	0.334	0.332	0.340	0.351

This table reports the results of linear regressions, with country and time fixed effects as well as standard errors clustered by region. *p<0.1; **p<0.05; ***p<0.01

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