REVERSAL OF THE RESOURCE CURSE? NEGATIVE REVENUE SHOCKS AND DEVELOPMENT IN RUSSIA AND BEYOND

by

Delgerjargal Uvsh

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The dissertation is approved by the following members of the Final Oral Committee:
    Yoshiko Herrera, Professor, Political Science, UW–Madison
    Scott Gehlbach, Professor, Political Science and Public Policy, University of Chicago
    Rikhil Bhavnani, Associate Professor, Political Science and Public Affairs, UW–Madison
    Paul Dower, Assistant Professor, Agricultural and Applied Economics, UW–Madison

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Chapter 1

Introduction: Examining the Effect of Negative Shocks to Resource Revenues on Business Activities

Volatility has been a key characteristic of commodity markets and, therefore, a major problem for the economies of countries that derive significant portions of their revenues from natural resources. Some of the volatility can be attributed to price variability, as global supply and demand of resources shift. For instance, the price of oil, arguably the most critical resource in modern times, has become notably more unstable since 1974 compared to the period prior to 1974 and increasingly so since 2003. Disruptions in supply chains and unforeseen political turmoils have also shaken commodity markets in the past. Depletion of readily available resources is expected to only increase the vacillation that comes with resource dependence. The International Energy Agency acknowledged in 2011 that almost half of the oil necessary to satisfy global demand by 2035 is "yet to be found and yet to be developed." Experts also estimate that critical mineral reserves will be in short supply, leading some to claim that we will live in a "resource-shock world" in the foreseeable future. This all implies that economies that depend on resource revenues face an increasingly uncertain future.

How does resource revenue volatility affect the economies of resource-dependent countries, particularly their private sector and businesses? What actions do governments take to deal with revenue shocks and how do their choices affect business activities? The literature on the "resource curse" in political science and economics provides us with a wealth of knowledge about how resource-rich countries handle one side of volatility—positive shocks. When a country receives windfall income from natural-resource exploitation,

businesses and the investment environment tend to suffer, as state institutions weaken and rent-seeking and corruption increase. In comparison, we know relatively little about the effects of the other side of resource-based volatility—what happens to economic outcomes, especially business activity, when resource revenues decline?

This dissertation explores this understudied aspect of resource dependence. I argue that negative shocks to resource-producing countries can serve as moments of change and that government policies play an important role in determining the effects of negative shocks on economic outcomes. I propose a theory of negative revenue shocks. In my theory, the effect of negative shocks to resource revenues on economic development depends on whether political elites of the resource-dependent country perceive the shock to be permanent or temporary. If the shock is long-lasting, elites have an incentive to compensate for lost revenues in the long run and, consequently, improve the institutional environment and increase support for private economic activities. In contrast, when the decline in resource revenues is expected to be temporary, elites lack such an incentive and divest from the business environment, as they make up for the shock in ways that worsen the institutional support for businesses.

I support this theory with evidence comparing the experiences of Russia's oil- and gas-producing regions following two negative revenue shocks. The first shock resulted from a tax reform in 2002 that centralized almost all of regional revenues from oil and gas to the federal government and thus considerably shrank the budgets of Russia's oil- and gas-producing regions. I compare the effect of this institutionalized negative shock with that of a negative shock post-2014, which was caused by an oil and gas price decline. I show that the first shock led to improvements in oil- and gas-producing regions' business and institutional environment and, consequently, increased the level of private investment in fixed capital and small business entry. In contrast, the post-2014 shock did not stimulate such positive changes. Rather, this shock may have harmed the institutional environment and private business activities.

I explore the mechanisms behind these statistical findings with a case study of two resource-rich regions in Russia, Tyumen' and Tatarstan. These regions are vastly dissimilar in terms of their political, business, and social structures, but both suffered considerable fiscal declines in 2002, when the federal government centralized natural resource revenues, and in 2014, when the price of oil and gas sank. The regional governments saw the former as a permanent policy shift and the latter as a temporary swing in the global oil and gas market. Consequently, after 2002, Tyumen' and Tatarstan both offered tax benefits to a range of firms, strengthened their infrastructure for business support, improved their interaction with the private sector, reduced the administrative burden, and utilized opportunities to channel federal grants to business development. They did not make similar improvements after the commodity price shock of 2014. In fact, some of the policies that benefited the private sector after the first shock seem to have been reversed and the administrative burden in particular appears to have increased after 2014.

In addition to proposing and testing a theory of negative revenue shocks, this dissertation examines another critical, yet unexamined, component of resource dependence—the assumption that negative and positive shocks to resource revenues have symmetric effects on economic outcomes. Underlying many theoretical and empirical studies of the political economy of the "resource curse" is the assumption that whatever happens during resource booms is reversed during resource busts. To test the validity of this assumption, I estimate the average short-term effects of negative shocks to various types of resource revenues on economic freedom and broad institutions in a cross-national setting. In this part of the dissertation, I apply a first-differences model to panel data and find that negative shocks are generally associated with improvements in institutions and economic freedom. Interestingly, positive shocks also appear to have a statistically significant *positive* relationship with economic freedom and institutions.

This dissertation contributes to broad questions of critical importance related to the dynamics of the political economy of natural resources, informing our understanding of

the conditions for incentive changes in resource-rich governments and in state-business relations. The dissertation points out that the distortion of government incentives that result from a sudden and massive increase in resource revenues can be at least partially offset during negative shocks to resource income as long as decision-makers expect the shock to last. It also reveals that the dynamics of resource dependence may have divergent effects on the national versus subnational level, as in the case of Russia.

This dissertation uses a diversity of methods to analyze the economic impact of negative revenue shocks. In the study of Russian regions, I apply a difference-in-differences model to region-level quantitative data on private investment in fixed capital, small business entry, employment in the manufacturing sector, and loans granted to entrepreneurs to estimate the economic effects of the two negative revenue shocks in oil- and gas-producing regions. I then use statistical data on investment climate and governance quality to ascertain the mechanisms connecting negative revenue shocks and economic outcomes. The quantitative analysis is supplemented by a case study of Tatarstan and Tyumen, which are chosen following the logic of most different cases. The case study is built on qualitative data from 32 interviews I conducted in these regions and Moscow as well as local news sources, government documents, and scholarship.

In the cross-national analysis, I employ a first-differences model to panel data on Economic Freedom of the World and Polity IV scores as well as data on resource revenues from various types of natural resources—oil, gas, coal, and metals. I also use relatively new data on direct measure of non-tax revenues from the International Centre for Taxation and Development.

The remaining chapters of the dissertation proceed as follows. In Chapter 2, I review the literature on the relationship between resource wealth and development and highlight several areas that have been under-developed. Drawing lessons from relevant literature on the effects of broader economic shocks, I lay out my theory of negative revenue shocks in resource-rich countries. Chapter 3 describes the nature of the two negative shocks that

are examined in the context of Russian regions and examines their effects quantitatively. Chapter 4 provides qualitative evidence to show that regional governments viewed the two shocks differently and, as a result, adopted different sets of policies towards businesses following the two shocks. Chapter 5 is the cross-national chapter, which uses country-level data to demonstrate that the average short-term policy effects of both negative and positive shocks to various types of resource revenues have been positive. I summarize the implications of the findings of this dissertation and offer some concluding thoughts in Chapter 6.

Chapter 2

Negative Shocks to Resource Revenues, Fiscal Incentives, and Economic Development

2.1 Introduction

What is the effect of natural resources on economic development? This has, perhaps, been one of the most persistent questions in development economics and political economy. Decades of research have provided the fields with many important insights, but they have also demonstrated that it is difficult to answer this question conclusively. Initially, scholars viewed natural resource exploitation as a boon to the economy, since it could provide the capital necessary to undertake large-scale industrialization (Wick and Bulte, 2009). This optimistic view soon gave way to studies that suggested that resource-rich countries often grow more slowly than their resource-poor counterparts (Auty 1993, Sachs and Warner 2001), due to distortions in economic mechanisms and political incentives. A common thread running through many of these works is their particular focus on the onset of the "resource curse," as they ask what happens to the economic mechanisms and political economy incentives when a country experiences windfall revenues from extraction of commodities.

In contrast, our understanding of how the "resource curse" could be effectively addressed is limited, despite the considerable number of countries facing difficulties in turning their resource wealth into sustained growth. The implication of the existing literature ap-

pears to be that a country cannot change its path, once it is in a "curse" equilibrium. Not only is it a dire outlook from a policy standpoint, but it also rings inaccurate from empirical perspective. Several countries dependent on oil exports successfully re-structured their economies, diversifying horizontally within the resource sector and vertically beyond the hydrocarbon sector in the past. Notable examples include Mexico and Malaysia and their diversification efforts translating into better economic growth. An important observation regarding these examples is that these re-structuring efforts took place in times of dwindling oil revenues. Therefore, the over-concentration of the literature on the onset and perpetuation of the "resource curse" is perhaps the result of the fact during the past three decades, when the literature burgeoned, key commodity prices tended to stay up, leading to more periods of resource booms than busts.

This dissertation contributes to the "resource curse" literature by exploring the effects of negative shocks to natural resource revenues on economic activities. Specifically, it proposes that negative revenue shocks—declines in natural resource revenues—can trigger moments of change that can re-position incentives to promote growth in resource-rich countries and potentially reverse the economic "curse" of natural resources. However, the effect of negative revenue shocks on economic development depends on how long political elites expect the revenue decline to last. Based on their perception of the shock, elites select their strategies to weather the shock, either attempting to expand their tax base through various policy instruments or resorting to survival strategies. As a result of their policy choices, private economic activities, the fundamental determinant of economic growth, either thrive or decline.

I take Russia as a critical case to illustrate the applicability of the theory. Russia is not generally known to be a country that has successfully diversified away from natural resources. In fact, it is often criticized for being a classical case of over-dependence on oil and gas that is locked in a perpetual political and economic dependence on the resource sector (Gaddy and Ickes 2013, Guriev and Zhuravskaya 2010, EBRD 2009). When national-level

data and context are considered, this conclusion is rather accurate. However, the interesting regional variation in resource dependence points to a more complicated picture, as this dissertation shows. Varying degrees and types of negative shocks lead the governments of resource-rich regions to use their authority to make differing choices in their policies and, subsequently, point economic activities in different directions.

In this chapter, I first review the literature on the relationship between resource revenues and development and demonstrate the need to study the political-economy effects of negative shocks on business activities and the business environment. The theory I propose is laid out in the second section, which builds on insights from the relevant literature on broader economic downturns, institutional changes, and economic reforms. I discuss the scope conditions of the theory in the third section. The last section summarizes and concludes.

2.2 Natural resources and economic development

The literature that explores how natural resources change the trajectory of economic development highlights two broad mechanisms—one related to the economy and one to the political economy.

Economic mechanisms

A downward trend and volatility in world commodity prices are two traditional economic forces argued to hinder economic development in resource-dependent countries. Prebisch (1950) and Singer (1950) suggested that world demand for natural resources is inelastic to income—as the world gets richer, it will spend a lower fraction of its wealth on basic necessities, such as natural resources. Therefore, in the long-run, natural resource prices will decline, depressing the economies of countries that depend on them. Others point out that it is not necessarily this trend, but rather the volatility of global market prices that makes resource dependence undesirable for economic growth. Prices of oil and gas are the most volatile among primary products, with aluminum and copper following close

behind (Frankel, 2012). Economies exporting their endowments in commodities suffer from frequent declines in their macroeconomic indicators (Blattman, Hwang and Williamson, 2007).

Further, a country may suffer from the "Dutch disease" when it draws a significant part of its revenues from commodity exports. This refers to a phenomenon of substantial appreciation of the exporter's currency that increases prices of non-traded goods and subsequently shifts labor and capital from the non-traded sectors to the resource sector (Edwards 1986, Chen and Rogoff 2003). Crowding out of the non-traded sector, which is assumed to have positive externalities for long-term growth, undermines growth prospects.

Political economy mechanisms

The body of literature that this dissertation more directly engages with is on how resource booms affect development through political economy mechanisms. This literature broadly concludes that positive shocks to revenues from natural resource exploitation erode institutions through various channels, which in turn have deleterious effects on the economy. Revenue windfalls induce rent-seeking behavior by giving politicians larger budgets to control and more room to steal (Humphreys et al., 2007). Opportunities to seek rents may also incentivize politicians to dismantle existing institutions of the state (Ross, 2001*b*). The extractive capacity of the state also suffers from high levels of resource revenues (Chaudhry, 1997). The quality of bureaucracy seems to deteriorate in the presence of high resource revenues, as they motivate lower-quality candidates to compete for and win public offices (Brollo et al., 2013) and resource-rich governments tend to be less likely to invest in state bureaucratic capacity (Besley and Persson, 2010). These negative effects of resource dependence might accumulate over time (De Rosa and Iootty, 2012).

Corruption, in particular, has attracted intense scholarly attention in the "resource curse" literature. Countries deriving higher proportions of their revenues from mineral resources tend to experience higher levels of corruption (Leite and Weidmann, 1999). In a context of weak institutions, windfall income from resources may trigger a "voracity effect,"

which refers to groups competing for the windfall and consequently harming prospects of economic development (Tornell and Lane, 1999). An increase in resources is likely to increase the willingness to engage in corrupt behavior not only of politicians and powerful groups, but also of ordinary citizens (Cappelen et al., 2018). Corruption induced by a revenue shock hinders allocation of newfound resources to productive activities, as money often first goes to patronage and embezzlement (Caselli and Michaels, 2013).

Opportunities in the literature

Although these two camps of research have taught us a lot about the "resource curse," they leave many important questions unanswered. In the studies reviewed above, the main mechanism connecting natural resource endowment to undesirable institutional and economic outcomes is the positive revenue shocks that political and economic actors experience due to windfall income from natural resource exploitation. In other words, many studies theoretically and empirically focus on how and under what conditions an *increase* in unearned revenues may affect economic development. In comparison, we know little about how negative revenue shocks or a *decrease* in natural resource income impact economic activities. Given the empirical observation that structural economic changes tend to happen during times of declining oil revenues (Baffes et al., 2015), we may be missing an opportunity to understand an important moment of change by exclusively focusing on the effects of an increase in resource revenues.

One reason behind this singular focus on positive revenue shocks appears to be that many studies assume positive and negative shocks affect economic outcomes symmetrically. Some theoretical work on the effects of windfalls on institutions is explicit about this assumption and their intent to focus on an increase in revenues, such as Tornell and Lane (1999). Economics research on the Dutch disease and crowding out of non-tradable sectors touches on what may happen for transaction costs when a country's currency depreciates due to a decline in commodity export, but it is only hypothesized and not rigorously examined either theoretically or empirically. Similarly, in most empirical studies, this

assumption is implicit, with a few recent exceptions (e.g., Zakharov (2020)). Cross-country quantitative tests especially rely on the assumption that the dynamics of the relationship between resource reliance and economic development are the same in the case of both negative and positive shocks and thus that a reduction in windfall revenues may lead to a reversal of the undesirable effects brought on by positive shocks. The validity of this assumption has not been examined, though it is of scholarly interest and has important implications for policy aimed at remedying the maladies of resource dependence.

Another opportunity I see in the "resource curse" literature is that most studies measure the dependent variable—economic development—in aggregate terms. Most-often used measures include levels of GDP per capita and economic growth. Disaggregated measures of economic activities—particularly activities of institutions pertaining to doing business—have not been extensively studied as a potential outcome of resource dependence. The few exceptions include Mazaheri (2016), who shows that abundance of oil revenues leads to restrictive business environment for entrepreneurs and small and medium enterprises, and De Haas and Poelhekke (2016), who demonstrate that the constraints faced by firms increase with active mines in their vicinity.

Theoretically, measures of business policies and activities can tell us a lot, not only about the economic trajectory of a resource-producer but also about its resiliance to volatility, as stronger business environment and more diversified economic activities are associated with higher and more stable economic growth (Koren and Tenreyro, 2013). Business capacity and development is argued to be a key determinant of a country's ability to translate its resource wealth into sustained economic welfare (Lashitew, Ross and Werker, 2020). It can also reveal the political and bureaucratic challenges a resource-rich government faces, both in times of negative and positive revenue shocks, as they sometimes adopt business-friendly policies strategically to deal with social demands to distribute the resource wealth.

This is a surprising shortcoming in the literature, given that an established body of work exists in political science and economics that connects the business and investment

environments with economic growth. For instance, Alesina et al. (2005) associate regulatory reforms with an increase in investment. Li (2006) finds that governments' fiscal interference in the investment environment reduces investment. Others have explored the relationship between aspects of state institutions and the business environment. Brown, Earle and Gehlbach (2009) connects the size of bureaucracies with better institutional support for businesses, whereas Duvanova (2012) shows that bureaucratic discretion conditions how regulatory burden affects the business environment.

When I consider the literature on the effects of resources on institutions and development specifically in Russia, the majority of the work either focuses on national-level outcomes (e.g., Luong and Weinthal 2010, Gaddy and Ickes 2015) or relies on purely statistical analysis to draw conclusions (Libman, 2013). This branch of scholarship could benefit from more detailed qualitative work that delves into the specific incentives and policies adopted or foregone by regional authorities.

The combination of an exclusive focus on positive resource shocks and reliance on aggregate level of analysis and measurement makes the literature better able to engage with discourses about the onset of the "resource curse" than its downturn or possible disappearance. Therefore, there is a need for scholarship to move beyond the "narrow question of whether or not there is a 'curse'" (Ross 2015, 253) and examine the conditions under which incentives of political and economic actors change for the better and reverse the "curse."

This dissertation takes up on these opportunities by arguing that negative shocks to natural resource revenues can be important moments of change. On the one hand, negative revenue shocks can perpetuate "the resource curse" and entrench undesirable outcomes. Incumbents may see economic reform and diversification as a threat to their political power. In this case, foreseeing the possibility of societal demands for redistribution and political openness as well as the emergence of potential challengers, the incumbent may reallocate resources to secure allies for repression, such as the military (Wright et al., 2015), and

centralize political authority as a preemptive strategy. Continuing political centralization in Russia could illustrate this logic. Some scholars describe the arrests and replacement of numerous sub-national governors as a reaction to the negative revenue shocks that Russia experienced as a result of the oil price decline since 2015 and Western sanctions (Interview2018619). Moreover, political and institutional maladies associated with high levels of resource revenues, such as corruption, could allow incumbents to re-allocate resources to reward their allies during negative revenue shocks.

On the other hand, extensive research on the effect of overall economic shocks shows that such shocks contribute to changes in policies and institutions by eroding the bargaining power of incumbents and improving the positions of opponents in the government (Haggard and Kaufman, 1997). In addition, negative revenue shocks can reduce resources in the hands of incumbents and therefore their ability to repress challengers and buy off societal support, thus increasing the likelihood of significant changes. If positive revenue shocks increase the value of being in office (Robinson, Torvik and Verdier, 2006), we may expect negative shocks to decrease the rent from holding power. Further, hard times lead to changes in policy orientation, as they challenge the existing coalitions in and around those in power (Gourevitch, 1986). Economic difficulties can also lead to economic policy changes, as they allow reformist leaders to package tough policy reforms with those that are absolutely necessary in one agenda and sell to those who were previously against reforms (Rodrik, 1996). As a result, substantial changes become more likely.

Negative shocks to natural resource income can also increase popular demand for reform. Countries that are highly dependent on revenues from natural resource exports experience overall income shocks in the service and other related sectors as well as in their public sector investment during times of decline in resource prices. Individuals and actors in affected sectors may demand that the government compensate for these income shocks or alternatively be replaced. Therefore, to the extent that negative resources shocks are similar to broader economic shocks, a reduction in resource revenues can catalyze

significant changes.

The main theoretical contribution of this dissertation is a new theory on how negative revenue shocks affect economic activities in the private sector and business environment through the policy choices of the political elite. In addition to providing quantitative and qualitative support for this theory based on the experiences of Russia's oil- and gas-producing regions, I conduct an empirical test of the assumption of symmetric effects of resources in a cross-national setting. More broadly, this dissertation extends the literature on the political and economic "resource curse" by shifting away from the literature's usual focus on the onset of the "curse" and examining the conditions that may lead to its disappearance. It also aims to contribute to connecting the "resource curse" literature with scholarship on the business environment and the private sector and enrich Russia-specific studies of the "resource curse" with more nuanced qualitative work.

2.3 Government responses to negative revenue shocks

Key variables and conceptual notes

This is a dissertation driven by my theoretical interest in the independent variable—decreases in a country's or region's revenues from natural resources, particularly in government revenues. I am interested in *any* negative changes in resource revenues, because there is no strong theoretical prior that suggests only large shocks would have effect on economic activities, though this is certainly possible. Therefore, I use terms such as negative revenue shock, revenue decline, and negative changes in resource revenues or income interchangeably through this dissertation. I also use the term "a resource-dependent country or region" to denote countries or regions who simply produce resources. What makes a country dependent on resources is not in the scope of this dissertation and therefore, in the empirical analysis, resource revenues are not measured as percentage of GDP.[1]

The main dependent variable is the activities of the private sector, particularly firms

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[1]It is well documented that this measure makes resources endogenous to the outcomes being explained in the analysis. See Ross (2015), p. 242, for further discussion.

and small- and medium-sized enterprises in general and in non-resource sectors, as well as the policies and policy-based institutions that govern the private sector's interactions with the state. These business actors do not have large organized instruments to put collective pressure on the state, especially in the country analyzed in this dissertation, Russia. Therefore, changes in the level of activities of these actors are more likely to result from the supply of policies at the discretion of the government, making it simpler to examine the chain of effects from negative shocks to government actions to business activities.

My theoretical interest is in understanding how short- and medium-term changes are potentially caused by negative shocks to natural resource revenues. Therefore, the institutions that I refer to here are not broad and fundamental economic institutions as conceptualized by North (1990) and Acemoglu, Johnson and Robinson (2005), but rather a set of policies and government choices regulating business activities. In the cross-national chapter, I frequently mention institutions, but the theoretical mechanism and empirical measurements are based on government policies regulating economic freedom. In the terms of Oliver Williamson's hierarchy of social analysis, this dissertation is concerned with Level 3 and 4 changes—resource allocation and governance—as opposed to the Level 2 and 1 changes that involve alterations in the formal rules of the game and embedded informal institutions and norms. Changes in resource allocation are assumed to take place frequently, while adjustments in governance happen in the short-run (1-10 years) (Williamson, 2000).

Theory of negative revenue shocks

How may negative shocks to natural resource revenues affect government incentives and consequently economic outcomes? Overall, when revenues from natural resource exploitation start to recede, political elites face several alternatives.

The first plausible option is that they increase production of the particular type of resource they depend on in order to increase revenues. Increased production often translates to higher income from specific fiscal instruments, such as resource export duty, and general

corporate profit tax. Secondly, governments may attempt to relieve the revenue pressure by cutting expenditure on public goods. The third alternative is to attempt to move away from dependence on non-tax windfall revenues and to shift to more tax-based income. This is often done either by increase in the tax rate or expansion of the tax base i.e., the number of individuals or firms being taxed. Finally, governments of resource-rich countries may resort to taking resources away from tax-paying individuals and firms, so that the decline in overall revenues due to negative shocks does not significantly reduce the rent available to the ruling elite. Under this alternative, the primary concern of the political elite is their access to resources rather than the long-term development of the economy.

The particular nature of dependence on natural resource revenues makes the first two of these alternatives more costly for leaders in resource-rich countries compared to the last two options. To begin with, increasing production of resources drastically in the short-run is not easy to accomplish. In the case of oil, arguably the world's most important and capturable resource, most producers are either producing close to their capacity or limited by existing technology. As various incidents of ecological disasters in recent years highlighted, much of remaining oil reserves are deep offshore or in other locations that are difficult to operate in. The International Energy Agency announced that the peak of conventional oil production has passed in 2006. Since 2004, the production of oil has not grown significantly and fluctuated within 5% (Fantazzini, Höök and Angelantoni, 2011).

The same limitations apply to Russia. Although Russia is one of the world's largest oil producers, its average reserve to production rate, which indicates the number of years that a country can sustain its current level of production, between 2006 and 2018 was about 23.2 years (British Petroleum, 2006–2018). Further, for many developing countries like Russia, the oil and gas exploration rates are very low and discovering and utilizing new reserves require major investment in technology (Kryukov and Moe, 2007). As a result of these limitations, Russia increased its production of oil only incrementally during the budgetary downturns in 2008 and 2014. Russia's oil production (in thousand barrels

per day) increased by 1.45% and 1.31% respectively in 2009 and 2015 (British Petroleum, 2006–2018).

Decreasing government expenditure significantly during times of budgetary restraint is also not attractive to resource-rich governments. The "resource curse" literature abundantly documents the "spending effect" of windfall revenues, which refers to the fact that windfall revenues from natural resource exploitation often lead to larger spending on patronage and enhance the distributive influence of the elite (Ross, 2001a). Once fiscal pacification becomes normalized, it would be difficult for the political elite to move away from this norm by significantly reducing expenditure without facing political costs and risks of removal from power. Opportunities for foreign borrowing become less available when a resource exporter suffers fiscally during a resource bust unless an international lender, such as the International Monetary Fund, steps in.

This supposition is empirically consistent with the experience of Russia during the budgetary decline following the steep oil price drop of 2014. At the federal level, Russia has prioritized policy adjustments that allowed the regime to increase revenues, rather than resort to outright expenditure cuts, especially in politically sensitive areas such as social policy and military. The controversial increase in pension age, the state pension fund's discontinuation of the capital accumulation program, and the sale of shares in key state owned enterprises, such as Bashneft, are a few examples of such attempts. Another development related to expenditure since the budgetary crisis has been a decrease in transparency of expenditures. The share of "classified spending" in the federal budget has grown from 10% of expenditures in 2009 to 17% in 2017 and is expected to reach 20% in 2021 (Ciechanowicz and Wisniewska, 2018).

On the regional level as well, reducing expenditure has been difficult. Regional governments have taken extra steps to expand the revenue stream, while maintaining expenditure levels. An example of an extreme step to this end was a "rain tax" introduced in the Republic of Tatarstan, which imposed a monthly fee on each apartment owner to pay

for existing gutters so that "rainwater is removed efficiently." It was widely mocked by residents of the region, but since the fee was small it has not caused protests or outrage (Interview2018457). At the same time, a staffer at the Ministry of Economy in Tatarstan characterized the possibility of reducing regional expenditure as "impossible," because the federal government has set up specific spending goals in regards with healthcare, education, and social policies. For instance, government employees' salaries had to be increased, not decreased, as per the directions from Moscow since 2015, and the regional government complied (Interview2018904).

These limitations leave the last two options as the most attractive responses to negative revenue shocks for resource-rich governments. I propose that which of the two a government chooses as its primary strategy to deal with a decline in resource revenues depends on whether the decision-makers perceive the shock to be temporary or permanent. The perception of the shock derives from the nature of the shock itself. When a shock results from institutionalized changes, it is more likely to be perceived, and actually turn out, to be long-lasting. Another example of a permanent shock can be a decline in resource revenues due to depletion of natural resources that the country depends on. Changes in terms of oil trade or disruptions to transportation channels of exporting commodities also constitute a shock that is likely to last for a while. In contrast, when the negative shock is related to global commodity prices, which may be seen as volatile and characterized by booms and busts, elites may expect the shock to pass over in a short period of time. Given that volatility of global commodity markets is well-documented, countries can be exposed to temporary shocks rather frequently.

In this theory, elites are self-serving and seek to remain in office for as long as possible. They understand that they have to maintain a certain level of government revenue to keep providing basic public goods, such as healthcare, education, security, and patronage, in order to hold onto public offices, which provide them with private benefits.

When elites see the shock as permanent due to the nature of the shock, they are more

likely to choose the third possible strategy—respond to the shock with a long-term vision and attempt to expand their tax base. In this scenario, changes in the budgetary components of the government may create incentives to encourage activities that provide it with alternative sources of income (Zhuravskaya, 2000). Upon facing a decrease in windfall income, regional governments may pursue changes in the policy and behavioral environment in order to attract investment and encourage businesses with an intention to expand their tax base.

The private sector, particularly firms, are the most likely targets of government initiatives to expand their tax bases, as opposed to individual tax payers. Supporting businesses allows the government not only to tax them directly, but also to charge them indirectly through legally required contributions to social security and pensions. Expansion of the private sector also leads to a higher level of employment and income, on which the government also imposes taxes. Services and goods produced by businesses are also taxed. Tax compliance is also relatively easier to enforce among businesses due the usual requirements to register in order to conduct business (Gehlbach, 2008).

Convincing businesses to become and stay a party to a fiscal contract with the state requires delivery of certain public goods, such as a better business environment, as firms can withhold their taxes and deprive the state of revenues. This is particularly true in developing countries with weak to moderate extractive capacity. The state may be able to force compliance, but continuous monitoring and sanctioning impose a significant cost on the government (Timmons, 2004). Therefore, governments in need of tax base expansion are willing to make credible commitments to businesses to direct resources to them and improve the regulatory framework.

A government in this situation needs to invest in institutional channels and fora for state-business interactions in order to at least give the impression that the private sector and the government are in a two-way relationship. It may also attempt to reduce corruption among medium to low level bureaucracy, which is viewed, in the Russian case, by firms as a source

of burden in doing business (Frye, 2008). Once the tax base begins to expand, additional pressure to continue improving the business environment may come from citizens and private actors, who are motivated to keep politicians accountable upon paying more taxes (Paler, 2013). Fiscal instruments can also be used to provide incentives to a broad base of firms or certain sectors to encourage investment in non-resource sectors. As a result, when the government chooses to take actions to increase its tax revenue in reaction to a decline in resource revenues, business and investment activities increase following the resource shock.

Conversely, political elites who expect the shock to be temporary may choose the fourth strategy, not only failing to invest in an environment conducive to private business, but also taking available resources away from them and undermining the institutional and regulatory environment for growth. In this scenario, governments, as rational actors, are aware that the fiscal contract must be upheld in the long-run to ensure access to revenues in the future and re-allocating resources from businesses in the non-resource sector will likely endanger the contract. However, they expect that future revenues from an anticipated resource boom will enable them to continue supplying public goods and in the short-run they can resort to pursuing their own needs, often at the expense of the private sector.

This option may be the easiest choice for the elite at the time of the shock, because resource dependence in the first place is associated with "bad" practices by the state that are harmful to thriving business activities. Availability of additional rents from oil and gas can lead to deterioration of state institutions, as politicians seek ways to access rents (Ross, 2001*b*). Resource-rich governments can also be less likely to invest in state bureaucratic capacity (Besley and Persson, 2010). The average quality of politicians seeking public offices can also decrease in resource-rich economies (Brollo et al., 2013) as availability of illegal means to benefit from rents attracts "bad types" to government posts. More importantly, these practices can be sticky. Once a polity has experienced the undesirable behaviors associated with the "curse," the political and business environment can become

a frequency-dependent equilibrium and actors remain unable to improve their payoffs by changing their strategies independently (Manion, 2004). In societies with a prevalent social practice of reliance on informal institutions and mistrust in the formal system, such as Russia (Levin and Saratov, 2013), the collective calculus among bureaucrats may tilt them towards demanding more bribes. Under this policy choice of the government, business and investment activities decrease. Figure 2.1 summarizes the theory in schematic form.

In the following two chapters, I apply this theory to Russia's oil- and gas-producing regions following two shocks—the first an institutionalized shock that was perceived to be permanent by the regions, the second a shock induced by a precipitous drop in global oil and gas prices and thus seen as temporary.

2.4   Scope conditions

This theory of how negative revenue shocks affect business activities through government policy choices can apply to most developing societies that draw a significant portion of their government revenues from natural resources. These are usually countries that are suffering from the economic and fiscal consequences of the positive revenue shock before being hit by the negative shock—a non-diverse economic structure that relies on the resource sector, a relatively high administrative and corruption-related burden on businesses, and relatively weak economic institutions.

Resource-rich countries that have sufficiently diversified economies may not feel the fiscal pressure from negative revenue shocks as severely as specialized economies and, therefore, governments' incentive to invest in supporting business activities may not be as high as it would be in more resource-dependent countries. Similarly, countries that already provide sufficient regulatory and institutional support to their businesses and firms may not have as much room to improve their policies towards the private sector as resource producers with larger distance to the frontier. Finally, under weak institutions, political elites tend to exercise more control over economic policies, which in turn acts as a strong

determining factor for investment and business activities. In contrast, in resource-exporters with stronger institutions and more liberal markets, the influence of market mechanisms would outweigh that of policy decisions and, therefore, limit the applicability of my theory.

On the one hand, these conditions restrict the generalizability of the theory. On the other hand, they may make the theory applicable to more cases of negative shocks in developing countries than just resource-related shocks as long as the shock affects the sector or economic activity that the country heavily relies on.

Can this theory apply to other units of analysis than the central state? I posit that it can apply to subnational units, provided that the following conditions are met. First, the overall regional government budget must be affected by the negative revenue shock either as part of a revenue-sharing scheme or through royalty transfers from the central government. Second, the regional government must have some fiscal instruments at its disposal and is able to adjust its budget by making policy changes to these instruments. Third, regional governments must have some degree of control over administrative policy that affects the business environment. Control can either be in form of the region's own policy or implementation of policies enacted at the national level. Fourth, the regional government must benefit from improvements to business environment in the form of increased tax revenues. If these conditions are met, testing the theory in a subnational setting may actually have advantages over testing in a cross-national setting, as it minimizes concerns about unit heterogeneity bias.

2.5   Conclusion

This chapter details the literature review and the theory of my dissertation. Based on an examination of the literature on the relationship between natural resources and economic development in political science and economics, I argue that existing work has paid dispro-portionately more attention to the effects of positive shocks from windfall resource revenues than to negative shocks. The reason behind this focus is perhaps the often-implicit assump-

tion that positive and negative revenue shocks have symmetric effects—whatever happens during times of high resource income is reversed when it declines. This assumption is seldom questioned.

I contribute to the literature on the "resource curse" with a theory of negative shocks to natural resource revenues. This theory hinges on how elites perceive the duration of the decline in resource revenues. Elites understand that they must maintain a certain level of government revenues to keep providing public goods or patronage and hold onto office. Access to the public purse also provides decision-makers in resource-rich countries with private benefits. If elites view the shock to be enduring and expect the dent in the budget to be long-lasting, they look for long-term solutions to compensate for the lost revenues. The result of their actions often corresponds to improvements in the institutional environment and increased support for private economic activities. In contrast, when elites believe that a forthcoming resource boom would replenish their budget soon, they are unwilling to implement policies to support the private sector. In fact, they may divert resources from businesses for their private benefit.

This theory supplements the "resource curse" literature by shedding light on the political economy of negative shocks to resource revenues. It also brings business activities and environment as a dependent variable into the literature. I address the assumption of symmetry empirically in Chapter 5 by estimating the average effects of negative and positive revenue shocks in a cross-national setting. This theory can have considerable policy implications, as it explicates conditions under which political elites' incentives may change for good.
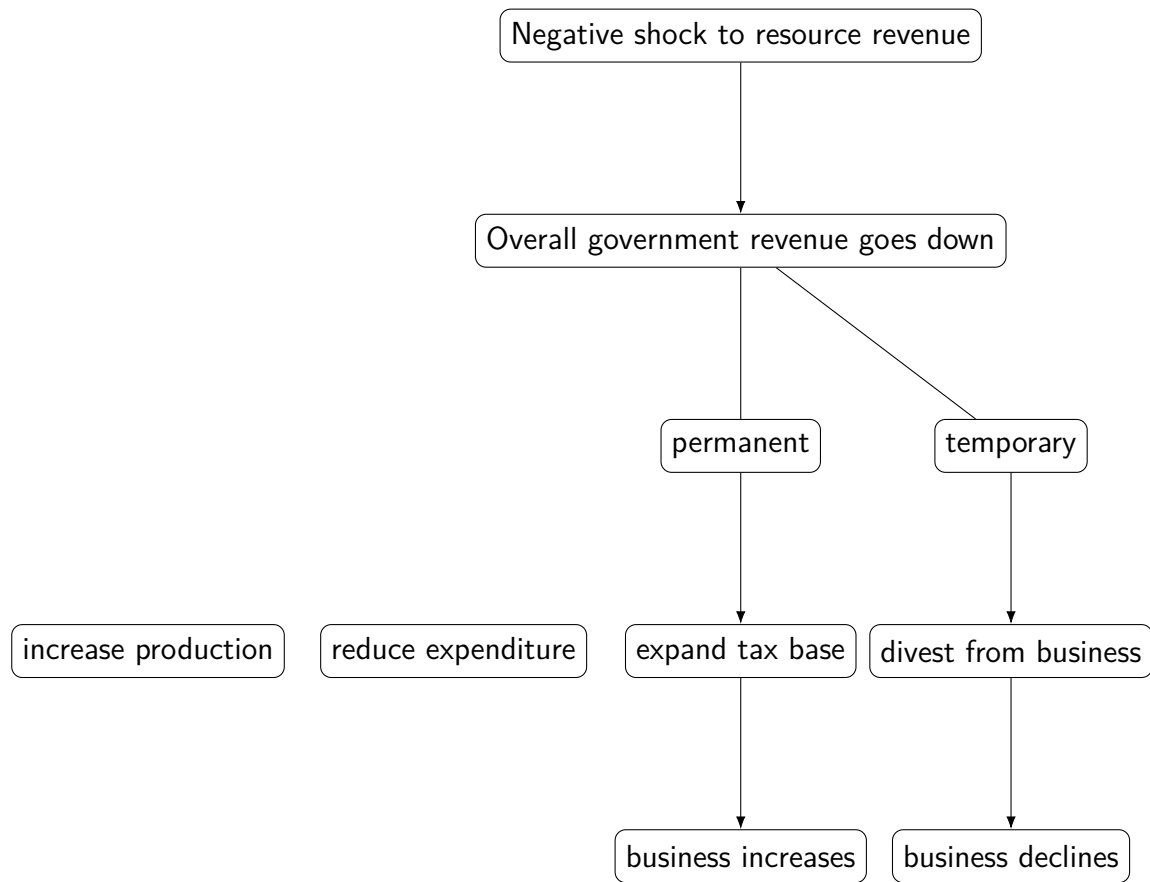
Figure 2.1: The theoretical argument in schematic form: Government policies after experiencing negative revenue shocks and their consequences for business and investment activities

Chapter 3

Negative Revenue Shocks and Economic Development in Russian Regions: A Quantitative Evaluation

3.1   Introduction

This chapter applies the theory developed in Chapter 2 to sub-national units in Russia. As one of the world's leading oil and gas producers, Russia relies heavily on its natural resources for revenue—oil and gas account for approximately 70% of its total goods export and 50% of the national budget (EBRD, 2013). At the same time, there is considerable variation in regional reliance on natural resources—39 of its 89 regions produce oil and gas (Kurlyandskaya, 2007), with varying amounts of their regional budgets and GDP coming from such production (Ilyina, Leonard and Plisetskij, 2014).[1] Similar differences exist in regional success in promoting economic development, specifically creating and stimulating business activities (EBRD, 2013). This variation on both the dependent and explanatory variables within a single country context facilitates identification of the causal relationship between the two variables, while keeping concerns about unobserved unit heterogeneity at bay.

In this context, I examine the effects of negative revenue shocks on development, comparing the experiences of Russia's oil- and gas-producing regions following two negative revenue shocks. The first is a policy change in 2002 that centralized the collection of natural

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[1]See Table A1 for a list of oil and gas producers.

resource revenues. This reform reduced regional governments' share of income from exploitation of minerals in general, but tax revenues from oil and gas production were most notably affected (Alexeev and Chernyavskiy, 2015). Consequently, regional budgets in gas- and oil-producing regions suffered. These conditions provide an ideal setting to examine the relationship between decrease in resource revenues and economic activities. The second case of a negative revenue shock examined in this chapter is the natural resource price shock after 2014. This particular negative shock occurred due to a substantial decline in world oil and gas prices.

I find a notable and statistically significant divergence between Russian regions that produce oil or gas and those that do not following 2002 and 2014. Specifically, resource-producing regions experienced 0.01%–1.78% higher private investment in fixed capital per capita and between 0.39% to 0.46% higher growth of small businesses per 10,000 enterprises after a systematic negative shock to their resource revenues in 2002 until 2013. Further, economic activities in regions that produced larger amounts of oil and gas and thus experienced a higher "dosage of the treatment," i.e., a larger negative revenue shock, increased at a higher rate after 2002 compared to those that received smaller shocks. Moving from the 25th percentile to 85th percentile[2] of resource production is associated with approximately 19.5% higher private investment in fixed capital per capita and over 69% higher rate of small business entry per 10,000 enterprises after 2002. In contrast, these measures of economic activities, along with employment in the manufacturing sector and bank loans to entrepreneurs, showed signs of deceleration following the 2014 price-induced shock.

Analysis of data on political regime openness and investment climate in Russian regions provide evidence that the gains and losses in economic activities after 2002 and 2014 respectively are due to changes in overall institutions—the centralization shock of 2002 improved regime openness and investment climate, while the price-induced shock of 2014

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[2]Because oil and gas production in Russian regions is skewed around the tails, 75th percentile of the distribution is 0 barrels of oil equivalents. This is why I chose 85th percentile as a point of comparison.

worsened these indicators of overall institutions.

These results suggest that negative revenue shocks may have substantial effect on economic development and may arguably reverse the economic "resource curse" in some cases. This finding contributes to scholarship on "the resource curse" by shedding light on the dynamics of resource dependence and adding to efforts to move beyond the "narrow question of whether or not there is a "curse" " (Ross 2015, 253). More broadly, this research extends the literature on the political and economic "resource curse" by shifting away from the literature's usual focus on the onset of the "curse" and examining the conditions that may lead to its disappearance.

The following section of the chapter describes the tax reform of 2002 and the price shock of 2014 and their implications for resource-producing regions in Russia. The third section discusses the empirical strategy. I interpret the results from the empirical analyses, explore the mechanisms, and rule out alternative explanations in the fourth section. The final section discusses the findings and their implications and concludes.

3.2 The empirical setting: Russia's oil- and gas-producing regions during two negative shocks

What are the effects of negative revenue shocks on economic development in Russian regions? How have the resource-rich regions dealt with loss in their resource revenues? I answer these questions based on the experiences of Russia's oil- and gas-producing regions following two types of negative revenue shocks.

Russian regions that produce oil and gas experienced a plausibly exogenous, negative fiscal shock in 2002 as a result of a reform in Russia's Tax Code, which centralized collection and allocation of mineral extraction and export taxes to the federal government. This fiscal shock led to an overall decrease in natural resource reliance in all regions that produce minerals on their territories,[3] but it affected regions extracting hydrocarbons (oil and gas)

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[3]Revenues from the mineral extraction tax for other minerals (i.e. ore, coal, sand) were distributed between the federal and regional budgets in a more forgiving ratio of 40:60 (Vedomosti, 2003).

most significantly. Specifically, before the reform 60% of taxes levied on mining operations accrued to regional government budgets in oil- and gas-producing regions. In contrast, beginning in 2002, the federal government started implementing a schedule to gain the right to 100% of mineral extraction tax on gas, 95% of mineral extraction tax on oil and 100% of export tax revenues on oil and gas. A separate category of taxation, hydrocarbon extraction tax, which previously accrued to the regional budgets, also shifted to the federal government.

Although the legal transition started in 2002, it was a gradual process. In 2002, the share of mineral tax to regional governments went down to 20% from the previous 60%. Regions saw further decline in their share in 2003, as the federal government assumed 100% of gas revenues, and 86% of oil revenues leaving 14% to the regions. In 2004, this figure went further down to 5% (Yushkov, Savul'kin and Oding, 2017). By 2005, tax revenue from natural gas and oil accruing at the regional level neared zero percent (Kurlyandskaya, 2007). In fact, natural resource revenues as percentage of total regional budget in Russia's top six oil- and gas-producing regions hit their lowest point in 2005 as Figure 3.1 shows. Upon collecting these taxes, the federal government now allocates the funds across regions based on regional need and taxing capacity, as determined by the Index of Budgetary Requirements (Thornton and Nagy, 2006).

This significant change was both economically and politically motivated. On the one hand, recentralization of natural resource revenues, along with replacement of regional governor elections with appointments by the federal government, was an integral part of the federal government's general strategy to shift political power from regions to Moscow in the 2000s (Appel, 2008). The importance of controlling natural resource taxation was magnified by the fact that many of the oil- and gas-producing regions (e.g. Tatarstan, Bashkortostan, and Sakha-Yakutia) are ethnic republics, which used their natural endowments and financial position to bilaterally bargain with the center for higher autonomy in the 1990s (Treisman, 2001) and preferential treatments and tax concessions from the federal
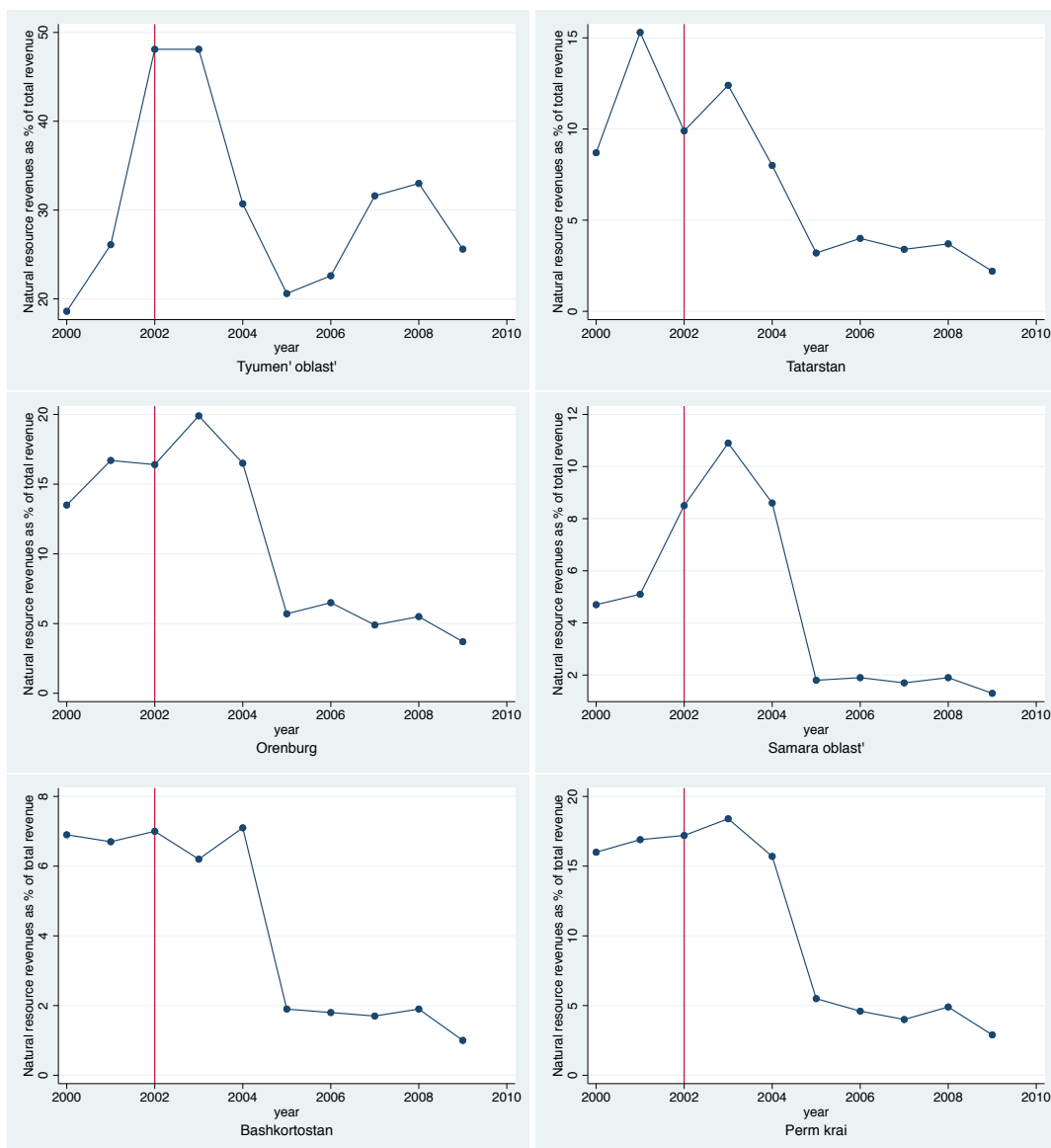
Figure 3.1: Natural resource revenue as percentage of total regional revenue in top six producers of oil and gas in 2002, 2000-2010

government (Martinez-Vazquez, 2007). Putin's government did not perceive strong regions as favorable to its hold on power. On the other hand, the restructuring of tax revenues was a response to the overall inefficiency of the tax system in the 1990s and the widespread perception of financial mis-management by regional governments (Alexeev and Conrad, 2013).

Several features of the tax reform and the subsequent reallocation of natural resource revenues make this shock an ideal setting to examine the effects of negative revenue shocks. First, this change resulted in a considerable decrease in oil- and gas-producing regions' revenues. Although informal and non-tax benefits, such as social investments by the oil and gas companies operating in the region, informal expenditure on "charitable activities, and bribes to regional government officials, continued to benefit the regions where oil and gas are produced, after the policy change in 2002 the formal benefits and revenues that oil and gas regions receive from extraction on their territory decreased. Regional rents from natural resources have been taxed away as a result of the new tax scheme (Alexeev and Chernyavskiy, 2015).

Second, the negative fiscal shocks under the new tax code were plausibly exogenous, since regional governments and corporate elites had little say in how much of their revenues were assigned to the central government. Because mineral taxes under the new law are pegged to production capacity determined by the combination of availability of accessible reserve and facilities built during the Soviet times and world oil price, the magnitude of the negative shock experienced by a region could not be easily manipulated by regional actors. The correlation between oil and gas production in Russian regions in 2002 and 2011 is nearly 99% suggesting that centralization of resource revenues did not affect production of resources and the regions could not compensate for lost revenue by increasing production.[4]

This tax reform is a particular kind of negative revenue shock—it is a policy-induced shock. Given the political climate at the time of the reform, decision-makers in the regions

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[4]Production in the first decade of transition has been much more unstable. Between 1988 and 1998, oil extraction, for example, almost halved in Russia (Appel, 2008)

would be more likely to perceive this shock as permanent and consequently adopt at least medium-term strategies when looking to compensate for lost revenues following 2002. The fact that corporate profit and individual income taxes accrued to regional budgets and these taxes could not be raised above federal guidelines provided regional governments with important tools and a specific set of policy options. Since regional governments could not reasonably expect the policy to change or increase tax rates, they are more likely to pursue policy changes and behaviors that aim at expanding their tax base in the long run. Therefore, this particular shock resulting from policy change is likely to have observable impact on the regional business activities and development. If governments do not adopt pro-business policies and economic activities are not stimulated following negative revenue shock in this context, it is even less likely in a context of global commodity price shock.

A potential concern regarding the suitability of the 2002 tax reform as an exogenous revenue shock is that the natural resource revenue loss on the regional level may have been compensated by budgetary transfers from the federal government. On the one hand, this is plausible, as some regions that have been notably successful in attracting federal transfers, such as Tatarstan (Sharafutdinova and Turovsky, 2017), are also natural resource producers. At least two major resource-producing regions—Tyumen' and Bashkortostan—have received *partial* compensation for their loss of natural resource revenues (Interview20160150, Interview20180136).

On the other hand, resource producers are a major part of Russia's "donor" regions, which are net contributors to the federal budget. For example, Tyumen' with its autonomous districts of Khanty-Mansk and Yamalo-Nenets have remained a core net "donor" since the early 2000s as of 2017 (Yushkov, Oding and Savul'kin, 2017), despite federal compensations for lost natural resource revenues. The centralization of natural resource revenues in 2002 took place in context of growing emphasis on the importance of equalization of Russia's regions. Capital and and key industries were clustered around a few regions during the Soviet Union (Dabla-Norris and Weber, 2001) and consequently post-Soviet Russia's regions

have had notably unequal economic conditions. The federal government aimed to reduce such horizontal imbalance across regions during the economic growth period in the 2000s. In fact, one of the motivating reasons for centralizing natural resource taxes was the idea that natural resources are a "national treasure" and that all regions should benefit from them (Interview2018734). Therefore, oil- and gas-producing regions are unlikely to have been large enough benefactors from federal transfers that would receive enough funds to cover the lost resource revenue.

I compare the effect of the 2002 tax policy change to the effect of oil and gas price decline that started in mid-2014. The fact that the nature of this shock was completely different from that in 2002 provides an ideal opportunity to compare the two shocks and draw broad conclusions regarding negative revenue shocks. The shock that started in 2014 dealt a huge blow to not only the national budget, but also to regional budgets— particularly those of oil and gas producing regions. As Figure 3.2 shows in mid-2014, prices of oil and gas dropped precipitously due to a combination of decreased global demand and surplus oil production. Between 2013 and 2015 a barrel of oil lost approximately 52% of its value, while the loss for a million British thermal units (btu) of gas was around 30%. Both prices bounced back around 2016, but the gain was not sufficient to offset the plunge of 2014. As a result, the number of "donor" regions decreased significantly by 2015.

The negative shock of 2014 is expected to have considerable effect on oil- and gas-producing regions' budgets. Although the policy change in 2002 centralized oil and gas revenues, other fiscal instruments, such as corporate profit tax and individual income tax, remained in the hands of regional governments. Over the later years of the 2000s, revenues from these instruments, especially from corporate profit tax from oil and gas producing companies, came to constitute a non-negligible part of regional revenues. When the price shock hit in 2014, budgetary income from these sources decreased, impacting overall regional revenues.

Note that the differential pace of development, if negative revenue shocks either due to
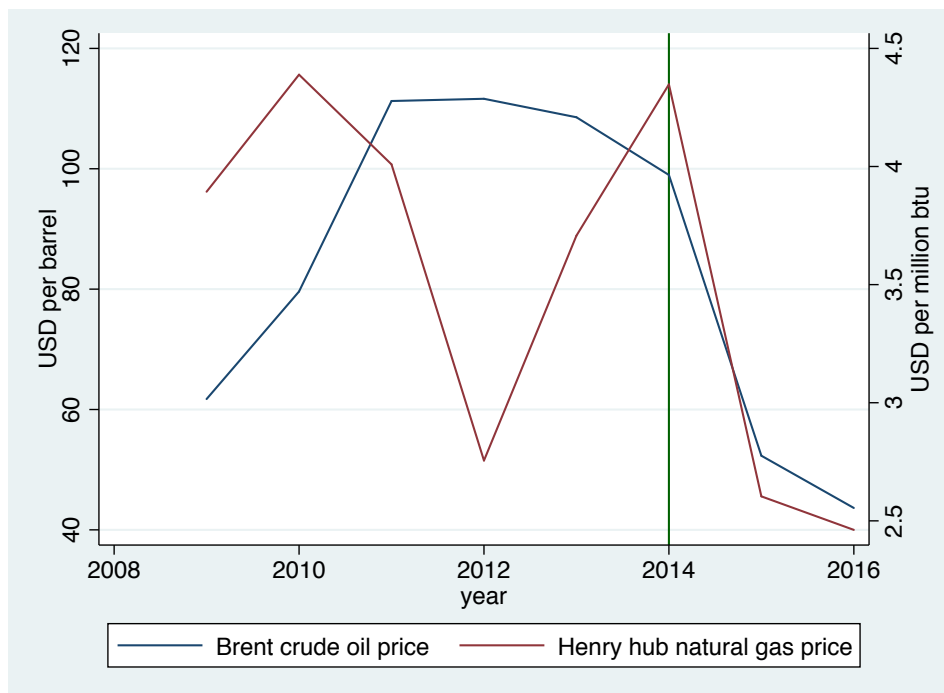
Figure 3.2: Prices of crude oil and natural gas since 2009. Prices for both commodities dropped in mid-2014.

policy changes in 2002 or global price decline in 2014 actually impact economic activities at all, is expected to occur on the regional, rather than municipal, level, because regional governments and authorities are tasked with providing for a legal and regulatory framework for entrepreneurial activities. For instance, the most significant tax new businesses have to pay are regional taxes, such as profit tax. Regional governments also may have the authority to regulate tariffs and prices, handle licensing in certain sectors, and manage property (Brown, Earle and Gehlbach, 2009). In contrast, municipal administrations play a key role in providing for public goods and administering social benefits. One exceptional area, in which municipal leaders and bureaucracies do play a role, is allocation of and permission for use of land.

3.3 Empirical strategy

Estimation equation

My objective is to identify the average effect of the negative revenue shocks in 2002 and 2014 on private economic activities in the resource-dependent regions. In an ideal condition, I would randomly assign negative revenue shocks to regions and compare the economic outcomes in the treatment and control regions. Given that such randomized trial is not feasible, I turn to a non-experimental approach, specifically estimating a difference-in-differences model on panel data of Russian regions before and after 2002 and 2014 respectively.

I estimate the following equation on two sets of panel data corresponding to the two negative revenue shocks:

$$Y_{it} = \beta_1 RESOURCES_i * POST_t + \theta X_{it} + \psi_t + \mu_i + \epsilon_{it}, \tag{3.1}$$

The variable, Y_{it}, denotes the outcome of interest, measuring business activities in region i in year t. $RESOURCES_i$ measures whether a region is resource dependent. $POST_t$ is an indicator variable equal to 1, if the observation is in the post-treatment period (after 2002 for the estimations regarding the first negative revenue shock and after 2014 for the second shock), and 0 otherwise. X_{it} is a matrix of time-varying region-level control variables. The variable ψ_t is a time effect common to all regions in time t, while μ_i is a fixed effect unique to region i. Error term is denoted by ϵ_{it}.

Data and operationalization of key variables

The main measures of the dependent variable are private investment in fixed capital per capita and small business entry per 10,000 firms in a given year. I choose these measures because they reflect actual and relatively costly business activities that capture the concrete manifestations of private business actors' confidence in the business environment. These measures also are likely to be sensitive to policy changes in the short-run, compared to

aggregate measures, such as gross regional product, and thus more accurately assess new economic activities that negative shocks to regional revenues may stimulate.

To estimate the effect of the 2002 revenue shock, I focus on region-level data between 1993 and 2013 for private investment in fixed capital per capita and between 1995 and 2013 for small business entry per 10,000 enterprises. In estimating the effects of the 2014 price-related shock, I change the key dependent variables slightly due to a concern related to the modeling assumption. For a difference-in-differences modeling strategy to work, one must assume that before the shock (either in 2002 or in 2014) the levels of the dependent variables follow a similar trend in the treated as well as control groups. However, in my empirical setting, this parallel trends assumption is violated in the case of the 2014 shock due to my finding that the 2002 shock led to a higher level of private investment in fixed capital and small business entry in oil- and gas-producing regions. In other words, if the 2002 shock resulted in more economic activities in resource-dependent regions after 2002, by definition resource-rich regions are different from resource-poor regions.

In order to sidestep this concern, I choose to move away from *levels* of private investment in fixed capital and small business entry as dependent variables in estimating the effects of the 2014 shock. Rather, in these estimations, the key dependent variables for the 2014 estimations are annual *changes* in private investment in fixed capital and small business entry between 2011 and 2016. In addition to private investment in fixed capital per capita and small business entry, I use growth of employment in the manufacturing sector and increase in loans on the regional level granted to individual entrepreneurs as dependent variables. I use these additional variables in order to confirm whether there has been a sectoral shift away from natural resources. Employment in the manufacturing sector is meant to measure the extent of diversification, which is routinely advised as the main basis of sustained economic development and crucial choice to combat the "resource curse" (Ross, 2017). Entrepreneurial loans capture easiness of doing business for private actors that usually do not have coordinated political and economic power, as lack of availability of

and access to financial resources is a common hindrance to business activities, particularly in developing countries.

The independent variable, RESOURCES, measures whether a region was vulnerable to negative shocks based on their oil and gas production and is defined in binary as well as continuous terms. When I estimate the effect of the 2002 policy change, the continuous measure of RESOURCES is defined in terms of the sum of oil and gas extracted in region i as of 2002. To allow for meaningful addition of the two types of resources, the unit measuring gas extraction is converted from million square meters to barrels of oil equivalent. Similarly, in the estimations of the effect of the 2014 oil and gas price shock, RESOURCES is defined as the sum of oil and gas production in 2011, the first year in this set of regressions. Note that oil and gas figures are implicitly normalized by population, which is also included in log form.[5]

Figure 3.3 depicts the distribution of oil and gas extraction in Russian regions in 2002, which is bi-modal. Similarly, oil and gas extraction in 2011 is clustered around the tails. This makes choosing the cut-off point for the binary measurement of resource dependence relatively unarbitrary—the cut-off point is 150 barrel equivalents of oil and gas production in 2002 and 2011 for the two sets of regressions respectively. Oil and gas extraction in Russian regions have been relatively stable over the study period, as investment in new fields and technology has been remarkably low in Russia since the 1990s (Gustafson, 2012). The correlation between combined oil and gas extraction in 2002 and the same variable in 2011 is 99%. Figure 3.3 also shows that resource production above the cut-off point varies across a considerably wide range and thus, in addition to the binary measurement, I use a continuous measurement of resource dependence to allow for varying "dosage" of the treatment. In principle, larger negative revenue shocks should produce larger effects on the economic outcomes, though I do not have strong priors about the precise shape of the relationship.

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[5]This is because $\alpha \cdot \log(\text{resources/population}) + \beta \cdot \log(\text{population}) = \alpha \cdot \log(\text{resources}) + (\beta - \alpha) \cdot \log(\text{population})$.
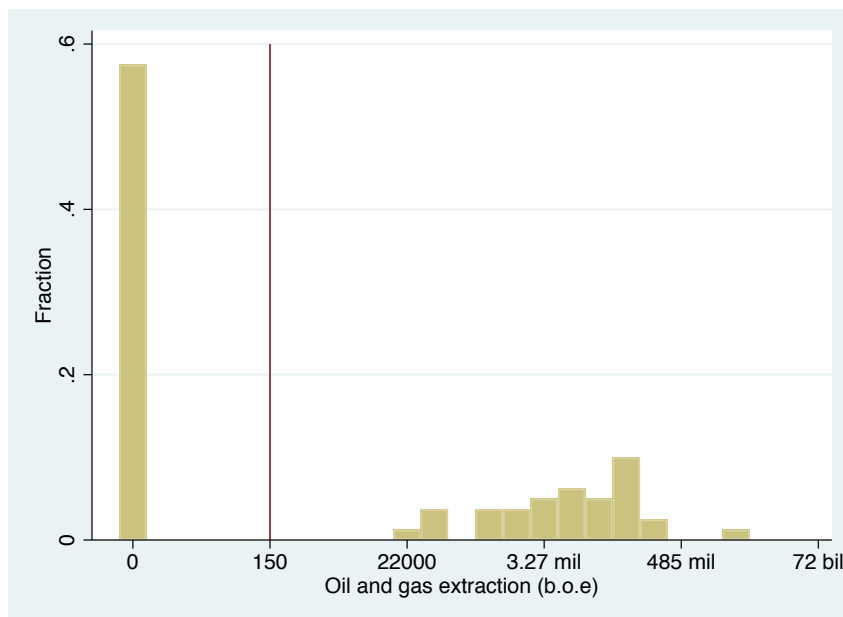
Figure 3.3: Distribution of oil and gas extraction in Russian regions in 2002. The x-axis shows the extent of oil and gas production in barrels of oil equivalents. The red line (production of 150 barrels of oil equivalent) divides regions coded as resource-dependent and non-dependent in the binary definition of the treatment variable in the regressions. The correlation between regions' oil and gas production in 2002 and 2011 are both 0.99, therefore distribution of resource production looks the same in 2011.

I use resource-producers and resource-dependent regions interchangeably in this chapter, but it is worth noting that the budgets as well as the economies of the oil- and gas-producing regions in Russia depend on these natural resources to varying degrees. The largest producers are the most dependent, whereas smaller producers are less dependent. Such divergence between production and dependence justifies my use of a continuous measure of resource production, in addition to a binary measure.

Tyumen' oblast, which produces the most oil and gas in Russia, derived 48.1% of its regional budget from natural resources at the time of the first shock in 2002. 59.9% of its gross value added came from the natural resource sector in 2005, the first year sectoral data is available. The next five largest producers, Orenburg, Tatarstan, Tomsk, Astrakhan, and Komi Republic received 16.4%, 9.9%, 17.2%, 7.9% and 14.3% of their budgets from the resources sector in 2002, respectively. In 2005, the shares of the natural resource sector in their gross value added were 37%, 30.9%, 35.4%, 2.7%, and 34.3%, respectively.

In comparison, Omsk oblast, which extracts the smallest amount of oil and gas among the regions that are classified as resource-producers based on the binary measure of resources, received only 3.4% of its regional budget from natural resources in 2002. In 2005, 0.5% of its value added originated from the resource sector. The degrees of resource-dependence among the next five small producers are also limited. The budgetary share of resources for Irkutsk in 2002 was 9.2% and the share of gross value added in 2005 was 3.8%. Similar values stood at 2.7% and 0.8% for Penza, 1.1% and 1.3% for Adygeya, 1.4% and 10.3% for Ingushetia, and 2.7% and 3.1% for Novosibirsk.

There is a considerable variation in dependence among the regions around the median. Natural resources constituted 8.6% of Volgograd's regional budget in 2002 and 6.8% of its gross value added in 2005. Saratov derived 4.2% of the regional budget from the same sector in 2002 and 4% of its gross regional products in 2005. These figures for Sakhalin, a region that produces a comparable amount of oil and gas to Saratov and Volgograd, are much higher—9.5% of the regional budget in 2002 and 22.1% of the regional gross products in 2005 came from the resource sector.

Control variables and the sample

I include a number of region-level control variables that may affect business environment and development. I include the population of the region to proxy for the size of the market. Regional income per capita controls for not only the purchasing power of the region's consumers, but also its capital stock. Size of the capital stock is relevant, as larger capital stock implies lower marginal return to investment. Another important variable to control for is the region's capacity to compensate for lost natural resource revenues through subsidies and transfers from the federal government. The federal government decides the size of regional transfers based on a formula that uses the tax capacity index of the region. Therefore, I include this index specified by the Ministry of Finance since 2001. For years before 2001, I use the figure from 2001 assuming a relative stability in regions' ability to tax. The index is not included as a control for manufacturing employment and

entrepreneurship loans, as they are not expected to have direct impact on these variables.

Region and year fixed effects control for a variety of other potential confounders. The former takes account of time-invariant unobserved heterogeneity and features of the region (e.g., geography, special federal status), while the latter captures observed and unobserved factors that affect all regions in a given year, such as macroeconomic conditions. Region fixed effects also absorb within-unit correlations of the error terms. Unit fixed effects are collinear with the variable RESOURCES, while time fixed effects are collinear with variable POST. Therefore, these two variables are not included in the model as separate variables as they otherwise would be in interaction models.

The sample includes all Russian regions, except regions that are administrative subordinates of other regions. For these regions, I use figures for the main region, which encompass data for the subordinates, and exclude the data for the subordinates. Therefore, Nenets is analyzed with Arkhangelsk and Khanty-Mansk and Yamalo-Nenets with Tyumen'. For consistency, even if a region was merged into another during the study period, I drop it out of the sample both before and after the merger, since statistics for the receiving region include its data even prior to the merger. Komi-Permyak, Koryak, Taimyr (Dolgano-Nenets), Evenk, Ust-Ordyn Buryat, and Aginsk Buryat are dropped from the sample for this reason. St. Petersburg and Moscow are in the sample as separate units equivalent to regions.

All variables, except indices, indicator variables, and GRP growth, are logged. See Table A3 for summary statistics and details.

Modeling assumption

Before moving on to the results of the analysis, a note on a critical assumption behind the difference-in-differences approach is in order. The key identifying assumption behind difference-in-differences models is that the trends (not levels) in the outcome variable for both the treatment and control groups would have been the same in absence of the treatment. In order to make this critical assumption about the counterfactual trends, I look at the trends before the treatment and examine whether they were similar in the two groups
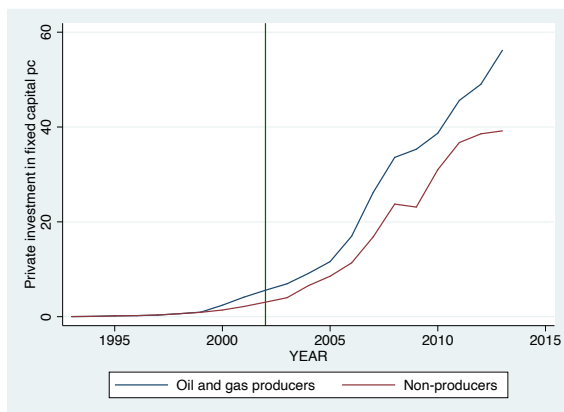
(a) Private investment in fixed capital per capita
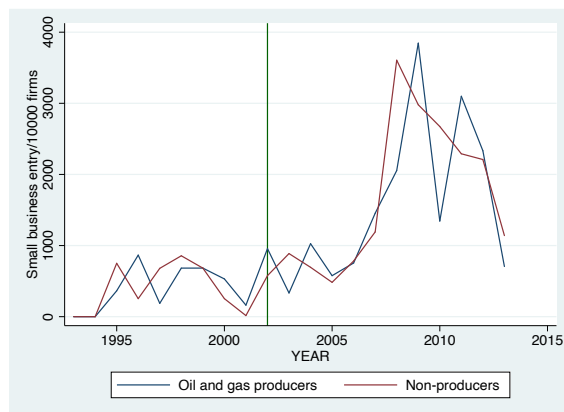
(b) Small business entry

Figure 3.4: Annual averages of measures of private economic activities in oil and gas producing regions versus non-producing regions (1998–2013)
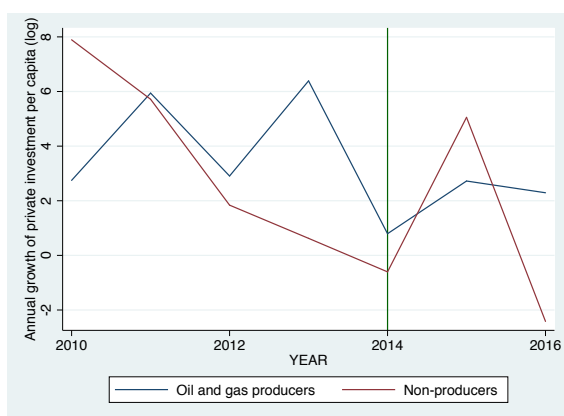
(a) Growth of private investment per capita
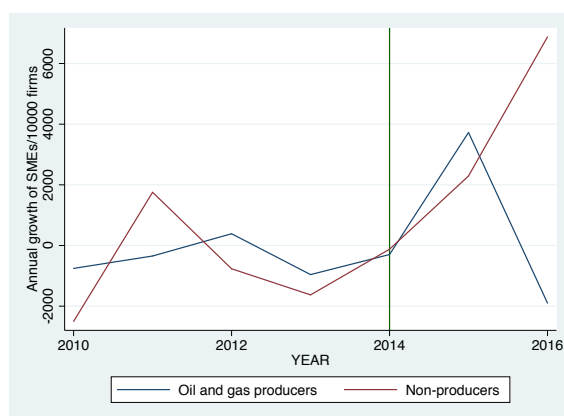
(b) Growth of small business entry
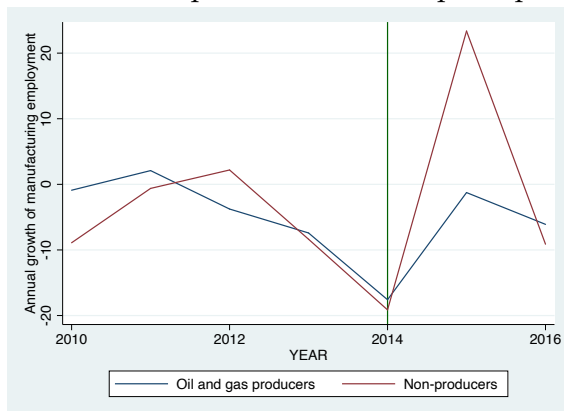
(c) Employment in manufacturing sector
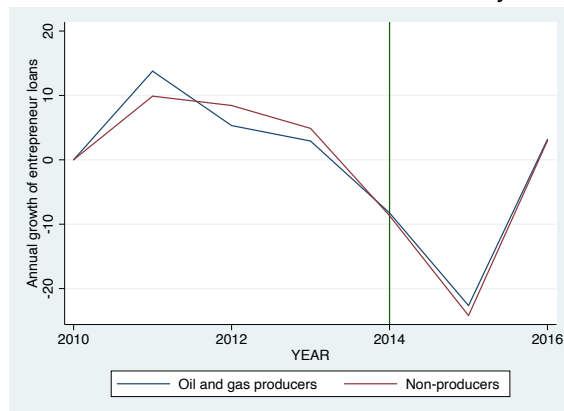
(d) Individual entrepreneur loans granted

Figure 3.5: Annual averages of measures of private economic activities in oil and gas producing regions versus non-producing regions (2010–2016)

of regions. Parallel pre-trends would give us confidence that the identification assumption is reasonable and allow me to argue that the outcomes corresponding to the control group is an unbiased estimate of the counterfactual. The assumption of parallel pre-trends cannot be directly tested, but I examine the validity of the assumption graphically as well as statistically. Figure 3.4 depicts the annual average of private investment in fixed capital and small business entry for resource-producing and non-producing groups between 1998 and 2013, while Figure 3.5 shows annual average growth of private investment in fixed capital, small business entry, employment in the manufacturing sector, and individual entrepreneurial loans for the two sets of regions between 2010 and 2016. In Figure 3.4, we do not observe signs of differential trends in the two variables before 2002. Similarly, in Figure 3.5, the trends in all four variables before the 2014 shock are comparable to one another suggesting that the pre-shock trends were not different for the two groups.

While the graphical evidence is informative, I statistically test whether the time trends for the control and treatment groups are different before 2002 and 2014. To do so, I estimate a version of Equation 3.1 that interacts a measure of a linear trend with the RESOURCES variable on a sample of observations only between 1993/5 and 2001 for the first shock and 2010 and 2013 for the second shock. A linear trend is captured by a variable that equals 1 in the first year of the sample and increases by 1 for each year afterwards for all six dependent variables. For all dependent variables, the coefficients of linear time trends interacted with an indicator variable denoting whether a region is affected by the shock are insignificant, thus we cannot reject the null hypothesis that pre-change trends are the same for the two types of regions at conventional levels of statistical significance (See Table A2 of the Appendix). One notable exception is that for growth in private investment, I find that the interaction term is statistically significant. However, the coefficient is positive, which suggests that in the in the years prior to the revenue shock oil- and gas-producing regions had higher growth in private investment in fixed capital per capita. The main analysis shows that after the shock such investment reduced.

3.4 Results

The effects of the two shocks on economic activities

Table 3.1 shows the results of a systematic examination of the relationship between negative revenue shocks and the two measures of economic activities following the centralization of natural resource revenues in 2002.[6] The dependent variable is private investment in fixed capital per capita in the first four regressions and small business entry per 10,000 enterprises in the last four regressions. In columns 1, 2 and 5, 6, the treatment variable, RESOURCES, is measured in binary terms, while in columns 3, 4, and 7, 8, it is in continuous terms. The results show significant and positive coefficients on the interaction of resource dependence and post-2002 indicator variable, except in the case of regressions of small business entry with a binary measure of resources. These results suggest a notable divergence between Russian regions that produce oil or gas and those that do not following the policy shock of 2002. Specifically, resource-producing regions experienced approximately 0.01%–1.78% higher private investment in fixed capital per capita and between 0.39% to 0.46% higher growth of small businesses per 10,000 enterprises after systematic negative shock to their resource revenues in 2002.

The results also suggest a dose-response relationship—economic activities in regions that produced larger amounts of oil and gas in 2002 and thus experienced higher "dosage of the treatment" (i.e. larger negative revenue shock) increased at a higher rate compared to those that received smaller shocks (Columns 3, 4, 7 and 8). The magnitude of the effect appears small at first glance, but it is substantial given that the distribution of negative revenue shocks is scattered around the tails. To interpret the coefficient, I scale the results by the magnitude of the percentile range of resource production. The distance between the 25th percentile to 85 percentile is 1771. The effect of moving from the 25th percentile of

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[6]Consistency of cluster-robust standard errors is in the number of clusters. Given that I have 80 clusters (regions) at most and that the region and year fixed effects are soaking up a lot of the variation, I report the results with non-clustered errors. Clustered standard errors are included in a robustness check and are not markedly different from non-clustered errors.

Table 3.1: Main results: Comparison of private investment in fixed capital (per capita) and small business entry (per 10,000 enterprises) in resource-dependent vs. non-dependent regions, 1993/1995–2013

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Private Investment in Fixed Capital (pc)				Small business entry (per 10,000 firms)			
Resources X Post–2002	0.178***	0.164**	0.010**	0.008**	0.398	0.488	0.039*	0.046**
	(0.051)	(0.053)	(0.003)	(0.003)	(0.349)	(0.356)	(0.021)	(0.021)
Log(Population)	-1.692***	-1.630***	-1.677***	-1.612***	-7.011***	-7.169***	-7.359***	-7.538***
	(0.243)	(0.243)	(0.244)	(0.244)	(1.893)	(1.897)	(1.896)	(1.899)
Regional tax capacity index	0.166***	0.156***	0.164***	0.154***	-0.012	0.017	-0.020	0.009
	(0.035)	(0.035)	(0.035)	(0.035)	(0.222)	(0.223)	(0.222)	(0.223)
Log(Regional income pc)	0.555***	0.511***	0.563***	0.518***	0.332	0.413	0.375	0.462
	(0.113)	(0.113)	(0.113)	(0.113)	(0.773)	(0.778)	(0.773)	(0.778)
Log(value of oil production)		-0.003		-0.003		-0.018		-0.021
		(0.003)		(0.003)		(0.022)		(0.022)
Log(value of gas production)		0.011**		0.010**		-0.014		-0.013
		(0.004)		(0.004)		(0.023)		(0.023)
Observations	1649	1649	1649	1649	1492	1492	1492	1492
Regions	80	80	80	80	80	80	80	80
Binary treatment variable	Yes	Yes	No	No	Yes	Yes	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.958	0.958	0.958	0.958	0.196	0.198	0.198	0.200
adj. R^2	0.955	0.955	0.955	0.955	0.138	0.139	0.139	0.140

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable in Columns (1) through (4) is private investment in fixed capital per capita and Columns (5) through (8) is small business entry per 10,000 firms.

Table 3.2: Main results: Comparison of various measures of business activities in resource-dependent vs. non-dependent regions, 2011-2016

Dependent variable	(1) PI	(2) PI	(3) SB	(4) SB	(5) EM	(6) EM	(7) EL	(8) EL
Dependence X post-2014	**0.039**	**0.001**	**-1.569**	**-0.077**	**-0.032**	**-0.002**	**-0.079**	**-0.004**
	(0.062)	(0.003)	(1.038)	(0.057)	(0.027)	(0.001)	(0.057)	(0.003)
Log(Population)	-1.780**	-1.781**	-6.338	-6.222	0.238	0.243	-0.974	-0.968
	(0.900)	(0.900)	(14.848)	(14.856)	(0.430)	(0.430)	(0.956)	(0.956)
Regional tax capacity index	0.074	0.074	-1.092	-1.124	-0.039	-0.040	0.000	-0.002
	(0.075)	(0.076)	(1.268)	(1.271)	(0.033)	(0.033)	(0.078)	(0.078)
Log(Regional income pc)	0.201	0.197	2.867	2.876	1.527	1.511	0.011	0.021
	(0.307)	(0.307)	(2.800)	(2.805)	(2.594)	(2.597)	(1.755)	(1.759)
Level of unemployment					-0.007*	-0.007*		
					(0.004)	(0.004)		
Ranking of investment climate							-0.003	-0.003
							(0.007)	(0.007)
Observations	559	559	560	560	553	553	480	480
Regions	80	80	80	80	80	80	80	80
Binary treatment variable	Yes	No	Yes	No	Yes	No	Yes	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R²	0.105	0.105	0.081	0.080	0.054	0.054	0.669	0.669

* Standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01. Dependent variable in Columns (1) and (2) is annual change in private investment in fixed capital per capita, in Columns (3) and (4) it is annual change in small business entry per 10,000 firms, in Columns (5) and (6) the number of people employed in manufacturing sector per 10,000 people, and in Columns (7) and (8) the loans granted by banks to individual entrepreneurs.

resource production to 85th percentile leads to approximately from 14.17% (0.008*1771) to 17.71% (0.010*1771) increase in private investment in fixed capital per capita. The importance of the effect is even more magnified for small business entry. Small businesses entered the market at 69% (0.039*1771) to 81.5% (0.046*1771) higher rate in regions at the 85th percentile of resource production compared to regions at the 25th percentile.

Table 3.2 shows the results of the difference-in-differences regressions on all four dependent variables related to the 2014 shock. The dependent variable in Column (1) and (2) is annual change in private investment in fixed capital per capita, Column (3) and (4) is annual change in small business entry per 10,000 firms, Column (5) and (6) is the growth in manufacturing sector employment per 10,000 people, and Column (7) and (8) is annual changes in loans granted by banks to individual entrepreneurs in the region. In Columns (1), (3), (5), and (7), the treatment variable, RESOURCES, is measured in binary terms, while in Columns (2), (4), (6), and (8) it is in continuous terms.

The results show consistently insignificant coefficients of the interaction of magnitude of the shock and post-2014 indicator variable, suggesting that the 2014 price-induced shock did not have considerable effect on the measures of private economic activities. Although the coefficients are not significant at conventional levels of statistical significance, notice that they are mostly negative.

These effects of negative revenue shocks are relatively stable across different specifications of the model. In the baseline results, controlling for regional population, tax capacity index, and regional income levels does not affect the direction and magnitude of the coefficients of interest.

Robustness checks of the main results

As robustness checks, I estimate modified versions of Equation 3.1 to cluster the standard errors by regions and include region specific time trends. As shown in Table A4 in the Appendix, when I cluster the errors for the 2002 shock, the results for small business entry do not change. The coefficients on the interaction of the post-2002 indicator variable and

measures of resource production change in the models with private investment in fixed capital become insignificant, when I measure resource production in continuous terms. When a same change is adopted for the 2014 regressions (Table A8), the coefficients of growth of small business entry and of employment in manufacturing *gain* significance, suggesting that these indicators have worsened after the 2014 shock. Including region-specific time trends in the 2002 regressions leads to loss of significance of the coefficients (Table A5), while in the 2014 regressions it does not change the results. One notable change that happens in regards with the latter is that the coefficients on growth in private investment are negative and become significant (Table A5).

Potential mechanism

What may account for the divergent rate of private economic activities after 2002 and 2014 in resource-producing regions? The theory developed in Chapter 2 suggests that after 2002, regional elites started to improve the overall quality of institutions and investment climate, because they saw the policy shift as a permanent situation and had to expand the tax base in order to make up for the dwindling resource revenue. In contrast, after 2014 the quality of institutions and investment climate must have deteriorated, because when regional elites faced a smaller pool of resources, they decided to allocate them for themselves, believing that it will be larger soon when the prices of oil and gas rebound.

I check for this mechanism using data from two sources. First, I use the Moscow Carnegie Center regional regime openness (Petrov, 2004) data to measure quality of overall institutions across Russian regions.[7] Second, I use the investment environment ranking data from Expert RA Rating Agency (1996-2017) to proxy for overall business environment of the region. The regressions modify Equation 3.1 in that they now have the indicators of institutional quality as the dependent variable. The results are displayed in Table 3.3.[8] It shows that regime openness was higher in oil- and gas-producing regions after 2002.

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[7]I thank Nikolay Petrov for sharing with me the data for recent years.
[8]The results do not substantively change if I use binary measures of RESOURCES.

Table 3.3: Mechanisms: Comparison of regime openness and business environment ranking in resource-dependent vs. non-dependent regions, 1993-2013 and 2011-2016

Period	1993–2013		2011–2016	
Dependent variable	Regime openness	Investment climate	Regime openness	Investment climate
Dependence X Post–shock	0.095***	0.111***	-0.043**	-0.028
	(0.013)	(0.028)	(0.020)	(0.022)
N	1493	1422	320	560
Regions	80	80	80	80
Controls included	Yes	Yes	Yes	Yes
Binary treatment	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Similarly, these regions were more likely to rank higher in terms of investment climate. The coefficients are highly statistically significant for both regime openness and investment climate. I interpret these results as suggestive evidence showing that the higher level of private investment and small business entry in resource-rich regions were driven by improvements in overall institutions and the investment climate in these regions.

I find the opposite result when I analyze similar data for the 2014 shock. Table 3.3 shows that regime openness was worse in oil- and gas-producing regions after 2014. The statistical significance is lower, though still notably present. The investment climate is not significantly different in resource-producers after the 2014 shock.

Ruling out alternative explanations

The most plausible alternative explanation for the diverging patterns of private economic activities between resource-rich and resource-poor regions following 2002 and 2014 is the potentially contrasting economic conditions following the two shocks. In the years following the mining tax centralization law of 2002, the world oil price has hit its highest level in recent decades. Rising hydrocarbon prices are said to be the most important cause of increased economic activity in Russia after the crisis of 1990s (World Bank, 2005) and therefore, regions with natural endowments could have benefited from the boom considerably more

during the 2000s. Based on an assumption that regional economic benefits from high hydrocarbon prices would be proportionate to the overall oil or gas production of the region, the baseline regressions control for the value of resource production (world oil and gas price X production volume). As Columns 2, 4, 6, and 8 of Table 3.1 show, the overall effect of oil production on private investment and small business entry during the study period has been negative and not statistically significant, whereas the effect of gas production on economic activities is ambiguous—the coefficient is positive in regressions on private investment and negative in regressions on small business entry. Important for my analysis is the result that even when oil and gas production values are controlled for, economic activities in resource-regions are significantly higher after 2002 than in non-resource regions.

In principle, booming oil and gas prices in the 2000s could have benefited regional economies in a way *disproportionate* to the value of oil and gas production. For instance, the rate of economic growth may not correspond to the overall extraction of resources due to unsound macroeconomic policy or weak institutions. In this case, controlling for the value of resource production would not effectively account for the effect of oil and gas prices. Conversely, economic conditions could have become significantly worse in producer regions after 2014, leading to lower level of economic activities. To explore the possibility that regional economies benefited from high prices disproportionately, I look at two indicators of overall macro-economic condition—GRP growth and unemployment. Specifically, I estimate the effects of the interactions between resource dependence and post-2002 and post-2014 indicator variables on GRP growth and unemployment. Table 3.4 displays the results of these regressions. Somewhat surprisingly, unemployment rate was significantly higher after 2002 in regions that have resources and thus experienced negative revenue shocks. Similarly, GRP growth was slightly lower in these regions. It suggests that the higher level of economic activities, and by extension business actors' confidence level, likely cannot be attributed to generally better economic conditions.

Table 3.4: Comparison of unemployment rate and real GRP growth in resource-dependent vs. non-dependent regions, 1993-2013 and 2011-2016

Period	1993–2013		2011–2016	
Dependent variable	Unemployment	GRP growth	Unemployment	GRP growth
Dependence X Post-Shock	0.004**	-0.154*	-0.001	-0.220**
	(0.002)	(0.089)	(0.001)	(0.068)
N	1265	1499	557	480
Regions	80	80	80	80
Binary treatment variable	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Controls included	Yes	Yes	Yes	Yes
R^2	0.521	0.519	0.536	0.444

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

When we look at the 2014 shock unemployment was not significantly different in resource-producing regions compared to non-producing regions. Therefore, potential loss in manufacturing employment, for instance, is unlikely to be driven by overall economic conditions. GRP growth continued to be lower in resource-rich regions after the 2014 shock, which may be a sign of a ceiling effect. Oil and gas-dependent regions have showed generally better economic performance since the Soviet era compared to the non-producers. As a result, there may be little room for *relative* economic growth for these regions as years pass. Therefore, lower economic growth after the revenue shock is unlikely to be the reason behind the result that the price-induced shock of 2014 did not bring positive changes in the same way as the 2002 shock.

A considerable number of the natural resource producers in Russia are autonomous republics (See Table A1 for a list of producers). The distinct political and economic dynamics of these regions are well documented. They have a history of having leverage to bargain for benefits and autonomy from the federal government (Treisman, 2001) and typically resisted market-oriented reforms in the early years of transition (Desai, Freinkman and Goldberg, 2003). These regions were most powerful vis-a-vis the federal government in the first decade of Russia's transition, but their political and economic autonomy began to

shrink in the 2000s. It is possible that their economies started to catch up with the rest of the country in the 2000s, as they opened up to market reforms and, therefore, accelerations of economic activities in these regions, rather than the negative revenue shocks after 2002, are driving the results of the baseline regressions. To address this possibility, I include an interaction of autonomous republic indicator variable X Post-shock indicator variable in both sets of regressions. The results in the Appendix (Tables A7) show that the coefficients of these interactions were statistically significant in the case of private investment in fixed capital, but the signs are negative, implying that autonomous regions tend to have lower level of investment. In the case of the 2014 regressions (Table A11), autonomous regions do not emerge to be different from other regions. Overall, even after controlling for these interactions, the results stand in both sets of regressions.

Another feature of Russia's resource dependence is that there are a few regions that are extremely well-endowed, as reflected in the fact that the distribution of oil and gas regions is lumped around the tails. Therefore, some resource-rich and economically developed outlier, such as Tyumen', could be behind the high levels of economic activities in the oil and gas regions. I account for this possibility by running the baseline regressions with jackknife variance estimations, dropping one region at a time. The results are not significantly different from the baseline results, as shown in the Tables A6 and A10.

3.5   Conclusion

The literature on "the resource curse" is criticized for being preoccupied with determining whether the "curse" exists. In particular, many studies of resource dependence focus on how positive and significant shocks to revenues leave resource-producers worse-off compared to their resource-poor counterparts. This tendency in the literature leaves many interesting issues understudied, one of which is the effect of negative revenue shocks.

This chapter zooms in on Russia's oil and gas producing regions' experiences during two particular shocks. Using quantitative data from various sources, I find that when these

regions faced a negative shock to their oil and gas revenues as a result of a federal policy shift in 2002, the levels of private investment in fixed capital and small business entry to the market have increased considerably. In contrast, after world oil and gas prices reduced their revenues in 2014, growth in private investment, small businesses, employment in manufacturing, and entrepreneurial loans were not affected significantly. If anything, there are signs that they decelerated following this arguably temporary shock. Additional analysis reveals that such different outcomes may have been driven by changes in the political economic and business environment—after the policy shock regime scores and ratings of business environment improved in resource-producing regions, while following the price shock they seem to have worsened.

Interestingly, when we look at the larger picture of Russian regions, the substantial differences between resource-producing and non-producing regions in relative economic performances does not seem to have changed. Data show that the top and bottom ten regions with the highest and lowest gross regional products per capita respectively are the same regions in 2002, 2007, and 2013. The top ten regions include major oil- and gas-producers. This implies that the negative revenue shocks may not have made a considerable difference in the relative economic performance of the regions.

Broadly, these findings have curious implications for policy aimed at rectifying "the resource curse." They imply that a reduction in resource dependence may lead to reversal of "the curse" in some contexts, especially when the shock is institutionalized and leads elites to believe that it is permanent. In contrast, temporary shocks may not bring such benefits, but may worsen the conditions for private economic actors. Therefore, instruments that affect the dynamics of resource revenues may prove useful in overcoming "the curse".

The analyses in this chapter supplement the cross-national study forthcoming in Chapter 5. A cross-national study may not be sufficient in accurately depicting the relationship between negative revenue shocks and economic outcomes, even while taking account of unobserved country-level differences with fixed effects, due to internal validity concerns.

The key assumptions necessary for causal inference may be violated, as variables can be measured improperly across countries, conceptualization of the causal process may not be sensitive to country contexts, and various characters of the sampled countries can confound the examination. These concerns are minimal in a sub-national study such as this chapter.

Table A1: List of oil- and gas-producing regions as of 2002 (in descending order of production volume)

Tyumen' oblast'
Orenburg oblast'
Republic of Tatarstan
Tomsk oblast'
Astrakhan oblast'
Republic of Komi
Samara oblast'
Republic of Bashkortostan
Perm krai
Republic of Udmurtia
Arkhangel'sk oblast'
Sakhalin oblast'
Krasnodar krai
Volgograd oblast'
Saratov oblast'
Republic of Sakha (Yakutia)
Stavropol' krai
Republic of Daghestan
Kaliningrad oblast'
Ulyanovsk oblast'
Rostov oblast'
Krasnoyarsk krai
Taimyr (Dolgano-Nenets) autonomous okrug
Republic of Kalmykia
Novosibirsk oblast'
Republic of Ingushetia
Republic of Adygeya
Penza oblast'
Irkutsk oblast'
Omsk oblast'
Evenk autonomous okrug
Republic of Kabardino-Balkaria
Kamchatka krai
Kirov oblast'
Republic of North Ossetia-Alania

Table A2: Pre-shock differential linear-trend analyses

Dependent variable	(1) Private investment	(2) Small business entry	(3) Δ Private investment	(4) Δ Small business entry	(5) Δ Manufacturing employment	(6) Δ Entrepreneurial loan
Resource X	-0.044	-0.310	0.069**	0.429	0.007	1.127
pre-treatment linear trend	(0.029)	(0.242)	(0.031)	(0.670)	(0.007)	(1.043)
Binary treatment variable	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
N	697	540	320	320	316	320
R^2	0.883	0.117	0.089	0.032	0.217	0.603

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: Summary statistics for panel data

Variable	Unit/Description	Mean	Std. Dev.	Min.	Max.
Regressions for 1993–2013					
Log(Private investment in fixed capital per capita)	Log (Thousand rubles/population)	0.989	2.338	-8.781	5.726
Log(Small firm entry/10,000 enterprises)	Log(New small firms/10,000 enterprises)	3.000	3.320	-4.853	9.213
Log(Resource production)	Log(Thousand b.o.e.)	6.736	8.038	0.000	22.378
Log(Population)	Log(People)	14.070	0.878	10.833	16.304
Regional tax capacity index	Numbers	0.821	0.666	0.079	9.746
Log(Regional income pc)	Log(Rubles)	7.951	1.714	2.398	10.913
Autonomous republic	Binary variable	0.263	0.440	0.000	1.000
Regime openness	Expert scores	29.012	6.285	14.000	45.000
Investment climate ranking	Expert ranking	47.837	23.644	1.000	89.000
Log(Oil production value)	Log(Oil price X Production)	3.909	7.950	0.000	26.240
Log(Gas production value)	Log(Gas price X Production)	2.882	6.867	0.000	26.076
Log(Unemployment)	Log(% of workforce)	2.135	0.536	-0.223	4.215
Real GRP growth	% over previous year's GRP	29.251	34.243	-27.644	227.61
Regressions for 2010/11–2016/17					
Δ Log (Private investment in fixed capital per capita)	Δ Log (Thousand rubles/population)	0.073	0.293	-1.915	1.383
Δ Log(Small firm entry/10,000 enterprises)	Δ Log(New small firms/10,000 enterprises)	0.055	4.743	-10.814	11.192
Δ Log(Employees in manufacturing per 10,000 people)	Log(Employees/10,000 people)	-0.002	0.126	-1.215	1.212
Δ Log(Loans to individual entrepreneurs per 10,000 people)	Log(Rubles/10,000 people)	-0.005	0.388	-2.077	1.465
Log(Resource production)	Log(Thousand b.o.e.)	3.860	7.482	0.000	22.500
Log(Population)	Log(People)	14.029	0.907	10.808	16.342
Log(Regional income pc)	Log(Rubles)	9.952	0.345	8.959	11.065
Regional tax capacity index	Numbers	0.851	0.743	0.099	7.420
Autonomous republic	Binary variable	0.263	0.440	0.000	1.000
Regime openness	Expert scores	28.000	5.499	16.000	42.000
Investment climate ranking	Expert ranking	47.650	23.938	6.000	89.000
Log(Unemployment)	Log(% of workforce)	1.860	0.478	-0.223	3.908
Real GRP growth	% over previous year's GRP	10.269	7.384	-46.010	39.298

Table A4: Robustness check: Comparison of private investment in fixed capital (per capita) and small business entry (per 10,000 enterprises) in resource-dependent vs. non-dependent regions, 1993/1995–2013 **(with clustered errors)**

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Private Investment in Fixed Capital (pc)				Small business entry (per 10,000 firms)			
Resources X Post–2002	0.178*	0.164*	0.010	0.008	0.398	0.488	0.039*	0.046**
	(0.104)	(0.097)	(0.007)	(0.006)	(0.327)	(0.333)	(0.020)	(0.020)
Log(Population)	-1.692**	-1.630**	-1.677**	-1.612**	-7.011***	-7.169***	-7.359***	-7.538***
	(0.610)	(0.605)	(0.607)	(0.601)	(1.894)	(1.885)	(1.886)	(1.871)
Regional tax capacity index	0.166***	0.156***	0.164***	0.154***	-0.012	0.017	-0.020	0.009
	(0.033)	(0.036)	(0.034)	(0.037)	(0.258)	(0.259)	(0.245)	(0.245)
Log(Regional income pc)	0.555**	0.511**	0.563**	0.518**	0.332	0.413	0.375	0.462
	(0.230)	(0.237)	(0.231)	(0.239)	(0.710)	(0.699)	(0.700)	(0.686)
Log(value of oil production)		-0.003		-0.003		-0.018		-0.021
		(0.004)		(0.004)		(0.023)		(0.023)
Log(value of gas production)		0.011**		0.010**	-0.014	-0.014	-0.013	-0.013
		(0.005)		(0.005)	(0.022)	(0.022)	(0.022)	(0.022)
Observations	1649	1649	1649	1649	1492	1492	1492	1492
Regions	80	80	80	80	80	80	80	80
Binary treatment variable	Yes	Yes	No	No	Yes	Yes	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-specific time trends	No	No	No	No	No	No	No	No
Errors clustered at regions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.958	0.958	0.958	0.958	0.196	0.198	0.198	0.200
adj. R^2	0.955	0.955	0.955	0.955	0.138	0.139	0.139	0.140

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable in Columns (1) through (4) is private investment in fixed capital per capita and Columns (5) through (8) is small business entry per 10,000 firms.

Table A5: Robustness check: Comparison of private investment in fixed capital (per capita) and small business entry (per 10,000 enterprises) in resource-dependent *vs.* non-dependent regions, 1993/1995–2013 (**with region-specific time trends**)

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Private Investment in Fixed Capital (pc)				Small business entry (per 10,000 firms)			
Resources X Post–2002	0.118	-0.017	0.005	-0.003	0.489	0.883	0.041	0.066*
	(0.107)	(0.105)	(0.007)	(0.007)	(0.621)	(0.660)	(0.037)	(0.039)
Log(Population)	-3.381**	-3.648**	-3.369**	-3.632**	-9.832**	-9.793**	-9.999**	-9.952**
	(1.142)	(1.138)	(1.142)	(1.140)	(3.446)	(3.349)	(3.461)	(3.357)
Regional tax capacity index	-0.056	-0.061	-0.055	-0.060	0.145	0.154	0.139	0.147
	(0.040)	(0.045)	(0.040)	(0.045)	(0.269)	(0.270)	(0.270)	(0.271)
Log(Regional income pc)	0.992***	0.927***	0.992***	0.926***	-0.923*	-0.453	-0.930*	-0.440
	(0.037)	(0.036)	(0.037)	(0.036)	(0.510)	(0.564)	(0.511)	(0.563)
Log(value of oil production)		0.014***		0.014***		0.006		0.005
		(0.003)		(0.003)		(0.024)		(0.024)
Log(value of gas production)		0.002		0.002		-0.051**		-0.052**
		(0.004)		(0.004)		(0.023)		(0.023)
Observations	1649	1649	1649	1649	1492	1492	1492	1492
Regions	80	80	80	80	80	80	80	80
Binary treatment variable	Yes	Yes	No	No	Yes	Yes	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-specific time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Errors clustered at regions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.965	0.966	0.965	0.966	0.169	0.173	0.169	0.174
adj. R^2	0.963	0.964	0.963	0.964	0.118	0.121	0.118	0.122

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable in Columns (1) through (4) is private investment in fixed capital per capita and Columns (5) through (8) is small business entry per 10,000 firms.

Table A6: Robustness check: Comparison of private investment in fixed capital (per capita) and small business entry (per 10,000 enterprises) in resource-dependent vs. non-dependent regions, 1993/1995–2013 **(with jackknife estimators)**

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Private Investment in Fixed Capital (pc)				Small business entry (per 10,000 firms)			
Resources X Post–2002	0.178*	0.164	0.010	0.008	0.398	0.488	0.039*	0.046**
	(0.107)	(0.100)	(0.007)	(0.006)	(0.341)	(0.348)	(0.021)	(0.021)
Log(Population)	-1.692**	-1.630**	-1.677**	-1.612**	-7.011**	-7.169**	-7.359***	-7.538***
	(0.683)	(0.677)	(0.682)	(0.675)	(2.112)	(2.121)	(2.099)	(2.102)
Regional tax capacity index	-0.056	-0.061	-0.055	-0.060	0.145	0.154	0.139	0.147
	(0.040)	(0.045)	(0.040)	(0.045)	(0.269)	(0.270)	(0.270)	(0.271)
Log(Regional income pc)	0.166***	0.156***	0.164***	0.154***	-0.012	0.017	-0.020	0.009
	(0.035)	(0.038)	(0.036)	(0.039)	(0.446)	(0.449)	(0.423)	(0.424)
Log(value of oil production)		-0.003		-0.003		-0.018		-0.021
		(0.004)		(0.004)		(0.024)		(0.024)
Log(value of gas production)		0.011**		0.010**		-0.014		-0.013
		(0.005)		(0.005)		(0.023)		(0.023)
Observations	1649	1649	1649	1649	1492	1492	1492	1492
Regions	80	80	80	80	80	80	80	80
Binary treatment variable	Yes	Yes	No	No	Yes	Yes	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-specific time trends	No	No	No	No	No	No	No	No
Errors clustered at regions	No	No	No	No	No	No	No	No
R^2	0.958	0.958	0.958	0.958	0.196	0.198	0.198	0.200
adj. R^2	0.955	0.955	0.955	0.955	0.138	0.139	0.139	0.140

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable in Columns (1) through (4) is private investment in fixed capital per capita and Columns (5) through (8) is small business entry per 10,000 firms.

Table A7: Robustness check: Comparison of private investment in fixed capital (per capita) and small business entry (per 10,000 enterprises) in resource-dependent vs. non-dependent regions, 1993/1995–2013 **(controling for autonomous regions)**

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Private Investment in Fixed Capital (pc)				Small business entry (per 10,000 firms)			
Resources X Post–2002	0.183***	0.169**	0.010**	0.009**	0.398	0.488	0.039*	0.046**
	(0.051)	(0.053)	(0.003)	(0.003)	(0.349)	(0.357)	(0.021)	(0.022)
Autonomous X Post–2002	-0.139**	-0.135**	-0.146**	-0.141**	0.016	-0.001	-0.018	-0.041
	(0.058)	(0.058)	(0.058)	(0.058)	(0.395)	(0.395)	(0.395)	(0.396)
Log(Population)	-1.524***	-1.467***	-1.506***	-1.447***	-7.035***	-7.167***	-7.334***	-7.479***
	(0.253)	(0.253)	(0.253)	(0.253)	(1.982)	(1.985)	(1.979)	(1.982)
Regional tax capacity index	0.157***	0.147***	0.155***	0.145***	-0.011	0.017	-0.021	0.007
	(0.035)	(0.035)	(0.035)	(0.035)	(0.223)	(0.224)	(0.223)	(0.224)
Log(Regional income pc)	0.537***	0.494***	0.544***	0.501***	0.334	0.412	0.373	0.458
	(0.113)	(0.113)	(0.113)	(0.114)	(0.775)	(0.780)	(0.774)	(0.779)
Log(value of oil production)		-0.003		-0.003		-0.018		-0.021
		(0.003)		(0.003)		(0.022)		(0.022)
Log(value of gas production)		0.010**		0.010**		-0.014		-0.013
		(0.004)		(0.004)		(0.023)		(0.023)
Observations	1649	1649	1649	1649	1492	1492	1492	1492
Regions	80	80	80	80	80	80	80	80
Binary treatment variable	Yes	Yes	No	No	Yes	Yes	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-specific time trends	No	No	No	No	No	No	No	No
Errors clustered at regions	No	No	No	No	No	No	No	No
R^2	0.958	0.958	0.958	0.958	0.196	0.198	0.198	0.200
adj. R^2	0.955	0.955	0.955	0.955	0.137	0.138	0.139	0.140

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable in Columns (1) through (4) is private investment in fixed capital per capita and Columns (5) through (8) is small business entry per 10,000 firms.

Table A8: Robustness check: Comparison of various measures of business activities in resource-dependent vs. non-dependent regions, 2011-2016 **(with clustered errors)**

Dependent variable	(1) ΔPI	(2) ΔPI	(3) ΔSB	(4) ΔSB	(5) ΔEM	(6) ΔEM	(7) ΔEL	(8) ΔEL
Dependence X post-2014	**0.039**	**0.001**	**-1.569****	**-0.077****	**-0.032****	**-0.002****	**-0.079**	**-0.004**
	(0.056)	(0.003)	(0.518)	(0.031)	(0.013)	(0.001)	(0.051)	(0.003)
Log(Population)	-1.780	-1.781	-6.338	-6.222	0.238	0.243	-0.974	-0.968
	(1.762)	(1.768)	(9.440)	(9.445)	(0.224)	(0.223)	(1.276)	(1.276)
Regional tax capacity index	0.074	0.074	-1.092	-1.124	-0.039**	-0.040**	0.000	-0.002
	(0.084)	(0.083)	(1.025)	(1.038)	(0.018)	(0.018)	(0.077)	(0.074)
Log(Regional income pc)	0.201	0.197	6.541*	6.561*	-0.174	-0.176	0.144	0.142
	(0.320)	(0.321)	(3.312)	(3.309)	(0.125)	(0.125)	(0.223)	(0.223)
Level of unemployment					-0.007	-0.007		
					(0.005)	(0.005)		
Ranking of investment climate							-0.003	-0.003
							(0.005)	(0.005)
Observations	559	559	560	560	553	553	480	480
Regions	80	80	80	80	80	80	80	80
Binary treatment variable	Yes	No	Yes	No	Yes	No	Yes	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-specific time trends	No	No	No	No	No	No	No	No
Errors clustered at regions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R²	0.105	0.105	0.081	0.080	0.054	0.054	0.669	0.669

* Standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01. Dependent variable in Columns (1) and (2) is annual change in private investment in fixed capital per capita, in Columns (3) and (4) it is annual change in small business entry per 10,000 firms, in Columns (5) and (6) the number of people employed in manufacturing sector per 10,000 people, and in Columns (7) and (8) the loans granted by banks to individual entrepreneurs.

Table A9: Robustness check: Comparison of various measures of business activities in resource-dependent vs. non-dependent regions, 2011-2016 **(with region-specific time trends)**

Dependent variable	(1) ΔPI	(2) ΔPI	(3) ΔSB	(4) ΔSB	(5) ΔEM	(6) ΔEM	(7) ΔEL	(8) ΔEL
Dependence X post-2014	-0.206*	-0.014**	-1.672	-0.083	-0.027	-0.001	-0.004	0.001
	(0.122)	(0.007)	(2.251)	(0.124)	(0.059)	(0.003)	(0.157)	(0.009)
Log(Population)	-10.902*	-10.920*	-121.405	-121.295	-1.018	-1.016	3.138	3.153
	(5.650)	(5.638)	(104.294)	(104.306)	(2.743)	(2.744)	(9.171)	(9.172)
Regional tax capacity index	0.169*	0.161*	-0.693	-0.711	-0.007	-0.008	0.068	0.070
	(0.092)	(0.092)	(1.710)	(1.715)	(0.045)	(0.045)	(0.156)	(0.157)
Log(Regional income pc)	0.094	0.102	-11.645*	-11.650*	-0.084	-0.084	-4.873***	-4.874***
	(0.337)	(0.337)	(6.214)	(6.215)	(0.175)	(0.175)	(0.430)	(0.430)
Level of unemployment					-0.010	-0.010		
					(0.008)	(0.008)		
Ranking of investment climate							-0.014	-0.014
							(0.013)	(0.013)
Observations	559	559	560	560	553	553	480	480
Regions	80	80	80	80	80	80	80	80
Binary treatment variable	Yes	No	Yes	No	Yes	No	Yes	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-specific time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-specific time trends	No	No	No	No	No	No	No	No
Errors clustered at regions	No	No	No	No	No	No	No	No
R^2	0.265	0.268	0.085	0.085	0.062	0.061	0.528	0.528

* Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable in Columns (1) and (2) is annual change in private investment in fixed capital per capita, in Columns (3) and (4) it is annual change in small business entry per 10,000 firms, in Columns (5) and (6) the number of people employed in manufacturing sector per 10,000 people, and in Columns (7) and (8) the loans granted by banks to individual entrepreneurs.

Table A10: Robustness check: Comparison of various measures of business activities in resource-dependent vs. non-dependent regions, 2011-2016 **(with jackknife estimators)**

Dependent variable	(1) ΔPI	(2) ΔPI	(3) ΔSB	(4) ΔSB	(5) ΔEM	(6) ΔEM	(7) ΔEL	(8) ΔEL
Dependence X post-2014	0.039	0.001	-1.569**	-0.077**	-0.032**	-0.002**	-0.079	-0.004
	(0.062)	(0.004)	(0.588)	(0.036)	(0.015)	(0.001)	(0.057)	(0.003)
Log(Population)	-1.780	-1.781	-6.338	-6.222	0.238	0.243	-0.974	-0.968
	(2.104)	(2.111)	(11.340)	(11.351)	(0.277)	(0.277)	(1.532)	(1.532)
Regional tax capacity index	0.074	0.074	-1.092	-1.124	-0.039	-0.040	0.000	-0.002
	(0.102)	(0.103)	(1.485)	(1.532)	(0.029)	(0.030)	(0.132)	(0.129)
Log(Regional income pc)	0.201	0.197	6.541*	6.561*	-0.174	-0.176	0.144	0.142
	(0.337)	(0.338)	(3.446)	(3.438)	(0.149)	(0.149)	(0.241)	(0.240)
Level of unemployment					-0.007	-0.007		
					(0.008)	(0.008)		
Ranking of investment climate							0.003	0.003
							(0.005)	(0.005)
Observations	559	559	560	560	553	553	480	480
Regions	80	80	80	80	80	80	80	80
Binary treatment variable	Yes	No	Yes	No	Yes	No	Yes	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-specific time trends	No	No	No	No	No	No	No	No
Errors clustered at regions	No	No	No	No	No	No	No	No
R^2	0.105	0.105	0.081	0.080	0.054	0.054	0.669	0.669

* Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable in Columns (1) and (2) is annual change in private investment in fixed capital per capita, in Columns (3) and (4) it is annual change in small business entry per 10,000 firms, in Columns (5) and (6) the number of people employed in manufacturing sector per 10,000 people, and in Columns (7) and (8) the loans granted by banks to individual entrepreneurs.

Table A11: Robustness check: Comparison of various measures of business activities in resource-dependent vs. non-dependent regions, 2011-2016 **(controling for autonomous regions)**

Dependent variable	(1) ΔPI	(2) ΔPI	(3) ΔSB	(4) ΔSB	(5) ΔEM	(6) ΔEM	(7) ΔEL	(8) ΔEL
Dependence X post-2014	0.040	0.002	-1.535	-0.075	-0.032	-0.002	-0.078	-0.004
	(0.062)	(0.003)	(1.039)	(0.057)	(0.027)	(0.001)	(0.057)	(0.003)
Autonomous X post-2014	-0.012	-0.011	-0.896	-0.917	-0.001	-0.001	-0.023	-0.024
	(0.059)	(0.059)	(0.988)	(0.988)	(0.026)	(0.026)	(0.055)	(0.055)
Log(Population)	-1.738*	-1.742*	-3.040	-2.851	0.240	0.245	-0.862	-0.851
	(0.925)	(0.925)	(15.289)	(15.296)	(0.436)	(0.436)	(0.994)	(0.994)
Regional tax capacity index	0.075	0.075	-0.986	-1.016	-0.039	-0.040	0.004	0.002
	(0.076)	(0.076)	(1.274)	(1.276)	(0.033)	(0.033)	(0.079)	(0.079)
Log(Regional income pc)	0.200	0.195	6.466	6.481	-0.174	-0.176	0.147	0.146
	(0.307)	(0.307)	(5.140)	(5.148)	(0.136)	(0.136)	(0.330)	(0.330)
Level of unemployment					-0.007*	-0.007*		
					(0.004)	(0.004)		
Ranking of investment climate							0.004	0.004
							(0.007)	(0.007)
Observations	559	559	560	560	553	553	480	480
Regions	80	80	80	80	80	80	80	80
Binary treatment variable	Yes	No	Yes	No	Yes	No	Yes	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-specific time trends	No	No	No	No	No	No	No	No
Errors clustered at regions	No	No	No	No	No	No	No	No
R²	0.105	0.105	0.082	0.081	0.054	0.054	0.669	0.669

* Standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01. Dependent variable in Columns (1) and (2) is annual change in private investment in fixed capital per capita, in Columns (3) and (4) it is annual change in small business entry per 10,000 firms, in Columns (5) and (6) the number of people employed in manufacturing sector per 10,000 people, and in Columns (7) and (8) the loans granted by banks to individual entrepreneurs.

Chapter 4

Policies Affecting Business Development in Russian Regions Following Negative Revenue Shocks

4.1 Introduction

The statistical analysis in Chapter 3 shows a strong relationship between negative revenue shocks and indicators of private business activities and the institutional environment. In particular, following the policy shock in 2002 that centralized oil and gas revenues, private investment in fixed capital and small business entry increased significantly in resource-rich regions, while the price shock of 2014 had mostly insignificant and potentially negative effect on private business activities in these regions. In this chapter, I demonstrate that the policy shock of 2002 incentivized regional governments to open up structured avenues for businesses to express their demand for a better business environment and more support from the government as well as to increase their policy and material support for entrepreneurs and small- and medium-sized businesses. In contrast, the years following the price shock of 2014 did not induce such changes, but rather featured retraction in some regional government policies regarding private business activities.

The following section explicates the reasons behind my decision to primarily focus on the cases of Tatarstan and Tyumen'. The third section describes how the perception of the two shocks differed for regional elites in resource-rich regions. Specific policy choices following the two shocks are discussed in the fourth section, while the final section

contextualizes the policies and offers concluding thoughts.

4.2   Case selection and data

Out of Russia's 89 regions, 39 produce some amount of gas and oil and have felt the budgetary effect of the two shocks in 2002 and 2014 (Appendix Figure 1). I chose Tatarstan and Tyumen' as focal regions with a logic of most different case selection. The idea is to compare two cases where the independent as well as the dependent variables (the outcomes) are similar, but other potentially confounding variables are different. The strength of the most different cases approach is that it can be definitive in eliminating other alternative causes and explanations for the phenomenon under study (Seawright and Gerring, 2008) depending on the extent to which the cases truly differ on potentially confounding variables. Findings based on this approach can also be broadly generalizable, since cases with more differences can represent the larger population of theoretical interest better compared to narrower criteria of case selection. The disadvantage of the approach is that it may provide weak evidence of causal relationship in contrast to its reverse, the most similar cases approach, because it relies on an implicit assumption that the variation in the dependent variable can only be caused by the independent variable (Gerring, 2006). Identifying factors other than the independent variable that may confound the causal relationship and rule them out by showing that they differ across the cases based on intimate knowledge of the case contexts mitigate this concern.

Tyumen' and Tatarstan experienced large revenue declines as a result of both the policy and price shocks, since they produce significant amount of Russia's oil and gas. Tyumen' is the number one producer in terms of combined volume of oil and gas output, while Tatarstan stands in the third place. They both adopted considerable policy changes in reaction to the two shocks, but differ along several dimensions. Tatarstan historically has had more autonomy than Tyumen'. In fact, Tatarstan and Chechnya are the only two regions in Russia that still have bilateral treaties with Kremlin. This could provide the regional

government of Tatarstan with more room and thus more incentives to closely interact with businesses. More autonomy may also put Tatarstan in a better position to negotiate with the federal government to mitigate the effects of the negative revenue shock. Further, Tatarstan's political system is often characterized as stable and consolidated, while Tyumen' has more political challenges as a result of the fact that it has constituent autonomous okrugs (Khanty-Mansiisk and Yamalo-Nenets) to rule and negotiate with. Tatarstan has had only one turnover and two governors in the post-Soviet period, whereas Tyumen' has had four turnovers and five governors thus far.

The two regions also differ in terms of their overall investment environment. When Russia centralized its natural resource revenues in 2002, Tatarstan was ranked at number 9 in the country, whereas Tyumen' was in the 39th place. The policy changes and regional governments' efforts to improve the business environment that, I argue, the 2002 shock triggered are reflected in their investment climate scores in 2014, when the second shock hit. Tatarstan had moved to the 6th place in the nation and Tyumen' to the 28th. Relevant to my case selection strategy is the fact that the gap between the two regions is still considerable, which highlights their dissimilarity.

The characters of state-business relationship are also notably distinguished in these two regions. In Tatarstan, the state holds large shares in its most notable big businesses, such as the truck and engine producer KamAZ and oil and gas company Tatneft. In contrast, the business environment in Tyumen' is characterized as "pluralist," (Orttung, 2004) and many private companies compete for and run businesses in the region. Such divergent characters may lead the regions to have different incentives when it comes to enhancing political and institutional conditions for doing business—in theory, Tatarstan has fewer incentives than Tyumen' to invest in initiatives that would primarily benefit non-state businesses.

The ethnic and societal composition of the two regions also cannot be more different. Tatars constitute about 53% of the population and Russians 39.7% in Tatarstan. Tyumen' is a Russian-dominant region, where 73.3% of the population is Russian. Consequently,

Tatarstan has two official languages, Tatar and Russian, whereas Tyumen' has one. Ethnic and linguistic diversity may lead to underprovision of public goods, such as the environment for doing business, because non co-ethnics may be less inclined to cooperate and less likely to be in closer social networks (Habyarimana et al., 2007). Conversely, monolithic societies may be more likely to achieve higher economic performance, as they are more likely to choose cooperative equilibria and be better able to threaten social sanctioning to induce behaviors from the political elite that support the common good.

The main sources of information for this chapter are government documents, local news sites, scholarship, reports, and semi-structured interviews with 32 individuals that I conducted in 2015–2016 and 2018 in the capital city of Moscow and the two oil- and gas-rich regions. Interviews in the regions provided me with a clearer picture of the local context and regional government actions, while those in Moscow helped me gain a broad understanding of political and economic dynamics behind negative revenue shocks. The interviewees primarily belonged to three categories—government officials, business owners and managers and representatives of business associations, and scholars and professors with expertise in state-business relations and resource dependence. Government officials were the most difficult to recruit for interview; they constitute 22% of the interviewees. Owners and managers of businesses and business associations and scholars and experts make up 37.5% and 40.5% of the interviews, respectively. I interviewed some of the interviewees twice to compare their responses across different points in time.

4.3 Perceptions of the two shocks

The centralization of natural resource revenues in the form of Mineral Extraction Tax (MET) in 2002 affected the revenue stream of regional budgets in Tatarstan and Tyumen' considerably and it became increasingly clear that this change would be long lasting. Tyumen' faced a 15% budget deficit, the legally allowed maximum, in 2004 for the first time

in years, which the governor attributed to the centralization of MET.[1] Tatarstan's financial problems were relatively less momentous compared to those of Tyumen', but in 2003 it also registered its first budget deficit in many years.[2]

Newspaper articles and accounts from experts in fiscal relations in Russia indicate that the 2002 shock was widely considered to be an irreversible shock, and as time passed it has become painfully clear to regional governments. As expected, some regional governments, especially the resource-rich national republics who enjoyed de facto fiscal sovereignty (Martinez-Vazquez and Boex, 2001), attempted to hinder taxation efforts in Moscow, but complaints of Putin's reallocation of revenues and attempts to negotiate higher level of fiscal independence were systematically denied. The institutional channel through which regional elites previously voiced their demands was simultaneously obstructed when Putin reorganized the Federation Council in 2000. Further, Putin's decisive actions during the second Chechen war have likely alarmed regional elites and discouraged them from threatening with separatist intentions (Appel, 2008).

Specific instances of resource-rich regions demanding the reversal of the reallocation were not successful. Sources also report that natural resource producing regions voiced their concerns to the federal government repeatedly following the budget reform. Minister of Finance of Tatarstan, for instance, complained in 2004 that "the redistribution of revenues from mineral extraction tax in favor of the Federation" cost the region's budget two billion rubles and this effect is compounded by the reduction in federal transfers.[3] Officially, regions submitted various proposals to retain significant portions of mineral extraction taxes in the years immediately after the centralization of natural resource revenues. In the context of federal initiatives to decentralize powers from the federal to the regional level, regions proposed through the Federation Council to receive 55% of the mineral extraction

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[1]Kommersant. 2003. "Budget Excess: Authorities in Tyumen' prepares to adopt regional budget with maximum deficit" (Byudjetnyi Ekscess: Tyumenskie vlasti gotovyatsya k prinyatiyu byudjeta s maksimal'nym deficitom) Accessed July 20, 2020. https://www.kommersant.ru/doc/422370

[2]I thank Ekaterina Zhuravskaya for generously sharing data on Russian regions' budgets.

[3]Kommersant. 2004. "A billion rubles to donor districts" (Raionom-donoram posulili millard rublei) Accessed November 20, 2019. https://www.kommersant.ru/doc/503250

tax revenues. A year later another proposal surfaced at the Federation Council to keep 60% of mineral extraction taxes in regional budgets. Leaders of some affected regions took bold steps. For example, governor of Astrakhan Aleksandr Zhilkin threatened to call for a boycott of the State Duma elections in December 2003.[4] These attempts and threats fell short in persuading the federal authorities. Although increasing revenues from corporate profit tax compensated for some of the lost income (Interview2018577), regional governments came to a "collective realization that the money from oil was not coming back to them" (Interview2015741) and had to make permanent changes to how they viewed economic development in the long run.

Hopes of receiving enough funds to cover the revenue gap from the federal government were also unrealistic to regional governors. Secondary sources suggest that the funds that shifted from the regional governments to the federal government did not directly go back to the resource-rich regions. Revenues from the mineral extraction tax and the export customs duty on oil in excess of the cut-off price flowed into the Oil Stabilization Fund. Much of the rest of the funds were used for pension reform in the hands of the federal administration (Kraan et al., 2008).

Compared to the descriptions of the permanent shock in 2002, qualitative data on the 2014 shock shows a picture of expected transience regarding the decline in resource revenues. The public officials, Russian scholars, and business owners and managers whom I interviewed generally agreed that the 2014 shock was seen as temporary by regional authorities and did little to incentivize them to encourage private investment and businesses. There were also reasons for regional governors to believe that the federal government might come to their rescue. After all, during the 2009–2010 economic downturn, the federal government did provide struggling regions with support to minimize budget deficits (Interview2018577). The abundant funds of the Oil Stabilization Fund were also common knowledge, which may have led to expectations of fiscal rescue after the 2014 shock.

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[4]Kommersant. 2003. "Astrakhan authorities ready to boycott elections" (Astrakhanskie vlasti gotovy boikotirovat' vybory) Accessed August 21, 2020. https://www.kommersant.ru/doc/422880

4.4   Regional policies for business development

Regional authorities in Russia play an important role in facilitating business activities, which has been enhanced by the overall regionalization of investment opportunities in Russia since the early 2000s. The main instrument at the hands of the regional government is fiscal incentives, as it controls corporate, personal income, and land and transportation tax rates on its territory within the limits set by federal regulations. It also has leeway in implementing licensing and banking regulations. The latter is particularly consequential for small and medium businesses, as one of the biggest obstacles for entrepreneurs is "expensive loans" (Interview2018457). In addition, regional governments own a significant array of properties, which they lease to businesses at varying rates. Licensing in the sectors of health, medicine, and education falls in the authority of the regions. Moreover, regional authorities play a discursive role in facilitating the interaction between the state and businesses as their messages to entrepreneurs matter in decisions to pursue costly investment activities.

Aside from regional government actions, the behaviors of federal bureaucrats can affect the ease of doing business in Russia's regions. The key regulatory bodies on regional territories are branches of the federal government, including the Ministry of Internal Affairs and Judicial Department that investigate economic crimes and fraud and the Federal Tax Services that registers new businesses and ensures compliance with tax regulations. Although the heads of these agencies are appointed by the Kremlin, they are often natives of the region and most of the staff are residents local to the region. These individuals are the main interface between entrepreneurs and the state and their attitude and behavior towards businesses and the demands they impose on entrepreneurs have an impact on the level of investment and activities in the region.

Fiscal incentives

The years following the centralizing tax reform witnessed an increase in the regional government's fiscal support for private businesses in Tatarstan. A government official highlights that "a qualitatively new era began" in the state and business relationship (Interview2018904). Fiscal incentives can affect a firm's balance sheets by reducing costs—a business manager of a young tech firm states that "[taking advantage of regional benefits] requires someone to do their homework, but it can make such a difference for companies" (Interview2016665). Starting in 2002, the Tatarstan government reduced the corporate profit tax rate for certain businesses, such as those operating in special economic zones, and in certain sectors, like media production. The regional government also gave district and city authorities the right to reduce their share of the profit tax for up to 4% for enterprises working on mechanical engineering and light industry projects.[5] Another change in 2002 was that businesses can now deduct from their taxable profit expenses for critical activities for new businesses, such as advertising, medical and property insurance, the cost of *developing* natural resources, research, and development work.[6] In 2004, the region freed investment projects that contributed to specific regional development goals from the portion of federal taxes that accrues to the regional budget and all regional taxes.

Similarly, tax rates in Tyumen' became more considerate of the needs of businesses in the region following 2002. Local scholars describe the causal chain of the process as follows. "Given that all of MET began to withdraw to the federal budget, only profit tax was left for the oil region, and that rationally active subjects of Russia moved their basic revenues either to offshore accounts or to their headquarters, relatively small amount was left in the regions" (Davydenko, Lazutina and Romashkina, 2015). They continue that in the end, it turned out that only collection of tax on those employed in the manufacturing sector

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[5] Republic of Tatarstan, Law on the Budgetary System of RT for 2002. Number: 1213

[6] Joint report of Minister of Finance, Robert Musin, and the Chairman of the State Council Commission on Budgetary and Financial Issues, Ilsur Safiullin. 2003. "About the Budgetary system of the Republic of Tatarstan in 2002." Accessed January 5, 2020. https://go.wisc.edu/3663rf.

became the basis of the revenue part of the regional budgets, implying that the regional government had to find a way to expand their tax base in this direction.

Accordingly, Tyumen' region reduced its corporate profit tax rate from the federally imposed 24% (Baccini, Li and Mirkina, 2014) to 16%[7] in 2003. It also started to provide approved specific investment projects with a reduced tax rate at 10.5% in 2002. Further, tax exemptions became more inclusive of different sectors. Beginning in 2004, new businesses in the chemical and pharmaceutical industry could receive an exemption from property taxes until the business achieved its targeted capacity. In the Yamolo-Nenets Autonomous Okrug, which is a constituent part of the Tyumen' Oblast, the regional governor entered into an agreement to reduce the land tax rate and allow private companies to enter into government procurement procedures in return for companies participating in social projects of the region that would have suffered from the budgetary gap due to centralization of MET.[8]

In contrast to the overall flexibility taken on by the regional governments, the years following the 2014 shock saw a relative restriction and contraction in the fiscal incentives offered to businesses. For instance, although Tyumen's regional government discursively committed to providing a high level of tax incentives to businesses during the economically challenging years of 2014 and 2015, the tax incentives were limited to large business (e.g., milk producers with minimum capacity to produce 150 thousand tons of whole milk products and 50 thousand tubes of canned milk a year), businesses that had secured investment project approvals or entered into concession agreements, and businesses in the field of natural resources (e.g., organizations using multistage and cluster hydraulic fracturing technology).

Data on tax benefits on corporate profit tax granted by the regional governments shows a picture consistent with this observation. In Tatarstan, the tax benefit per registered business went down from 151.427 rubles in 2013 to 114.083 rubles in 2014, signifying a decrease of

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[7]Tyumen' Oblast', Law on the Regional Budget for Year of 2003. Number 105.

[8]Kommersant. 2003. "Budget without development. (Byudjet bez razvitiya). https://www.kommersant.ru/doc/435422 Accessed April 12, 2020.

24.6% within a year. The decline continued afterwards—this figure went down to 97.644 rubles in 2015 and 21.675 in 2016 and reached an unprecedented low of 7.957 rubles in 2017. For the first time since the shock, the tax benefit a registered business increased in 2018 to 30.480 rubles. Similarly, in Tyumen' the tax benefit per registered business experienced a shock, but on a larger scale. Between 2013 and 2014, regional support to businesses in form of tax benefit dropped from 26,063.800 rubles to 475.590 rubles per business. The number bounced back to 26,085.200 in 2015, but kept declining in 2016 to 2,496.23 rubles and in 2017 to 1,865.450 rubles. As in Tatarstan, 2018 was a better year for businesses in terms of fiscal benefits—regional tax benefit per a business went up to 5,275.59 rubles, but has not reached the overall level before the negative shock. Unfortunately, data for the years around the first shock in 2002 is not available.

Interactions with entrepreneurs and businesses

In addition to adjusting their fiscal instruments, regional governments appear to have changed their investment and participation in institutions and organizations that facilitate state-business relations. When resource-rich regions were hit with revenue decline due to centralization of MET in 2002, the regional governments showed a willingness to listen to the business community and several institutional mechanisms emerged to this effect in both Tatarstan and Tyumen'. Various government initiatives, including expansion of fiscal benefits, had a secondary "psychological effect" that encouraged businesses to participate in these institutions and voice their demands, even if they did not directly benefit from these initiatives (Interview2016843). The apparent importance and activities of these institutions peaked after 2002, but many of them suffered from under-funding, conflict with political leaders and consequent prosecutions or decline in their legitimacy around 2014 and afterwards.

An example of such an institution in Tatarstan is the Small and Medium Business Association (SMBA). Before its establishment in November 2002, sectoral business associations existed in Tatarstan, like the Association of Farmers and Peasant Households of Tatarstan

founded in 1991, but SMBA is considered to be the most influential business association in Tatarstan (Interview2016577). The association was established to provide independent venue for state-business relations and facilitate state support for businesses. One of the main motivations for establishing the association was the sense that there is more willingness on the side of the state to pay attention to businesses (Interview2016848). SMBA's membership had grown by late 2003 seven-fold,[9] and it played key roles in facilitating small and medium businesses' participation in procurement processes and creating the trade union of workers of small and medium businesses[10] among others. Its president sat on government committees that decided which companies would receive coveted government assistance. The effectiveness of this organization was undermined when the founder and president of SMBA, Haidar Haliullin, was accused of embezzling from the "Leasing Grant" program and arrested in 2017. The descriptions of court proceedings provide little direct evidence pointing to Haliullin's guilt and thus many argued that the evidence against him was circumstantial and minimal. They insist that his fall from grace was orchestrated by the state for his meddling in the distribution of state funds to favored businesses and interpreted it as a general attack on the business community. Haliullin received a seven-year sentence in prison during a highly publicized trial in 2019.

This episode is consistent with the experiences of other business associations after the shock of 2014. An employee of an association shared that having a conversation (*beseda*) with someone in power has become important to get things done for businesses during the economically difficult time after 2014 and business associations were no exception. The fact that business associations frequently have financial support from foreign government initiatives has been used to undermine them in this period (Interview2016119).

Another manifestation of the regional government's willingness to listen to businesses was the prominence of the Congress of Entrepreneurs in Tatarstan. The first Congress

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[9]Regnum Information Agency. 2003. "The number of participants in SMVA rose by seven times." (Chislo uchastnikov Assosiatsii prepriyatii malogo i srednogo buznesa Tatarstana vyroslo v 7 raz.) https://regnum.ru/news/economy/158357.html Accessed October 12, 2019.

[10]The trade union parted ways with SMBA and became an independent organization later on.

of Entrepreneurs took place in October 2003 in the city of Naberejnye Chelny with over 500 delegates. The Congress was attended by then-president Mintimer Shaimiev and then-prime minister (and now president) Rustam Minnikhanov among other high-level political officials. A report on the meeting reflects a tense environment in which a "prepared audience [that] sharply considered" various issues related to small- and medium-sized businesses ranging from the timing of taxes on new enterprises, local monopolies, and appropriateness of police conducting state inspections. Based on the report, Shaimiev mostly took a reactive position responding to questions, but notably brought up the large number of entrepreneurs operating in the "shady sphere" that are not registered with the state as income recipients and do not contribute to the state budget. One of specific appeals made from the government was to avoid wages "in envelopes" and take responsibility to contribute to social protection and pension provisions. Shaimiev said these entrepreneurs are depriving people of a secure future and [they] "do not have right to borrow on the people's expense." [11] One interpretation of this statement is that Shaimiev points to an implicit bargain between the state and SMEs—the state will create conditions for entrepreneurship and resolve their complaints, but more of them should contribute to the newly dented regional budget. This is a hard bargain to make, but it did not stop the President from using this logic to appeal to the Congress.

This gathering was more than a mere theater of state-business interactions. The regional government took it seriously to listen to the private sector, to prepare to respond to demands, and use the feedback to try to resolve problems related to important issues, such as inaccessibility of loans. Access to finances is one of the biggest obstacles facing small and medium businesses, especially at the beginning of their business. As a small business owner puts it, "we are not big enough to be targeted by raiding or bureaucratic corruption. State service has become generally accessible and easy for us in the 2000s and it has not

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[11]TatCenter News. 2003. "Mintimer Shaimiev: "We will create all conditions for the development of entrepreneurship" ("My sozdadim vse usloviya dlya razvitiya predprinimatel-stva") Accessed September 2, 2020. https://tatcenter.ru/news/mintimer-shajmiev-quot-my-sozdadim-vse-usloviya-dlya-razvitiya-predprinimatelstva-quot/.

gotten worse. For me, the largest problem is inability to get a loan, in addition to the requirement to contribute to pension funds" (Interview2016659). During the second Congress of entrepreneurs in 2006, the government announced that it is proposing regulations to expand insurance of businesses and that it has negotiated an agreement with Spurtbank and Tatfondbank (later Ak Bars bank joined) to provide government guarantee for loans for businesses lacking collateral on a competitive basis. This initiative took place through the government's Investment and Venture Fund, but later developed into a separate organization called the Guarantee Fund. The general success of this initiative was celebrated in the early years, but did not withstand the effects of the 2014 shock, as the Fund reduced the number of recipients considerably in late 2014.[12] The Tatarstan government also announced a new regime of electricity access at this meeting—the government established an agreement with the region's main electricity provider, Tatenergo, to reduce the small businesses' pre-payment required to connect to electricity lines to up to 90% under energy contracts. Small entrepreneurs were also to receive a differentiated rates to connect to electricity of up to 10 kilowatts. Access to electricity has also become easier for businesses, as the government laid down measures to streamline and simplify the rate setting system, the list of documents, timing of decisions, and the approval process. The Congress took place with some regularity before the 2014 shock—the second was organized in 2006 and the third in 2011. However, this tradition stopped in the years following the hardship from 2014 and afterwards.

In more official form, Tatarstan established its regional office for the Agency for Development of Enterpreneurship in 2002 with personnel of 50 people. The funding for this Agency came directly from the regional budget and provided for the founding of several sub-organizations, such as the Center for the Protection of the Rights of Entrepreneurs in Tatarstan's capital city Kazan', Center for Support of Small Businesses within the industrial-

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[12]Business Online. 2014. "Guarantee Fund of the Republic of Tatarstan has reduced the number of guarantees provided due to a reduction in lending in trade and rent. (Garantiinyi fond RT snizil kolichestvo predostavlennyh poruchitel'stva iz-za sokrasheniya kreditovaniya v torgovle i arende.) https://www.business-gazeta.ru/article/116608 Accessed September 13, 2020.

innovation technopark of Idea as well as in cities of Almet'evsk and Naberejnye Chelny (Cabinet of Ministries of the Republic of Tatarstan, 2002). This Agency was renamed the Committee for the Development of Small and Medium-Sized Businesses and elevated to status of a government executive agency and its head became a member of the region's Cabinet of Ministers in 2008. The new president Rustam Minnikhanov further extended this institution by turning it into the Agency for Investment Development in 2011 with a separate arm for supporting export-oriented business. A slew of other institutions came to existence within the government, including Investment and Venture Fund of the Republic of Tatarstan in 2004. The effectiveness of these organizations have arguably been negatively affected as a result of the negative shock in 2014. The financial support for these organizations were one of the first to be deducted from the regional budgets. The Ministry of Economy has started to centralize some of the functions into itself (Interview2016577).

Similarly, Tyumen' in the 2000s saw a new process of converting the need for budget security to raising real economic sectors (Davydenko, Lazutina and Romashkina, 2015). Tyumen governor, Vladimir Yakushev, established a regional investment and business support institution in 2006—Department of Investment Policy and State Support for Entrepreneurs, which plays key roles in coordinating assistance to businesses and entrepreneurs. Tyumen' Microfinance fund and Tyumen' Investment Fund were created in 2010 and 2013 respectively. Similar state agencies emerged in Tyumen's subordinate regions of Yamalo-Nenets and Khanty Mansk. These organizations came to existence with optimistic goals to actually support businesses, but when the 2014 shock hit they were young and inexperienced (Interview2016843). The financial hardship following the crisis turned them into opportunities for bureaucrats to deal with their own financial needs. An example of such practice was a notable scandal that broke out in 2015, as the deputy head of Microfinance Fund of Small Entrepreneurs and Guarantee Fund of Support for Small and Medium Entrepreneurs, Vasily Stepanov, was accused of fraud. He was allegedly put in this position by his son,

who was a deputy-governor of the region.[13]

Administrative burden

Administrative and regulatory burden is another critical area in which regional governments can have leadership to improve the business environment. Regional governments can adopt policies to minimize businesses' need to interact with the state. Governors may also change administrative regulations to lift predatory regulatory burden off the shoulders of small enterprises (Akhmedov and Zhuravskaya, 2004). Admittedly, not all administrative obstacles originate from regional agencies, as the regional branches of the federal government play significant role in implementing federal laws and requirements. However, the overall investment policy and discourse of the regional governments can have direct impact on the behaviors of the federal officers and staff, as many of them are locally recruited.

Tatarstan and Tyumen' both took progressive steps in this area after 2002. They were one of the early implementors of federal liberalization reforms aimed at reducing administrative burden. One aspect of the liberalization reform was the "one-stop shops," which meant to reduce administrative costs to businesses by formalizing the required list of documents and streamlining the business registration process. Their implementation had widely varied across Russia's regions (Yakovlev and Zhuravskaya, 2013). Tatarstan independently adopted a resolution to establish a one-stop shop in November 2002,[14] long before the federal law was adopted in January 2004. The first unified registration center opened just a month after the resolution in December 2002.[15] The government also launched a program "Starting a Business" in 2008. This program subsidizes the legal and consulting services

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[13]RBK Tyumen'. 2016. "Yamalo-Nenets Autonomous Okrug will appoint a new Deputy Governor." (V YANAO znachat novogo zamestitelya gubernatora). https://t.rbc.ru/tyumen/18/01/2016/569c725c9a794737033b3298 Accessed August 25, 2020.

[14]Cabinet of Ministers of Tatarstan. 2002. "Resolution on approval of the regulations for the registration of legal entities and individual entrepreneurs using "one window" technology."" (Postanovlenie ob utverjdenii reglamenta protsedury registratsii yuridichiskih lits i individual-nyx predprinimatelei po tehnologii "odnogo okna").

[15]RT Online. 2002. "Unified Registration Center opens". (Otkrylsya edinyi registratsionnyj tsentr) hrefhttp://rt-online.ru/p-rubr-obsh-3552/http://rt-online.ru/p-rubr-obsh-3552/ Accessed April 3, 2020.

for new businesses. Tyumen' opened its first unified center (single registration center) in 2007[16] and subsequent centers popped up across the region.

The institutional developments and successful implementation of the liberalization laws in Tatarstan and Tyumen' changed the nature of administrative burden on businesses and entrepreneurs. Small businesses no longer worried about how to register or comply with the official requirements of the state, but invisible pressures, like having to pay a bribe to pass an audit, have remained (Interview2018457). These less tractable burdens seem to have worsened after the 2014 shock. Access to straightforward bureaucratic services may have become more difficult to business owners who do not have "administrative resources" or connections in the government or bureaucracy. "When the prize gets smaller, it is natural for [a bureaucrat] to fight to make it bigger. He will still have to pay for his children's tuition" and likely his child studies in a private school in Russia or in Europe. This bureaucrat likely hopes that money will flow back in soon (Interview2016621). In an interview, a researcher notes that "following the 2014 crisis, the talk has changed for the better in the legal sense, but the reality of state pressure has been different" (Interview2016970).

One manifestation of such pressure is the fact that the period of financial difficulty following the 2014 resource-price shock featured a notable increase in state registration of economic crimes in both Tatarstan and Tyumen'. Entrepreneurs can interpret fluctuations in economic crimes and accusations as threat to their security and property from regulatory bodies and criminals who are connected with the state (Barinova et al., 2018). The number of people accused of economic crimes, which include illegal banking, pseudo-business, money laundering, illegal loans, malicious evasion from paying off accounts payable, deliberate bankruptcy, commercial bribery, and tax evasion among others, had been consistently declining in both regions from 2010, the first year detailed data is available, until 2014. In Tatarstan, the number of individuals accused of economic crimes grew by 13.6% between 2014 and 2015 from 1097 to 1246. Tyumen' saw a staggering 54% increase in the same period

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[16]Federal Tax Service. "History of Administration of Federal Tax Service. (Istoriya UFNS Rossii.) https://go.wisc.edu/d2238z Accessed August 20, 2020.

from 285 to 439. The number of registered economic crimes also experienced a bump in Tatarstan in 2015 by 11.6% and in Tyumen' in 2016 by 37%. Tyumen's regional commissioner for the protection of entrepreneurs' rights also reported that the annual number of complaints to Tyumen's ombudsman about criminal prosecution of entrepreneurs grew considerably between 2016 and 2017 by 47%.[17] In Tyumen', the number of tax inspections by state organs has also went up by 30% in 2015 defying the trend of continued decline in field inspections since 2010.

The budgetary incentives of the governments of Tyumen' and Tatarstan due to natural resource shocks aligned well with the federal government's overall strategy to centralize corruption in the Russian regions. Corruption was highly decentralized in the 2000s as opposed to the 2010s, when it has become concentrated in the upper levels of the government and administration (Interview2018309). The silver lining of this process for businesses was that in dealing with reduced resource revenues in the 2000s regional governors participated actively in regulating the behaviors of low- and mid-level bureaucrats and diminishing their ability to extract payments from businesses and entrepreneurs. This centralization process was particularly emphasized in regions with generally better investment climate, such as Tyumen' and Tatarstan, because firms value political connections less in their investment decisions in regions with better institutions (Yakovlev and Ivanov, 2020).

Unfortunately, this process also created perverse incentives for regional governors down the road, as its real consequence was a system that puts economic development in second place. An expert on Russian regional politics says that"the more important economic considerations become, the less important economic considerations become" to describe the political environment in the post-crisis period after 2014. They continued that deviation from the federal strategy has become more costly as time went by, as reflected in the "a significant percentage of Russian regional governors [...] sitting in prison as we

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[17]RBK Tyumen'. 2018. Tyumen's entrepreneurs complain about the actions of security officials. (Tyumenskie predprinimalteli jaluyutsya na deistviya siloviki). https://go.wisc.edu/0853wm Accessed April 4, 2020.

speak" (Interview2018619). According to this logic, the federal government fearing protests from the population started to put pressure on regional governors incentivizing regional governors to only worry about their political future, rather than the economic future of their region. The victory of political concerns over economic considerations was also reflected brightly in the case of Aleksei Kudrin, according to an interviewee. "Thanks to Kudrin, Russia had the [Reserve] Fund that gave [the government] enough space to weather the crisis [of 2014]. But look at what happened to Kudrin. Everyone watched how Kudrin will be treated after the 2018 election as a signal for how seriously the current president will take economic reform. As we know, he did not take a powerful position in the government" (Interview2018309).

The past and present governors of Tatarstan and Tyumen' are not among the arrested (in fact some of them assumed high offices in the federal government, such as former Tyumen' governor Vladimir Yakushev working as the Minister of Construction and Housing and Sergey Sobyanin as a mayor of Moscow), implying that they have been good at playing by the rules of the federal government and that political consideration came to dominate in these regions. Prioritization of politics over economics in the 2010s blended well with the general perception that the price shock to oil and gas would not last long. Therefore, the regional governments did not adopt significant policy changes as they did in 2002, especially when it came to reducing bureaucratic burden on the private sector. As a result, private business activities diminished.

Channeling federal support to entrepreneurs and businesses

Another noteworthy aspect of the Tyumen' and Tatarstan regional governments' support for businesses was that they took full advantage of federal government co-financing opportunities after 2002. Tatarstan is known to be particularly adept at extracting funds from the center (Sharafutdinova, 2013). Starting in 2005, the federal government made funds available to regional authorities that can be used for co-financing projects to benefit small businesses (Interview2018577). Tatarstan established a flagship initiative—"Leasing

Grant" program—in 2008 with partial use of federal funds. Under this program, new small and medium businesses can apply for monetary support from the state for up to 45% of their purchase of equipment on a competitive basis. The government took this initially regional initiative to the federal level. Upon realizing that the project was well-received by then-minister of economic development Elvira Nabiullina and was adopted and replicated in other regions, Tatarstan asked for an opportunity to increase the center's contribution. When the program ran into problems related to the selection process, the regional government attempted to continue the program, tightening the selection procedure and even broadcasting the meetings of the competition committee online. One motivation behind this insistence to continue the program was that Tatarstan did not want to lose the partial funding from the federal government.

Other notable jointly-funded projects include the IT Park complex, which was established in 2009 to support businesses in the fields of science and technology. It has benefited from federal funding and has grown to be a major hub for innovative businesses (Interview2016638). Tyumen' similarly jumped on the train of federally-funded projects. It established a technopark of its own in 2006 upon receiving over 300 million rubles from the federal government. The above-mentioned Guarantee Fund in Tatarstan also receives funding from the federal government. In fact, one of the main reasons banking partners like to participate in this program is the fact that federal funds are part of the deal—they know that Moscow's money is much more reliable than the region's (Interview2016104).

These programs reflect Tatarstan and Tyumen's regional governments' willingness to take steps to assist businesses. Not all regions take advantage of the federal opportunities, as participation in these programs are costly to the regional governments, because most of them require co-financing of activities from the regional budget. As federal funding declined following the shock to natural-resource prices in 2014, the reach and effectiveness of these initiatives also diminished.

4.5   Conclusion

This chapter aimed to illustrate the policy changes that the regions of Tatarstan and Tyumen' adopted following the policy shock of 2002 that centralized natural resource revenues from regions to Moscow and the price shock of 2014. Comparing two resource-rich regions that are different on key political and socio-economic variables, I show that the variation in the perception of the two shocks is connected to the variation in regional governments' policies towards businesses. Consistent with the results of the statistical analysis in Chapter 3, the regional governments stepped up their support for businesses through expanding their fiscal instruments, building and increasing their participation in institutions for state-business interactions, reducing administrative burden, and channeling federal support to their constituents after 2002. They reversed course after 2014. A scholar of Russia's regional politics notes that "characteristic of the authorities is [...] the syndrome of expecting better times, accompanied by intensification of the battle for dwindling financial recourse" to describe the reactions of Russian regions to the 2014 shock (Zubarevich, 2016).

The developments on the regional level after 2002 are particularly impressive, given that federal authorities had started to push the business community to the fringe from the mid-2000s. Modernizing the economy was on president Putin's agenda in the early 2000s, but the dramatic increase in oil price in the 2000s obviated the economic role of the business community in the eyes of the federal elites. This change was reflected in various decisions of the federal government, such as abandoning of the informal tradition for the president to meet with representatives of the business community on a regular basis, approximately every six months (Interview2018577). During the period of continued oil price increase between 2000 and 2008 that led to an exponential increase in the federal budget, Russia not only failed to invest in building new institutions to promote diversification, it dismantled some existing structures that were meant to help modernization. A clear example is closure of the Federal Fund for Support of Small Business in 2005 (Rutland, 2011). The rise of security and military branches of the government is also partially explained by the federal

government's decision to exert pressure over the business community.

The lukewarm response to the 2014 price shock by the regional governments in Tyumen' and Tatarstan, which differed from the active stance they took after 2002, may be partially explained by the particular feature of the environment Russian businesses operate in— Russia's labor market is quite resiliant to economic shocks. Regional governments did not face demands and expectations of increased monetary and infrastructure support from firms, because firms could minimize their employee expenses by legally furloughing or outright reducing salaries. This is a "secret cushion of Russian politicians protecting them in times of economic downturns" (Interview2018295).

The main conclusion of this chapter is that if governments perceive a negative shock as a long-lasting change, the moment of shock can serve as a moment of change and provide strong incentive to support businesses and improve the business environment. In contrast, negative shocks that are seen as temporary or have potential to be relieved through other means quickly may not change government policy and actually worsen behaviors of certain segments of public servants, such as bureaucrats. More broadly, the relationship between positive revenue shocks and business development in the literature (Mazaheri, 2016) seems to hold in the case of negative revenue shocks. The direction of the relationship depends on the decision-makers' view of the shock.

Table A1: List of interviewees

Interviewee	Occupation	Location	Number of interviews	Category
1	business association manager	Moscow	1	2
2	small business owner	region	2	2
3	professor	region	1	3
4	business association president	region	1	2
5	innovation park official	region	1	1
6	head of a research institute	Moscow	1	3
7	government official	region	1	1
8	professor	Moscow	2	3
9	business executive	Moscow	2	2
10	professor	Moscow	1	3
11	researcher at research institute	Moscow	1	3
12	researcher at a private business	Moscow	1	2
13	business owner	region	1	2
14	professor	region	1	3
15	professor	region	1	3
16	researcher at research institute	Moscow	1	3
17	professor	Moscow	1	3
18	government official	region	1	1
19	government official	region	2	1
20	government official	region	1	1
21	government official	Moscow	1	1
22	business owner	Moscow	1	2
23	professor	Moscow	1	3
24	professor	region	1	3
25	government official	region	1	1
26	professor	Moscow	1	3
27	professor	Moscow	1	3
28	business owner	region	1	2
29	business manager	region	1	2
30	business owner	region	1	2
31	small business owner	region	1	2
32	small business owner	region	1	2

Category 1: government official; Category 2: business owner, manager, or employee;
Category 3: scholars and researchers

Gas extraction, 2002 (million cubic meters)

0–1	101–500	3501–10000
2–100	501–3500	10001–100000
		100001–600000
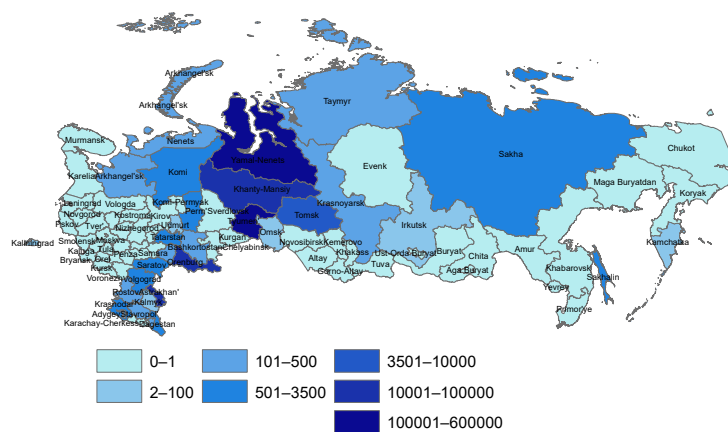
Oil extraction, 2002 (thousand tons)

0–0.6	500–1000	12001–24000
0.601–100	1001–2400	24001–100000
101–249	2401–5900	100001–260000
250–499	5901–12000	
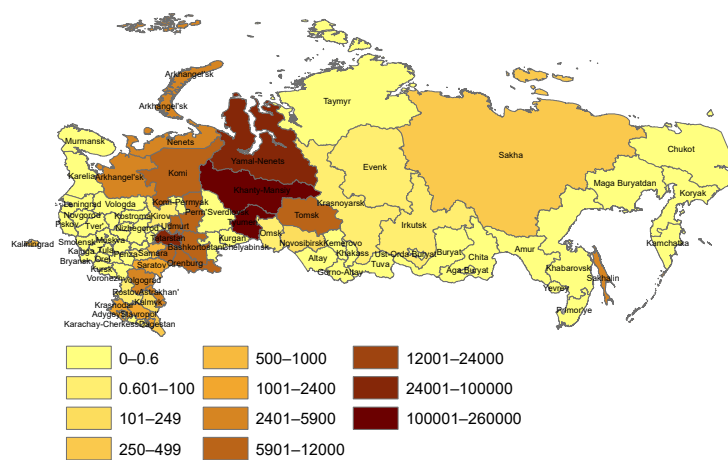
Figure A1: Distribution of the negative shocks across Russian regions

Chapter 5

Moments of Change? Revenue Shocks and Institutional Changes

5.1   Introduction

The relationship between natural resource abundance and economic growth has long intrigued political scientists and economists. Influential studies suggest that exploitation of natural resources negatively affects economic development by triggering a rise in currency value and shift of talent and capital to the resource sector at the expense of other tradable sectors. Institutions, broadly defined, have emerged as a key variable in providing nuance for the early version of this "resource curse" argument, as later work found that the effect of resources on the economy may be conditioned on institutional quality. Weak institutions before resource production can lead to squandering of resource revenues through government employment and patronage spending, while strong institutions may maximize benefits of resource revenues (Robinson, Torvik and Verdier, 2006). Further, institutions themselves can be affected by the resource windfall and end up determining economic outcomes later (Sala-i Martin and Subramanian, 2013). The body of work connecting resource dependence to institutions suffers from the same general shortcomings of the "resource curse" literature described in detail in Chapter 2—strong focus on positive revenue shocks, insufficient attention paid to the dynamics of resource revenues, untested assumption of resource symmetry.

   This chapter aims to contribute to addressing these gaps by empirically estimating

the average effects of revenue shocks on broad institutions that can determine growth trajectories of countries. Specifically, I examine the effect of negative revenue shocks on changes in political and economic institutions using a first-differences model with country-level fixed effects. While doing so, I test whether positive and negative revenue shocks have symmetric effects on these institutions as commonly assumed by scholars. I distinguish between shocks to revenues from different types of natural resources and search for evidence of differential effects across democracies versus autocracies to get a more nuanced picture of the examined relationship.

I include both broad political regime type and specific economic freedoms as measures of institutions that may affect economic and business development in a country. An economic freedom index that quantifies the business and investment environment of a given country based on government policies provides a direct, though not perfect, measure of institutions that are of theoretical interest in this chapter. Measures of political regimes supplement the use of the economic freedom index, as it is highly correlated with the economic freedom index. More open and democratic societies may grow faster, as democracy and sustained protection of property and contract rights require the same conditions (Olson, 1993), though this relationship has been called into question (Przeworski and Limongi, 1993). Further, democratic countries may have lower levels of corruption, which is widely accepted to have detrimental effect on development (Drury, Krieckhaus and Lusztig, 2006). Therefore, examining the effects of revenue shocks on broad regime types can provide a bird's eye view of how changes in resource revenues interact with institutions that promote growth. Availability of data covering a wide-range of countries and time periods also makes using regime types attractive for the empirical exercise in this chapter.

In my analysis, I find consistent, statistically significant, and positive effect of negative revenue shocks on the likelihood of improvements in regime openness and in economic freedom, though the overall magnitude of this effect is not large. This effect is particularly robust for negative shocks to oil and gas and oil income and sometimes for income from

metals. Revenues from coal do not seem to lead to changes in regime scores. Another notable finding from the analysis is that positive revenue shocks also seem to have positive correlations with changes in regime openness and economic freedom. The effects of negative and positive shocks are both positive and similar in magnitude.

The following section lays out the empirical strategy and explains the data. I interpret the results from the empirical analyses in the third section. The fourth and final section discusses the findings and their implications and concludes.

5.2 Empirical strategy

Estimating equation

My main objective is to determine if negative shocks to unearned revenues from various natural resources influence changes in measures of key institutions. A secondary goal is to examine the effect of positive revenue shocks in order to explicate whether the effects of the two types of shocks are symmetrical. Although shocks to unearned natural resource revenues are largely dependent on global commodity prices and thus are often argued to be exogenous (e.g. Ahmed 2012), I estimate a version of a first-differences model with country-fixed effects on panel data in order to minimize endogeneity concerns.

$$Y_{i,t} - Y_{i,t-1} = \beta(R_{i,t} - R_{i,t-1}) + \theta(X_{i,t}) + \mu_i + \epsilon_{i,t} \tag{5.1}$$

Y denotes the outcome of interest, while R stands for resource revenues, the main independent variable. Subscript, i, denotes countries and t indicates years. Variable, X, is a set of control variables. Variable, μ_i, represents country fixed effects. Variable, ϵ_{it}, is the error term clustered at the country level.

Given that my theoretical interest includes the potential asymmetry between the effects of negative and positive revenue shocks, I include both positive and negative revenue

shocks in the model. As a result, Equation 1 can be rewritten as follows:

$$Y_{i,t} - Y_{i,t-1} = \beta_1 R_{i,t}^+ + \beta_2 R_{i,t}^- + \theta(X_{i,t}) + \mu_i + \epsilon_{i,t} \tag{5.2}$$

$R_{i,t}^+$ measures the magnitude of positive revenue shocks. It is equal to $R_{i,t} - R_{i,t-1}$ if $R_{i,t} - R_{i,t-1} > 0$ and 0 otherwise. Similarly, $R_{i,t}^-$ measures the magnitude of negative revenue shocks and is equal to $|R_{i,t} - R_{i,t-1}|$ if $R_{i,t} - R_{i,t-1} < 0$ and 0 otherwise. Parameters of interest are β_1 and β_2.

The advantage of a first-differences model combined with fixed effects is that it estimates the effect of *changes* in the independent variable on *changes* in the dependent variable holding other relevant variables constant. Country fixed effects in first-difference equations control for a number of country-specific and time-invariant changes. These fixed effects also absorb within-unit correlations of the error terms, though perhaps not all of it. Therefore, it would allow me to assess the short-term effects of revenue shocks on changes in institutional measures exploiting within-country variation.

The sample includes all countries that had population of more than 500,000 in the year 2010. Countries that have become independent during the study period are included starting from the year of their independence. The data is unbalanced due to missing data on some of the variables.

Dependent variable

I use two data sources to measure the dependent variable. First, I utilize the data on Economic Freedom of the World (EFW) indices from Fraser Institute covering years between 2000 and 2016. The EFW indices is a summary index meant to measure the quality of "market liberal" economic institutions, which include the rules that regulate institutional transaction costs, protection of property rights, and trade. The summary index is based on a compilation of externally sourced data on the size of government, legal system and property rights, access to sound money, freedom to trade internationally, and regulations

(Gwartney et al., 2017). Among other measures of economic institutions, EFW indices are recognized for their transparency and commitment to more objective and less subjective measurement efforts. Previous studies show that EFW captures key aspects of the concept of liberal economic institutions and has positive relationship with economic growth and development (O'Reilly and Murphy 2017, De Haan, Lundström and Sturm 2006, Kacprzyk 2016).

Although EFW indices are available from 1950, the spatial coverage began to be wide enough for cross-national analysis beginning in 1965. Until 2000, the indices were assigned every five years. Starting in 2000, the temporal coverage expanded, as the indices became available on annual basis. Given the suitability of a first-differences model for my theoretical interest in short-term effects of revenue shocks, I focus on the period when annual data is available—since 2000.

The second source I use for measuring the dependent variable is the Polity IV scores. Although Polity IV scores are most widely used to measure the level of democracy, as it combines various measures of political competitiveness, openness and competitiveness of executive recruitment, and the constraints on the chief executive (Marshall, Gurr and Jaggers, 2017). I use it as a measure of overall character of institutions in a country. Studies have suggested that broader institutions, particularly economic freedom and democracy, are cointegrated, suggesting that there is a long-run relationship between them (Sobel and Coyne, 2011). In absence of long-run and consistent data on economic freedom, Polity scores can serve as a proxy for institutions and enable me to examine the relationship between resource revenue shocks and institutions that affect doing business and consequently economic growth.

EFW indices range from 0 to 10, higher numbers signifying more liberal economic institutions. I multiply the indices by 10 before differencing for easier interpretation. Similarly, I normalize the Polity scores to run from 0 to 100 before differencing, following Haber and Menaldo (2011).
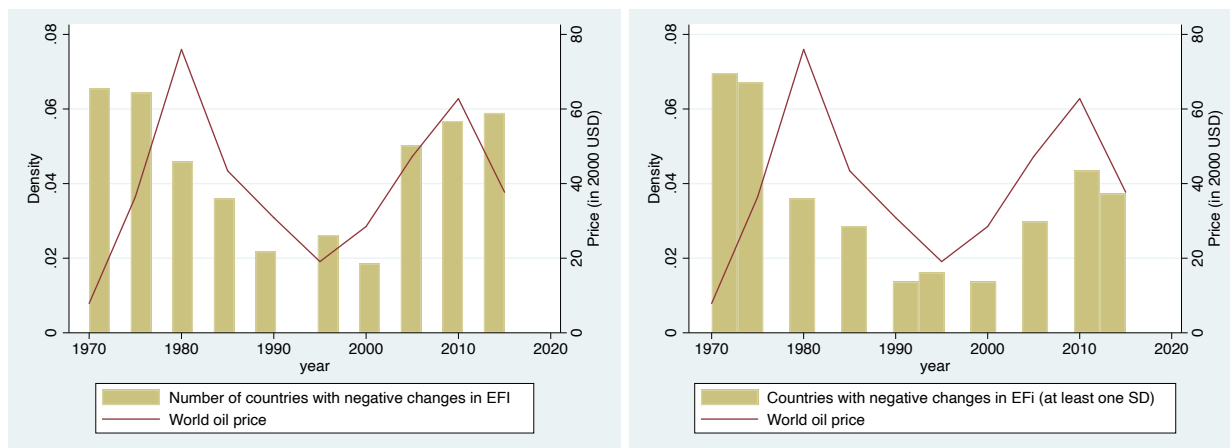
Figure 5.1: Temporal distribution of declines in economic freedom against world oil price fluctuations.

Figures 5.1 and 5.2 show a temporal distribution of changes in economic freedom scores against fluctuations in world oil prices between 1970 and 2015. I focus on oil prices, as oil is a resource that is most important in terms of the rent it generates and its trade volume. Figure 5.1 shows a number of countries that experienced negative changes in their EFW index every five years and suggests a possibility of temporal correlations between world oil price and negative institutional changes. When oil price reached its peak in the 1970s and 1980s, the number of countries the economic freedom of which worsened was rather high. The fall in oil prices in the 1990s corresponded with a decrease in the number of countries that experienced deterioration of economic freedom. This tendency reversed in the 2000s, when oil price again increased. This pattern holds even when I consider more sizable declines in economic freedom. The second image in Figure 5.1 demonstrates the number of countries that experienced at least one standard deviation of decline in their economic freedom and the overall picture that emerges is similar to the case of all negative changes.

Figure 5.2 focuses on improvements in economic freedom over time against world oil price. The first image shows sustained increase in the number of countries that experienced improvements in their economic freedom since 1970, both in times of oil price drop and hike. However, when I only include countries that experienced at least one standard deviation of
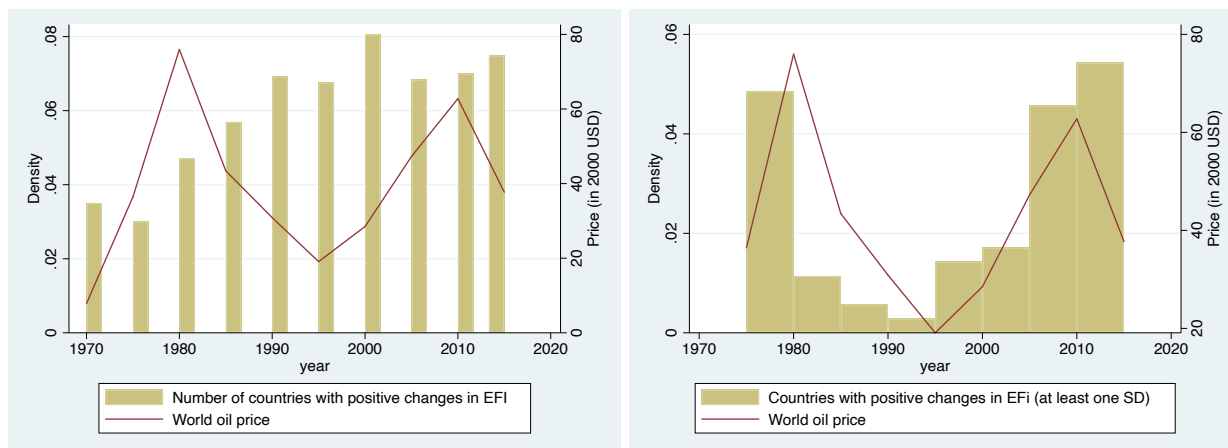
Figure 5.2: Temporal distribution of improvements in economic freedom against world oil price fluctuations.

positive changes in the analysis, the magnitude of the improvements, at least in the number of countries, seems to diminish and the overall relationship between oil price and advances in economic freedom seems to be positive. When oil prices were high in the 1980s and 2000s, more countries experienced sizable positive changes. In contrast, fewer countries belonged in this category in the 1990s, when the price of oil reached a particularly low point.

Polity score changes are similarly reflected in Figure 5.3, which depicts the temporal distribution of considerable regime changes (>30% decrease or increase in Polity IV scores) against the world price of oil. The number of countries that experienced worsening of regimes declined and the number of countries that saw improvement of their regimes increased contemporaneously with the significant decline in oil prices in the 1980s, which presumably resulted in large negative shocks to resource revenues. The subsequent oil price increase in the 2000s, however, did not coincide with observable changes in patterns of regime change.

Independent variable

The independent variable of interest is negative changes in the per capita income from natural resources. Resource revenues are expressed in per capita basis, rather than as
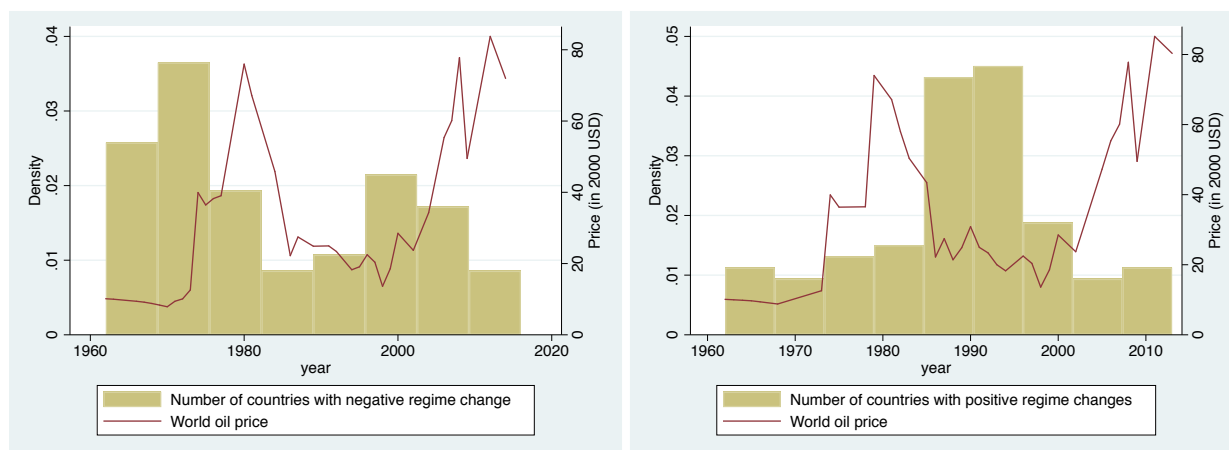
Figure 5.3: Temporal distribution of sizeable regime changes (>30% decrease or increase in Polity IV scores) against the world oil price fluctuations.

percentage of GDP. Using GDP as the denominator of the independent variable is inappropriate, because it may introduce bias. Take two countries that experience the same amount of shock to their natural resource rents in time $t - 1$, but one is wealthy and has diverse economy and the other is poor and dependent on resources. Because the GDP of the poorer and more-dependent country in t would shrink accordingly with the shock in $t - 1$, the magnitude of the shock will appear larger for this country in comparison to its wealthier counterpart, the GDP of which has not changed much as a result of the shock. This may tilt the results of the analysis for a Type II error.

I measure natural resource income using data from various sources. The measures of per capita income from overall natural resource revenues are calculated using data from World Bank (2016). The *World Development Indicators* database from the World Bank provides measurements of *Total Natural Resource Rent as % of GDP*, but this measurement includes rent from forestry. Given that the effects of point-source resources (oil, gas, and minerals) and diffuse resources (agriculture, fishery, and forestry) on a country's political and economic institutions may differ (Leite and Weidmann, 1999), I deduct *Forestry Rent as % of GDP* from the *Total Natural Resource Rent as % of GDP*. Then using *Total GDP* and *Total Population* values, I compute the *Total Resource Rent* in USD.[1]

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[1]This procedure results in 120 observations that have non-positive, though small, values for *Total Resource*

This measure of natural resource income, however, provides only an aggregate proxy for resource revenues. In order to get a more nuanced picture and examine whether shocks to different types of point-source resources produce differential effects on institutions, I use measures of per capita income from key resources separately. Ross and Mahdavi (2014) provide panel data on *Income from Oil and Gas* as well as *Income from Oil*, both on per capita basis. The data on *Income from Coal* and *Income from Metals*[2] are adopted from Haber and Menaldo (2011).

These measures of natural resource income have the advantage of wide temporal and spatial coverage, but they do not directly measure the government's unearned revenues, which is the theoretical independent variable of interest. To overcome this measurement problem, the International Centre for Taxation and Development developed a new dataset on natural resource revenues. Its main shortcoming is that it only covers some years since 1980, though spatial coverage is rather high (148 countries). Nonetheless, I use data from this dataset in the analysis. The measurements of *Total Tax Revenues as % of GDP* and *Total Non-Tax Revenues as % of GDP* are available from this dataset. Using values of *Total GDP* and *Total Population* for each observation, I compute the *Total Non-tax Revenue* per capita.

The per capita income from various resources are differenced year to year in order to construct the independent variables. If the annual difference in a country's per capita income is positive, then it is considered a positive shock. Conversely, a negative annual difference is considered a negative shock. Both variables are log-transformed. To facilitate log-transformation of negative shocks, I take the absolute value of the negative shocks and add 1.

Control variables

I control for a number of country-level factors that may affect changes in institutions. First, I control for *EFW Index in* $t-1$ and *Polity score in* $t-1$ to capture potential persistence of

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Rent. The results are robust to exclusion of these observations.

[2]This variable includes most major industrial and precious metals, such as Antimony, Bauxite, Chromium, Copper, Gold, Iron Ore, Lead, Manganese, Mercury Molybdenum, Nickel, Silver, Tin, Tungsten, and Zinc.

institutions at various levels and to account for the theoretical possibility of mean-reverting tendency.[3] The level of overall resource reliance is also controlled for, since high level of resource revenues before the shock may allow incumbent governments to resist changes even in times of negative shocks to resource revenues. In contrast, relatively resource-poor regimes may be susceptible to even a small amount of revenue shock. Therefore, I include *Resource income per capita in* $t-1$ as a proxy of pre-existing importance of a given type of resource revenues in the model.

Further, *GDP per capita in* $t-1$ is included to take account of the idea that institutional changes, particularly democratic changes, are possible only at certain levels of income (Lipset, 1959). Civil war is another variable the model includes. Ongoing wars may affect economic freedom (O'Reilly and Powell, 2015) and make regime changes more likely and thus need to be controlled for. Since civil wars can also result from the treatment or the revenue shock, I include an indicator variable of whether there was an ongoing civil war with $\geqslant 1000$ battle death casualties in the previous year.

Political corruption can also affect institutions. In corrupt countries, economic reform can be harder to come by. It can also increase the incumbent's desire as well as the ability to hold onto power and consequently forestall democratic transitions or improvements in economic institutions, if these changes do not align with the preferences of the incumbent. I measure political corruption using the Political Corruption Index of Varieties of Democracy (V-Dem) data, which corresponds to how pervasive political corruption is.

Another important factor for institutional change is the level of inequality. Higher level of inequality may increase popular demand for institutional change; at the same time it may disincentivize elites from taking steps to make changes and opening up the regime, as they perceive inequality as need for redistribution (Dunning, 2008). Inequality is measured by the Egalitarian Democracy Index of V-Dem dataset and it proxies for the extent to which the ideals of egalitarian democracy are achieved.

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[3]Democracy scores may tend to return to an equilibrium value for a country (Acemoglu et al., 2008).

Lastly, institutional change is not a singular process that happens within individual countries, but rather a set of institutional changes, particularly democratization and regime change, may spill over to neighboring countries (Gleditsch and Ward, 2006). Thus, I control for the percentage of democracies in countries' geographic and cultural region.[4] All variable sources are included in the Appendix in Table A1.

5.3   Results

Main results

Table 5.2 shows the baseline results of the models that estimate the relationship between positive/negative revenue shocks and changes in EFW indices, while controlling for the level of the resource income and EFW indices the year before. Columns differ in their main independent variables, i.e., the type of natural resource income that experienced shocks. The effect of negative revenue shocks are consistently positive and statistically significant. The magnitude of the effects is highest for oil revenue shocks and the oil- and gas-combined revenue shocks. Similarly oil and oil and gas revenue shocks have the highest level of statistical significance along with total resource rent shocks. Negative shocks to coal and metals income appear to produce smaller positive effects at lower level of statistical confidence.

Interestingly, positive shocks to all types of natural resource revenues are also associated with *increase* in EFW indices. Same as negative revenue shocks, the effects are largest for oil and oil and gas income at a high level of statistical significance. For total natural resource rent, the effects are smaller, though still highly significant. This result stands in contrast to the "resource curse" literature that argues that windfall from natural resource revenues may harm institutions. The effect of overall income from natural resources is practically nil in these models.

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[4]Including indicator variables denoting whether a country is located in the Middle East or Sub-Saharan Africa is common for econometric analysis of regime change and durability. In my analysis, these indicator variables are collinear with the country fixed effects and thus do not explain any variation.

Table 5.1: Baseline results: Effects of revenue shocks on Economic Freedom indice changes

Dependent variable	Δ in EFW index					
Revenue source	Total resources	Oil and gas	Oil	Coal	Metals	Non-tax
Negative shock	0.748**	1.102***	1.432***	0.660*	0.970**	0.869**
	(0.236)	(0.361)	(0.425)	(0.343)	(0.404)	(0.321)
Positive shock	0.849***	1.393***	1.804***	0.757**	1.218**	0.710**
	(0.237)	(0.343)	(0.424)	(0.144)	(0.397)	(0.297)
EFW $_{t-1}$	-5.996***	-6.141***	-6.170***	-8.932***	-8.956***	-6.060***
	(0.428)	(0.425)	(0.419)	(0.243)	(0.224)	(0.458)
Resource income $_{t-1}$	-0.000	-0.000**	0.001	0.000	0.000	-0.001
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Constant	30.882***	32.526***	31.957***	41.967***	39.762***	34.497***
	(2.893)	(2.372)	(2.391)	(2.455)	(2.813)	(2.794)
N	2466	2436	2416	1116	1116	2062
Countries	158	164	163	160	160	145
Country-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Errors clustered	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Heteroskedascity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

When I control for additional covariates, as shown in Table 5.2, the prevalence of the effect of negative revenue shocks becomes less obvious. In the full models, coefficients of negative revenue shocks are strongly significant only for regressions with oil and gas income per capita and oil income per capita. Negative shocks seem to be weakly and positively associated with changes in economic freedom in the case of overall non-tax revenues. As for positive shocks, oil and gas income combined, along with oil income alone, still have large, statistically significant effect. The magnitude of coefficients on income from metals and non-tax revenues per capita is now smaller, though still significant. Total resource income and coal income appear to no longer have an effect on economic freedom index changes.

Table 5.2: Full models: Effects of revenue shocks on Economic Freedom Indice changes

| Dependent variable | Δ in EFW index | | | | | |
Revenue source	Total resources	Oil and gas	Oil	Coal	Metals	Non-tax
Negative shock	0.199	1.383**	1.809**	0.518	0.549	0.800*
	(0.305)	(0.576)	(0.701)	(0.343)	(0.344)	(0.422)
Positive shock	0.451	1.644**	1.994**	0.408	0.644**	0.612*
	(0.288)	(0.516)	(0.671)	(0.373)	(0.320)	(0.358)
EFW $_{t-1}$	-9.011***	-8.999***	-8.986***	-9.442***	-9.454***	-9.023***
	(0.224)	(0.224)	(0.226)	(0.177)	(0.170)	(0.256)
Total resource dependence$_{t-1}$	-0.000**	-0.001*	-0.001	0.000	0.000	-0.001*
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
GDP per capita$_{t-1}$	31.995***	29.437***	28.981***	31.341**	30.234**	31.740***
	(7.266)	(7.107)	(7.131)	(9.709)	(9.108)	(8.132)
Indicator for civil war$_{t-1}$	-0.137	-0.578	-0.522	-0.872	-0.424	-1.297
	(2.584)	(2.484)	(2.530)	(2.878)	(2.905)	(2.872)
Political corruption index$_{t-1}$	17.017	16.721	16.354	18.778	18.557	19.064
	(11.025)	(10.840)	(10.768)	(11.681)	(11.602)	(13.556)
Egalitarian democracy index$_{t-1}$	38.552	42.507*	42.601*	42.665	39.064	26.764
	(24.646)	(24.521)	(24.316)	(26.380)	(26.495)	(26.034)
Regional democratic diffusion$_{t-1}$	0.044	0.044	0.042	0.059	0.053	0.047
	(0.040)	(0.041)	(0.039)	(0.051)	(0.050)	(0.043)
Constant	-238.996***	-220.989***	-217.208***	-234.938**	-225.863**	-229.946***
	(60.100)	(58.871)	(59.200)	(78.588)	(74.365)	(67.305)
N	1191	1213	1213	1059	1059	1040
Countries	151	154	154	153	153	137
Country-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Errors clustered	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Heteroskedascity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5.3: Baseline results: Effects of revenue shocks on Polity IV score changes

Dependent variable	Δ in Polity IV					
Revenue source	Total resources	Oil and gas	Oil	Coal	Metals	Non-tax
Negative shock	0.247***	0.483***	0.500***	0.237**	0.143*	0.210
	(0.056)	(0.117)	(0.122)	(0.108)	(0.085)	(0.144)
Positive shock	0.234***	0.443***	0.480***	0.089	0.076	0.182
	(0.056)	(0.097)	(0.105)	(0.101)	(0.080)	(0.132)
Polity$_{t-1}$	-0.089***	-0.071***	-0.072***	-0.080***	-0.080***	-0.121***
	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)	(0.012)
Resource dependence$_{t-1}$	-0.000	-0.000**	-0.000**	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	4.586***	3.559***	3.663***	4.103***	4.063***	7.898***
	(0.507)	(0.359)	(0.371)	(0.556)	(0.608)	(0.786)
N	5775	7478	7363	6140	6136	3718
Countries	157	166	162	160	160	145
Country-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Errors clustered	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Heteroskedascity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Analysis of the Polity IV score data spanning a broader time frame shows similar results. Table 5.3 shows that in the baseline model negative shocks to natural resource revenues are positively associated with annual changes in Polity IV scores. The only exception is non-tax revenues. As for positive shocks, the coefficients are positive across models of all types of resource revenues, but significant only in the cases of total resource income, income from oil and gas combined, and income from oil alone. Including the control variables in the models does not change the direction of the effect or the significance of the coefficients for income from total resources, oil and gas, oil, and metals. The coefficient of negative shock to coal income altogether loses its significance. The effects of positive shocks do not differ between baseline and full models, though the magnitudes of the coefficients are smaller in the full models.

The coefficients on the control variables are also noteworthy. In both baseline and full models higher level of Polity scores are correlated with decrease in changes in the following period potentially due to a ceiling effect. Political corruption has a large, positive,

Table 5.4: Full models: Effects of revenue shocks on Polity IV score changes

| Dependent variable | Δ in Polity IV | | | | | |
Revenue source	Total resources	Oil and gas	Oil	Coal	Metals	Non-tax
Negative shock	0.173**	0.335**	0.384**	0.134	0.133*	0.167
	(0.070)	(0.169)	(0.168)	(0.101)	(0.078)	(0.199)
Positive shock	0.157**	0.349**	0.364**	0.068	0.094	0.185
	(0.066)	(0.135)	(0.137)	(0.099)	(0.071)	(0.179)
$Polity_{t-1}$	-0.171***	-0.174***	-0.173***	-0.176***	-0.175***	-0.205***
	(0.020)	(0.017)	(0.017)	(0.017)	(0.017)	(0.022)
Total resource $dependence_{t-1}$	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per $capita_{t-1}$	-0.057	-0.417	-0.405	-0.145	-0.139	-1.414*
	(0.640)	(0.533)	(0.513)	(0.508)	(0.498)	(0.753)
Indicator for civil war_{t-1}	0.464	0.514	0.479	0.514	0.504	-1.248
	(0.673)	(0.673)	(0.677)	(0.679)	(0.678)	(0.820)
Political corruption $index_{t-1}$	4.561***	4.081**	4.082**	4.452**	4.283**	2.990
	(1.353)	(1.320)	(1.324)	(1.344)	(1.344)	(1.950)
Egalitarian democracy $index_{t-1}$	17.161***	20.314***	20.300***	20.776***	20.420***	18.720***
	(3.966)	(3.199)	(3.210)	(3.260)	(3.204)	(4.295)
Regional democratic $diffusion_{t-1}$	0.136***	0.127***	0.126***	0.131***	0.131***	0.109***
	(0.020)	(0.022)	(0.023)	(0.022)	(0.022)	(0.028)
Constant	1.469	3.880	3.781	1.727	1.530	15.577**
	(4.952)	(3.971)	(3.829)	(3.869)	(3.813)	(5.842)
N	4465	5197	5195	5055	5055	2696
Countries	152	154	154	154	154	140
Country-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Errors clustered	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Heteroskedascity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

and statistically significant effect on Polity score changes in the next period across all models. Inequality and regional democratic diffusion also both have positive effect on regime change, though the magnitude of the effect is considerably larger in the case of the former than the latter.

Mongolia's experience since 2000 exemplifies the results of these two sets of exercises regarding the effect of revenue shocks on institutions. It witnessed a resource boom in the 2000s due to initial development of new mining sites, such as the Oyu Tolgoi copper and gold mine, and increasing price of copper and gold. Between 2003, when the Oyu Tolgoi project started exploratory operations, and the global financial crisis of 2008, Mongolia's total resource revenue per capita grew 5.6 fold. During the boom, Mongolia took several steps to improve the environment for doing business. Notable examples include adopting the country's first law to support small and medium businesses in 2007 and amendment of the General Law of Taxation to provide exceptions for certain sectors and SMEs in 2006. These improvements in the economic conditions are reflected in the subcomponents of the EFW index. Mongolia received a score of 6.60 for regulatory burden on business in 2003, but it jumped up to 7.41 in 2008. The score for legal system and property rights improved from 5.69 to 5.87. After a slight decline in 2008-2009, Mongolia's resource income continued to grow, peaking at $130847.4 per person in 2011, which made Mongolia the fastest growing economy in the world with 17.1% annual growth. The boom, however, did not last long, as in 2012 resource income dropped by 35% and continued to decline in the following years. However, Mongolia's EFW index reached its highest in 2015 when resource revenue reached its lowest since 2006.

The mechanisms of change during boom and bust seem to differ in nature in the case of Mongolia. During the 2000s, major changes in favor of private businesses resulted from the actions of two key actors. First, several informal lobby groups emerged from traditionally important sectors, such as crop and livestock production, as well as from sectors that became the beneficiaries of the boom, such as construction. The second key actors were international

organizations and governments, including the World Bank, the European Union, and the governments of Japan and Switzerland, who funded and encouraged implementation of numerous projects to improve the business environment and institutions in general. When resource revenues started to decline, the main motivation was a fiscal need to minimize the impact of receding revenues from natural resources on government budget and reduce the need for foreign loans, rather than pressures from below. For this end, the government adopted policies to increase fiscal compliance (e.g., adoption of e-tax system in 2014) and systematize state-business interactions (e.g., opening of "one window" service centers not only in the capital city, but also in province centers, in 2013). For both types of mechanisms, the fact that Mongolia is a democracy appears to have played a key role, as it facilitated regular interactions between the state and businesses and motivated international players to promote business interests during the boom and limited the set of policy options to fiscal measures during the bust.

Heterogeneous effects

The main goal of the analysis so far has been to identify the average short-term effects of negative and positive revenue shocks across the world. Nonetheless, as a brief glance at the case of Mongolia suggests, the level of democracy in a country may be an important factor determining the effect of resource revenue shocks. Scholarship on the effects of positive revenue shocks points out to the possibility that autocracies and democracies have different dynamics—autocracies are shown to transfer more money to tax havens in times of resource boom (Andersen et al., 2013) and generally experience more corruption than democracies (Arezki and Gylfason, 2013). Such dissimilarities may hold true for negative revenue shocks. Therefore, I ask—are the dynamics of natural resource dependence different for democracies and autocracies?

I examine these potential differential effects by estimating the same models on smaller samples of authoritarian and democratic countries. The results of the baseline models are in Tables 5.5-5.8 and the full models in Appendix Tables A2- A5. Overall, the relationship

between resource revenue shocks and indicators of economic freedom are stronger for democracies compared to autocracies. For democracies, as shown in Table 5, both negative and positive revenue shocks entail large effects on EFW indices at a high level of statistical significance and across almost all types of natural resources, except coal.

Table 5.5: Baseline results: Effects of revenue shocks on EFW indice changes in democracies (Polity IV score $\geqslant 50$)

Dependent variable	Δ in EFW indices					
Revenue source	Total resources	Oil and gas	Oil	Coal	Metals	Non-tax revenues
Negative shock	0.732***	0.828**	1.053**	0.613	1.007**	0.677*
	(0.216)	(0.316)	(0.409)	(0.409)	(0.432)	(0.385)
Positive shock	0.880***	1.172**	1.495**	0.828*	1.339**	0.340
	(0.211)	(0.360)	(0.454)	(0.452)	(0.472)	(0.321)
EFW $_{t-1}$	-6.877***	-6.913***	-6.903***	-9.087***	-9.094***	-6.626***
	(0.504)	(0.500)	(0.501)	(0.263)	(0.246)	(0.550)
Resource dependence$_{t-1}$	-0.000	-0.000	0.001	0.000	0.000	-0.002**
	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.001)
Constant	39.482***	42.070***	41.551***	50.721***	47.727***	43.604***
	(3.645)	(3.072)	(3.112)	(2.906)	(3.616)	(3.434)
N	1784	1743	1726	770	770	1512
Countries	125	130	129	117	117	115

Notes: Heteroskedascity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

When I consider the full models that include the control variables for democracies (Table A2), negative shocks only to oil and gas and oil by itself are significantly and positively associated with EFW indices. The results for the positive revenue shocks are more consistent with the base model—just the coefficient of coal income per capita loses its significance.

In contrast, the baseline models for autocracies (Table 5.6) show that only the coefficients of oil and oil and gas combined have large and significant effects on annual change in economic freedom. The coefficients of natural resource income measured by non-tax revenues also seem to be positively associated with EFW indice changes. The direction of the relationship between changes in total resource revenues and coal and metal income and economic freedom growth is still positive, but it is not significant in these models as they were in the baseline model for democracies. The full model results, displayed in Table

Table 5.6: Baseline results: Effects of revenue shocks on EFW indice changes in autocracies (Polity IV score < 50)

Dependent variable	Δ in EFW indices					
Revenue source	Total resources	Oil and gas	Oil	Coal	Metals	Non-tax revenues
Negative shock	0.503	1.231*	1.309**	0.825	0.934	1.354**
	(0.550)	(0.718)	(0.710)	(0.732)	(0.970)	(0.578)
Positive shock	0.575	1.518**	1.763**	0.501	1.102	1.616**
	(0.553)	(0.668)	(0.695)	(0.468)	(0.822)	(0.621)
EFW $_{t-1}$	-4.274***	-4.597***	-4.716***	-8.867***	-8.755***	-4.772***
	(0.739)	(0.793)	(0.763)	(0.568)	(0.510)	(0.859)
Resource dependence$_{t-1}$	-0.000	-0.000	0.000	0.001***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Constant	16.824**	15.327***	14.944***	23.255***	22.308***	17.258***
	(5.171)	(3.120)	(3.246)	(1.936)	(4.506)	(4.180)
N	682	693	690	346	346	550
Countries	62	65	65	60	60	56

Notes: Heteroskedascity-robust standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 5.7: Baseline results: Effects of revenue shocks on Polity IV score changes in democracies (Polity IV score ⩾ 50)

Dependent variable	Δ in Polity IV scores					
Revenue source	Total resources	Oil and gas	Oil	Coal	Metals	Non-tax revenues
Negative shock	0.268***	0.430**	0.581**	0.087	0.045	0.138
	(0.069)	(0.159)	(0.190)	(0.094)	(0.100)	(0.146)
Positive shock	0.267***	0.426**	0.509**	0.020	0.059	0.162
	(0.067)	(0.138)	(0.165)	(0.101)	(0.094)	(0.128)
Polity IV $_{t-1}$	-0.167***	-0.121***	-0.122***	-0.138***	-0.142***	-0.224***
	(0.037)	(0.031)	(0.031)	(0.037)	(0.038)	(0.036)
Resource dependence$_{t-1}$	-0.000	-0.000**	-0.000**	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	12.689***	9.337***	9.383***	10.873**	11.358***	18.768***
	(3.172)	(2.606)	(2.614)	(3.298)	(3.350)	(3.179)
N	3456	3967	3942	3019	3015	2402
Countries	133	141	140	132	132	121

Notes: Heteroskedascity-robust standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 5.8: Baseline results: Effects of revenue shocks on Polity IV score changes in autocracies (Polity IV score < 50)

Dependent variable	Δ in Polity IV scores					
Revenue source	Total resources	Oil and gas	Oil	Coal	Metals	Non-tax revenues
Negative shock	0.205**	0.493**	0.450**	0.538**	0.151	0.351
	(0.092)	(0.169)	(0.165)	(0.199)	(0.131)	(0.287)
Positive shock	0.159**	0.399**	0.410**	-0.010	1.102	0.171
	(0.086)	(0.157)	(0.158)	(0.155)	(0.117)	(0.248)
Polity IV $_{t-1}$	0.016	0.014	0.014	0.010	0.012	-0.000
	(0.028)	(0.026)	(0.026)	(0.028)	(0.029)	(0.043)
Resource dependence$_{t-1}$	-0.000	-0.000**	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Constant	0.788	0.617	0.684	0.641	1.134*	1.847*
	(0.727)	(0.449)	(0.457)	(0.570)	(0.645)	(1.083)
N	2319	3511	3421	3121	3121	1316
Countries	107	118	114	113	113	83

Notes: Heteroskedascity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

A3, do not differ from the baseline model, except that non-tax revenue changes in either direction do not appear to be significant anymore.

When I consider how resource revenue shocks affect Polity IV score changes in the two sets of countries, the estimated effects of revenue shocks in democracies are comparable to autocracies. In both democratic and autocratic countries, coefficients of both negative and positive shocks to total resource income, oil and gas income, and oil alone income are significant and positive. In the sample of authoritarian countries, the coefficient of negative shock to coal income also is significant. Changes in metal income and overall resource income measured by non-tax revenues do not seem to affect changes in institutions as measured by Polity IV scores.

Now consider the results of the full models for the relationship between Polity IV score changes and revenue shocks in authoritarian and democratic countries (Tables A4 and A5). For democracies, the results regarding negative shocks to total resource revenues and oil income are robust to the inclusion of the control variables. Results associated with positive shocks are similarly robust. For autocracies, the baseline model results hold only

for negative shocks to total resource revenue and metals revenue—negative changes in these two types of resource income are weakly associated with small positive changes in Polity IV scores.

Another noteworthy result from the full models that separate between democratic and authoritarian countries is that the role of political corruption in improving institutions seem to matter for authoritarian regimes, but not in democracies. The direction of the relationship, however, is counter-intuitive—higher levels of political corruption are significantly correlated with better institutions in the short-run.

5.4   Conclusion

This chapter takes on the task of examining whether there is a significant relationship between negative revenue shocks and measures of institutions that are thought to be critical for sustained economic growth and business activities in a cross-national setting. A secondary goal of this chapter is to ascertain whether the effects of negative and positive revenue shocks, if any, are symmetric as assumed in the current literature on the "resource curse."

The estimated results from the first-differences models on two measures of institutions, one broad (Polity IV scores) and one more precise (Economic Freedom of the World indices), suggest that generally natural resource revenue declines are associated with *positive* changes or improvements in market liberal institutions. The most robust relationship is between negative shocks to oil revenues and advancement of institutions. The combined revenue from oil and gas also seems to have strong effect on institutions, but this correlation may be driven by the inclusion of oil revenue in the data. Negative shocks to overall resource dependence measured by non-tax revenues also have persistent positive effect on institutions, especially on EFW indices. The positive institutional consequences of resource revenue decreases appears more prevalent in democratic societies than in authoritarian countries. This may be because democratic systems provide a fertile ground for changes

when negative shocks hit. Democracies may facilitate closer interactions between businesses and the state and may be more sensitive to pressures from international organizations as well as domestic organized or informal groups that attempt to advance the institutional environment.

The finding that negative shocks have positive short-term effects potentially points to the mechanism behind the institutional changes—these changes likely happened through the proactive actions of the governments or business communities, rather than through economic channels. If negative shocks affected institutions through economic means, we would expect the direction of the effect to be negative—negative shocks lead to economic hardship, which in turn deteriorates institutions and limits economic freedom. I find the effect in the opposite direction and, therefore, the results are likely to have happened through non-economic mechanisms.

The empirical set-up of the paper provides some assurance that the relationship between negative revenue shocks and institutions is not only correlational, but also potentially causal. A first-differences model with country fixed effects removes concerns about endogeneity deriving from omitted variables, as it exploits the variations within a country. Endogeneity due to simultaneity cannot be directly ruled out, but theoretically it is improbable that annual changes in economic freedom or Polity IV scores can affect resource revenues, which are often dependent on exogenous factors, such as global commodity prices and demand.

Is the assumption of symmetry regarding the effects of positive and negative shocks to resource revenues empirically valid? Negative revenue shocks are associated with positive effects on institutions on average, as implied by studies that find a political and economic "resource curse." However, in the empirical setting of this chapter, I find that positive resource shocks are associated with a "blessing," rather than a "curse." Positive and negative shocks have similar effects on indicators of institutional changes, both in magnitude and direction. Therefore, negative and positive shocks to natural resource revenues do not produce opposing symmetrical effect.

The broader implications of this paper are two-fold. First, considering the dynamics of resource dependence is crucial for research on resource dependence. Given the volatility of global commodity prices, natural resource revenues change considerably within short periods of time. Such volatility is argued to cause economic and financial problems in resource-rich countries and for this reason, experts recommend countries to diversify away from their resource sectors to avoid the undesirable effects of sudden decline in resource income. However, it appears that decline in resource revenues may not be harmful to the institutions that govern economic transactions. In fact, it may serve as moments of change for certain countries. Future studies may explore how the dynamics of resource dependence affect the variety of other outcomes that have been studied in the "resource curse" literature.

Second, the strong and positive short-term effects of both positive and negative revenue shocks found in this chapter suggest that institutions can change and adapt to shocks rather quickly. This is encouraging not only for resource-rich economies, but also other countries as other types of revenue shocks are ubiquitous. Another fortunate implication of this chapter is that the speedy improvements in institutions and economic freedom are likely the outcomes of initiatives in the hands of political and economic actors, rather than the mechanics of economic forces.

Table A1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	Source
EFW index	5.472	2.797	0.000	8.760	Gwartney et al. (2017)
Δ in EFW index	3.655	15.136	-69.700	87.500	Computer by the author
Log(Positive Δ in total resource rent)	3.557	3.946	0.000	13.369	Computed by author
Log(Negative Δ in total resource rent)	2.437	3.748	0.000	13.870	Computed by author
Log(Positive Δ in oil and gas income)	1.191	2.100	0.000	9.580	Computed by author
Log(Negative Δ in oil and gas income)	0.672	1.660	0.000	9.941	Computed by author
Log(Positive Δ in oil income)	1.048	1.938	0.000	8.863	Computed by author
Log(Negative Δ in oil income)	0.516	1.457	0.000	9.443	Computed by author
Log(Positive Δ in coal income)	1.731	3.225	0.000	11.862	Computed by author
Log(Negative Δ in coal income)	0.348	1.476	0.000	11.254	Computed by author
Log(Positive Δ in metals income)	3.462	4.148	0.000	13.785	Computed by author
Log(Negative Δ in metals income)	0.648	2.100	0.000	12.464	Computed by author
Log(Positive Δ in non-tax revenue)	1.793	2.058	0.000	9.247	Computed by author
Log(Negative Δ in non-tax revenues)	0.886	1.681	0.000	9.160	Computed by author
Log(GDP per capita, lagged)	8.276	1.521	5.251	11.425	World Bank (2016)
Indicator variable for civil war (lagged)	0.044	0.205	0.000	1.000	Haber and Menaldo (2011)
Political Corruption Index (lagged)	0.553	0.355	0.000	1.000	Coppedge et al. (2017)
Egalitarian Democracy Index (lagged)	0.409	0.242	0.040	0.890	Coppedge et al. (2017)
Regional democratic diffusion (lagged)	0.436	6.166	-70.000	65.000	Haber and Menaldo (2011)
Polity IV score	54.865	36.898	0	100	Marshall, Gurr and Jaggers (2017)
Δ in Polity IV score	0.393	8.231	-90	80	Computer by the author
Log(Positive Δ in total resource rent)	2.986	3.799	0.000	14.347	Computed by author
Log(Negative Δ in total resource rent)	1.941	3.383	0.000	13.870	Computed by author
Log(Positive Δ in oil and gas income)	0.842	1.763	0.000	10.444	Computed by author
Log(Negative Δ in oil and gas income)	0.638	1.588	0.000	9.941	Computed by author
Log(Positive Δ in oil income)	0.736	1.654	0.000	10.416	Computed by author
Log(Negative Δ in oil income)	0.554	1.482	0.000	9.856	Computed by author
Log(Positive Δ in coal income)	1.23	2.762	0.000	12.250	Computed by author
Log(Negative Δ in coal income)	1.087	2.586	0.000	11.979	Computed by author
Log(Positive Δ in metals income)	2.57	3.831	0.000	14.098	Computed by author
Log(Negative Δ in metals income)	1.945	3.468	0.000	13.029	Computed by author
Log(Positive Δ in non-tax revenue)	1.666	1.987	0.000	9.247	Computed by author
Log(Negative Δ in non-tax revenues)	0.538	1.351	0.000	9.277	Computed by author
Log(GDP per capita, lagged)	8.055	1.511	4.752	11.425	World Bank (2016)
Indicator variable for civil war (lagged)	0.083	0.276	0.000	1.000	Haber and Menaldo (2011)
Political Corruption Index (lagged)	0.508	0.347	0.000	1.000	(Coppedge et al., 2017)
Egalitarian Democracy Index (lagged)	0.340	0.246	0.032	0.891	(Coppedge et al., 2017)
Regional democratic diffusion (lagged)	0.393	8.231	-90.000	80.000	Haber and Menaldo (2011)

Table A2: Full models: Effects of revenue shocks on Economic Freedom Indice changes in democratic countries (Normalized Polity score ≥ 50)

Dependent variable		Δ in EFW index				
Revenue source	Total resources	Oil and gas	Oil	Coal	Metals	Non-tax
Negative shock	0.305	0.678*	1.002*	0.480	0.488	0.659
	(0.311)	(0.389)	(0.523)	(0.393)	(0.302)	(0.527)
Positive shock	0.465*	1.002**	1.057**	0.444	0.648**	0.423
	(0.277)	(0.360)	(0.520)	(0.444)	(0.326)	(0.422)
EFW $_{t-1}$	-9.346***	-9.379***	-9.387***	-9.762***	-9.754***	-9.425***
	(0.218)	(0.209)	(0.213)	(0.158)	(0.162)	(0.220)
Total resource dependence$_{t-1}$	-0.000*	-0.001*	-0.002*	-0.000	-0.000	-0.002*
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)
GDP per capita$_{t-1}$	38.395***	38.632***	37.848***	43.797**	41.630**	42.646***
	(10.762)	(10.743)	(10.868)	(13.755)	(12.801)	(11.746)
Indicator for civil war$_{t-1}$	2.349	2.108	2.120	1.384	1.999	1.916
	(2.915)	(2.866)	(2.886)	(3.719)	(3.617)	(3.346)
Political corruption index$_{t-1}$	18.675	17.931	17.801	21.415	21.537	20.370
	(16.410)	(15.868)	(15.822)	(16.972)	(16.931)	(19.066)
Egalitarian democracy index$_{t-1}$	40.233	42.973	43.191	46.618	44.121	29.706
	(29.039)	(29.152)	(29.012)	(32.271)	(31.701)	(31.343)
Regional democratic diffusion$_{t-1}$	0.026	0.028	0.026	0.065	0.061	0.046
	(0.056)	(0.056)	(0.056)	(0.062)	(0.061)	(0.062)
Constant	-296.209**	-298.370**	-291.623**	-343.141**	-325.789**	-323.897**
	(90.174)	(90.017)	(91.016)	(113.036)	(106.075)	(99.130)
N	827	839	839	731	731	730
Countries	151	154	154	153	153	137

Notes: Heteroskedascity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: Full models: Effects of revenue shocks on Economic Freedom Indice changes in authoritarian countries (Normalized Polity score < 50)

Dependent variable		Δ in EFW index				
Revenue source	Total resources	Oil and gas	Oil	Coal	Metals	Non-tax
Negative shock	-0.054	2.830**	2.637**	0.739	0.814	0.993
	(0.590)	(1.261)	(1.141)	(0.785)	(0.980)	(0.639)
Positive shock	0.271	2.823**	2.872**	0.347	0.840	0.948
	(0.589)	(1.096)	(1.079)	(0.569)	(0.782)	(0.635)
EFW $_{t-1}$	-8.358***	-8.482***	-8.497***	-9.059***	-9.006***	-8.535***
	(0.624)	(0.561)	(0.540)	(0.495)	(0.459)	(0.669)
Total resource dependence$_{t-1}$	-0.000	-0.000	-0.000	0.001***	0.000	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
GDP per capita$_{t-1}$	23.646**	17.083**	17.501**	13.137	18.821*	18.156*
	(9.131)	(7.861)	(7.836)	(10.034)	(10.131)	(9.424)
Indicator for civil war$_{t-1}$	-3.258	-4.002	-4.190	-4.130	-3.684	-4.342
	(3.970)	(3.577)	(3.554)	(4.365)	(4.407)	(4.114)
Political corruption index$_{t-1}$	18.562**	17.530**	17.754**	12.316	15.229*	22.509**
	(8.248)	(8.129)	(8.294)	(7.600)	(7.970)	(9.325)
Egalitarian democracy index$_{t-1}$	6.670	-0.833	5.621	32.053	5.436	47.649
	(57.089)	(49.127)	(49.524)	(48.284)	(57.270)	(60.361)
Regional democratic diffusion$_{t-1}$	0.015	0.022	0.029	0.028	0.001	0.025
	(0.053)	(0.045)	(0.044)	(0.040)	(0.048)	(0.053)
Constant	-164.647**	-120.446**	-124.085**	-88.384	-129.529	-131.056*
	(67.816)	(59.452)	(60.088)	(76.162)	(77.625)	(71.862)
N	364	374	374	328	328	310
Countries	58	59	59	57	57	53

Notes: Heteroskedascity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A4: Full models: Effects of revenue shocks on Polity IV score changes for democratic countries (Normalized Polity score $\geq$ 50)

Dependent variable			Δ in Polity IV			
Revenue source	Total resources	Oil and gas	Oil	Coal	Metals	Non-tax
Negative shock	0.239**	0.274	0.433**	0.099	0.061	0.130
	(0.098)	(0.192)	(0.211)	(0.096)	(0.121)	(0.194)
Positive shock	0.219**	0.255	0.301*	0.055	0.084	0.170
	(0.090)	(0.159)	(0.179)	(0.103)	(0.112)	(0.175)
Polity$_{t-1}$	-0.267***	-0.244***	-0.244***	-0.251***	-0.254***	-0.304***
	(0.056)	(0.053)	(0.053)	(0.055)	(0.056)	(0.064)
Total resource dependence$_{t-1}$	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per capita$_{t-1}$	1.452	0.017	0.024	0.262	0.232	0.866
	(1.178)	(0.831)	(0.815)	(0.821)	(0.837)	(1.082)
Indicator for civil war$_{t-1}$	-1.007	-0.914	-0.943	-0.987	-0.960	-2.058
	(1.217)	(1.103)	(1.108)	(1.117)	(1.119)	(1.327)
Political corruption index$_{t-1}$	3.040	2.800	2.776	3.022	2.988	0.234
	(2.646)	(2.434)	(2.426)	(2.543)	(2.551)	(2.507)
Egalitarian democracy index$_{t-1}$	17.347**	22.516***	22.293***	23.054***	23.264***	7.810
	(6.772)	(5.845)	(5.844)	(6.052)	(6.138)	(4.812)
Regional democratic diffusion$_{t-1}$	0.160***	0.169***	0.168***	0.172***	0.173***	0.101**
	(0.031)	(0.030)	(0.030)	(0.031)	(0.031)	(0.033)
Constant	-1.100	7.526	7.504	5.736	6.003	14.419
	(10.531)	(7.203)	(7.098)	(7.440)	(7.324)	(9.289)
N	2511	2847	2847	2741	2741	1632
Countries	121	123	123	123	123	109

Notes: Heteroskedascity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: Full models: Effects of negative revenue shocks on Polity IV score change for authoritarian countries (Normalized Polity score < 50)

Dependent variable		Δ in Polity IV				
Revenue source	Total resources	Oil and gas	Oil	Coal	Metals	Non-tax
Negative shock	0.190*	0.403	0.460	0.396	0.197*	0.422
	(0.109)	(0.302)	(0.280)	(0.296)	(0.112)	(0.420)
Positive shock	0.156	0.408	0.447*	0.189	0.067	0.333
	(0.097)	(0.253)	(0.250)	(0.235)	(0.104)	(0.369)
Polity$_{t-1}$	-0.140**	-0.107**	-0.105**	-0.108**	-0.106**	-0.197**
	(0.044)	(0.040)	(0.040)	(0.042)	(0.042)	(0.064)
Total resource dependence$_{t-1}$	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per capita$_{t-1}$	0.413	0.370	0.343	0.941	0.693	-1.420
	(0.664)	(0.869)	(0.846)	(0.773)	(0.764)	(0.942)
Indicator for civil war$_{t-1}$	1.955	1.778*	1.734*	1.759*	1.819*	0.106
	(1.184)	(1.016)	(1.014)	(1.028)	(1.032)	(1.341)
Political corruption index$_{t-1}$	5.182**	3.625*	3.612*	3.937*	3.690*	2.092
	(2.176)	(2.090)	(2.091)	(2.156)	(2.106)	(3.825)
Egalitarian democracy index$_{t-1}$	48.250***	32.980**	33.281**	33.634**	32.314**	65.787**
	(12.263)	(12.327)	(12.254)	(12.625)	(12.607)	(20.835)
Regional democratic diffusion$_{t-1}$	0.198***	0.139***	0.139***	0.141***	0.138***	0.249***
	(0.033)	(0.037)	(0.037)	(0.037)	(0.037)	(0.056)
Constant	-10.224**	-6.863	-6.753	-10.583**	-9.188*	3.510
	(4.965)	(6.072)	(5.860)	(5.311)	(5.336)	(6.340)
N	1954	2350	2348	2314	2314	1064
Countries	104	105	105	105	105	81

Notes: Heteroskedascity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Chapter 6

Conclusion

In this dissertation, I aim to contribute to scholarship on the "resource curse" with a theory of negative shocks to natural resource revenues. The empirical evidence in this dissertation shows how Russia's regional governments' perception of negative revenue shocks and the subsequent policy changes affected business activities and environment. After being hit by substantial decline in their natural resource revenues as the federal government centralized resource taxes in 2002, Russia's resource-producing regions attempted to reverse the shock. As it became clear that their efforts to decentralize resource income would not succeed, regional governments started to take action to expand their tax base. These policy actions translated into higher levels of private investment and business activities in these regions. When the oil- and gas-price shock reduced their regional budgets in 2014, the regional governments expected it to be temporary. As a result, they were not as proactive as they were in 2002 towards businesses and this attitude was reflected in sluggish economic activities. Another finding of this dissertation is that the average short-term effect of negative resource shocks on broad measures of important economic institutions has been consistently positive across countries. Similarly, positive revenue shocks also have improved these measures in the short-run. Below I discuss the implications of these findings and future directions for this project.

6.1 "Resource curse" literature

What I find in this dissertation is generally good news for scholars of the "resource curse" and those concerned about the fate of resource-dependent nations. The finding in Chapter 5 that negative shocks to resource revenues have positive short-term effects on business institutions suggests that despite the broadly-studied undesirable effects of high levels of windfall income, businesses in resource-dependent countries can experience at least a brief period of support when revenues decline. This may not completely reverse the "resource curse," but it can provide opportunities for businesses to demand reform as leaders may be more willing to make structural changes. The experience of Russia's oil- and gas-producing regions following two types of negative shocks implies that the type of the shock and how elites perceive the shock can determine whether these opportunies translate into actual improvement in business and economic activities.

How can we interpret the finding from Chapter 5 that shows *positive* revenue shocks also have positive short-term effects on policies and institutions related to the business environment? The resource curse literature suggests that positive shocks are usually associated with a decline in economic growth. These two empirical observations may not actually be at odds with each other based on existing research on how windfall revenues from natural resource exploitation shape societal expectation for distribution as well as quality of state institutions. During positive revenue shocks, resource-rich governments may have incentives to improve their business and institutional environment for two reasons. First, they face increased pressure to distribute the fruits of the resource exploitation. Distribution may take a form of increased spending on certain public goods, such as support for businesses, as well as patronage (Ross, 2001*a*). Second, there may be international and reputational pressure on resource-rich governments to improve their business and institutional environment and strive for modernization at least in appearance (Lashitew, Ross and Werker, 2020).

At the same time, these government initiatives and policies can fail to lead to higher

economic growth either by design or due to implementation failures. Regarding the former, governments dependent on natural resources may see strong and diverse businesses as an unnecessary political rival since they do not need the businesses' financial support (Dunning, 2005) and, therefore, may not want their own policy initiatives to succeed. In other words, they may adopt de jure policies that do not provide de facto increase in support for businesses. With regards to the latter, even if elites genuinely want to develop diverse economic base, the weakening and increasingly corrupt state institutions and bureaucracy may not be capable of actually implementing the policies and reducing the burdens on businesses.

Therefore, the "resource curse" literature's finding that resource wealth does not always translate into continued economic growth and my finding that the average short-term effects of positive revenue shocks have been positive are consistent with one another. We observe incremental improvements in the business environment following a positive shock, as reflected in the small magnitude of the coefficients in the first-differences models, but these improvements may not actually help the broader economy to sustain economic development in the long-run. The divergence of findings from analyses that use aggregate measures of economic development versus that utilize its theoretical and empirical components points to the importance of zooming in on the concept of economic development in the "resource curse" literature.

My dissertation also enriches the "resource curse" literature by showing that the assumption of symmetry in the effects of positive and negative revenue shocks is not valid, at least when we consider policy-based institutions and the business environment in a cross-national setting. I find that negative revenue shocks are associated with positive effects on institutions on average, as implied by studies that find a political and economic "resource curse." However, positive resource shocks are associated with a "blessing," rather than a "curse." This finding suggests that scholars perhaps should question this assumption as it relates to the relationship between resource dependence and other measures of economic

development.

What do the Russian regions' experiences following the two negative revenue shocks tell us about the broader "resource curse" literature? One hopeful implication of the Russian experience is that governments can deal with the changing dynamics of resource dependence effectively, if they want to. Russia's regional governments did not have a lot of leeway in mitigating the "resource curse" and using the moments of shock to their advantage. Given that regional governors do not have full autonomy in making economic decisions and are subject to federal policies and politics, what they achieved in the 2000s is no small feat. If Russia's regional governments can use their relatively limited authority, fading in the context of growing political and economic centralization in Russia in the 2000s, then national governments with more muscle in the policy arena are even more likely to be able to initiate policy changes that can benefit their economic development.

Another positive note is on institutional changes. As the cross-national analysis shows, policy-based institutional changes can happen pretty quickly—resource-rich countries saw small but significant improvements in their economic freedom scores and broad institutions just the year following resource revenue decline. Russian regions' experiences demonstrate these arguably marginal policy improvements can induce business activities in a short period of time as well.

6.2   Intra-governmental relationship in Russia

The literature on the relationship between Moscow and regional governments tends to conclude that regional governors have increasingly lost their autonomy and become mere puppets of the federal center. While this is certainly accurate for politics, regions seem to still have some room to make divergent choices when it comes to fiscal and economic policies. Regional governors may be aware of an observation in the literature that they tend to be rewarded for their economic performance, while the federal government is often punished for their perceived conduct in the economic area.

This is not to say that the preferences of the federal government do not matter for regional economic policies. The pro-business measures taken by resource-rich regions in the 2000s took place in a period when economic development was one of the top priorities of the federal center. This is why, for example, it had various resources available for regional governments that resource-rich regions utilized to support businesses. In comparison, the 2010s are characterized by concerns about political stability and continuation of the status quo from the perspective of the Kremlin. Consideration of the federal government's perspective may be one limitation of applying my theory to subnational level policies—the intentions of the federal government are always going to matter.

Another implication of this dissertation for Russia regards how natural resources may affect national-level outcomes versus the regions. The empirical analysis shows that the aggregate effect of resources can be different, even contradictory, on these two levels of governance. In the 2000s, Russia was undergoing resource revenue growth on the national level due to unprecedented high prices for oil and arguably experiencing the effects of the Dutch disease. For the regions, the negative effects of the Dutch disease in particular do not seem to have overwhelmed the positive effect of incentive change of regional governments.

The empirical results also speak to the issue of the division of power and resources between federal and regional governments in Russia. The federal government's decision to combine political centralization with fiscal centralization, as opposed to other authoritarian regimes like Kazakhstan that only consolidated political power, often attracts criticism, as it deprives the regions of substantial benefits related to having the means to manage and provide local public goods. The fact that Russia's resource-rich regions managed to effectively deal with the budgetary re-configuration of natural resource revenues in 2002 may suggest that centralization of budgetary powers had some positive effects on the regional level. For the national government, however, the double centralization may have exacerbated the "resource curse," as the it magnified windfall revenues accruing to the federal budget.

6.3   Sources of resource shocks

Resource shocks, particularly negative shocks, are likely to continue to be an inseparable part of resource reliance. The demand shock inflicted upon oil-producers by the COVID-19 crisis presents one example. The economic downturn following the onset of the pandemic caused massive financial losses for resource-producing countries and companies, particularly through a drop in consumer and transportation industry demand for fuel. Not only is resource production affected by this shock, but all related activities, such as exploration, have been brought to a near halt. It is estimated that production and exploration companies will lose a trillion dollars just in the year 2020 and will likely continue to suffer the financial consequences in the next few years. This may trigger a resource shock to countries that are likely to last in the short to medium term. The findings of this dissertation imply that this shock can incentivize resource-dependent governments to re-think the structure of their economies and make at a minimum incremental changes to support small- and medium-sized businesses and private actors in non-resource sectors.

Climate change may be another source of negative revenue shock to resource-producers, particularly oil producers. Increasing awareness of the impacts of reliance on fossil fuel has caused an increase in demand for renewable energy. Fighting emissions has emerged as a key policy priority for many developed countries, such as the members of the European Union, and some developing countries like China. As public awareness of and attention to this issue increases, political interests in them are also likely to rise. However, this shift in demand would not affect natural resources uniformly. The oil and coal industries are expected to be impacted negatively, while producers of aluminum, copper, and other metals can benefit from a low carbon economy. Therefore, we may observe divergence between the dynamics of fossil fuel revenues and metal revenues over the next few years. The implication of this dissertation is that we may not have to wait for long for oil and coal producers to start adopting policy changes towards businesses.

These two recent developments with likely lasting consequences for resource producers

point to an interesting possibility—maybe permanent shocks will become even more prevalent than temporary shocks in the future. If my theory is valid, then the findings from the cross-national analysis—the average effects of negative resource shocks are positive—would imply that on average, shocks that are perceived to be permanent were more common than temporary shocks. Maybe this tendency would be exacerbated by climate change and the ramifications of the COVID-19 pandemic.

6.4   Future extensions

My immediate plan is to extend the dissertation by examining whether better economic performance and business environment after the permanent shock and lack thereof after the temporary shock in Russia correspond to other changes. Specifically, I want to explore if these shocks led to the broader diversification of regional economies and consequently diversification/openness in politics in oil- and gas-dependent regions in Russia.

The current version of the dissertation does touch upon sectoral diversification. Manufacturing employment has been included in the analysis. Small business entry and loan to entrepreneurs are also meant to capture movement away from the resource sector, as these actors are assumed to not operate in the resource sector that requires large-scale operations and equipment. I intend to use additional data to assess the economy-wide diversification of resource-rich regions and how changes in economic diversification interact with the political dynamics of the regions.

This would be an important contribution to our understanding about diversification. Investing politically and economically in non-resource sectors is routinely advised to resource-dependent countries as the best strategy to protect themselves from both the political and economic "resource curse." Economic diversification may be important also for the capacity of the state, as some argue that the character of the leading sector of the economy determines the extractive capacity of the state and consequently leaders' incentive structure. Despite its importance, surprisingly little is known about diversification.

Economic diversification can theoretically lead to political diversification. As economic sectors that are not easily controlled by the government expand, their monetary power can easily spill over to politics. In Russia, this is particularly possible as leaders of many growing industries enter politics. Therefore, I will address the question—has diversification happened during times of negative revenue shocks, both institutional and price-related, in Russian regions? If yes, has diversification of the economy led to diversification or openness in politics?

Another interesting question that my findings raise and do not answer is the long-term effects of resource dependence on economic growth. Understanding how the short-term positive effects of resource revenue fluctuations interact with the long-term influence of resources would provide us with a more complete picture of the dynamics of the "resource curse." Leading scholars studying the political effects of resource reliance have already made advances both theoretically and methodologically in this regard, which can complement my analysis of its economic effects.

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