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Political Economy of Offshore Finance

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ABSTRACT OF THE DISSERTATION

Political Economy of Offshore Finance

by

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This dissertation analyzes the patterns of business elites' offshore usage and its impact on domestic politics. I advance two theoretical claims. First, the availability of offshore zones makes autocracies stronger by facilitating patron-client exchanges that keep regimes in power. Second, I argue that vulnerability to political risks prevents firms from using tax havens for tax avoidance.

After providing some historical and economic background on the evolution of tax havens, I present a simple theory of patron-client exchange in autocracies that rely on a tax haven as a commitment device for a ruler. I argue that the availability of such a device makes elites more docile to the regime and prevents movements towards a more open and constrained regime.

Then, I offer cross-national evidence that speaks to some of my theory's implications. In particular, I use previously untapped country-level data on the size of offshore holdings to test if offshore utilization prevents democratizations. I find that the countries with higher offshore wealth in the year 2007 were less likely to democratize between 2007 and 2016. I show an array of placebo tests and robustness checks to demonstrate that my results are unlikely to be driven by previous regime dynamics, coup risk, or other potential confounders.

Then, I move on to explore another important implication of my theory: an

exogenous marginal decrease in the safety of offshore assets should trigger an increase in the spoils the ruler shares with the elite. I use recent rounds of international sanctions against the members of the Russian business community linked to the Russian regime to explore this empirical prediction.

I also discuss corporate tax avoidance through tax havens. In particular, I ask why some firms avoid local taxes by establishing affiliates in tax havens while others do not. I argue that firms that are more vulnerable to political risk are less likely to engage in income shifting since complying fully with the tax law makes firms more valuable to the host government. I explore the empirical implications of my theory using a registry-based dataset that allows tracing connections between firms and tax havens. My findings improve our understanding of tax capacity and can inform international efforts to combat tax avoidance.

The dissertation of Maxim Ananyev is approved.

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2018

To my mother, Marina Ananyeva, and to the memory of my father, Igor Ananyev

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CHAPTER 1

Introduction

When an international consortium of journalists published the enormous cache of documents that became known as "The Panama Papers", non-specialists were shocked by the scale of global money laundering and tax evasion that they revealed. To specialists, however, the only surprising thing was that such details became public. Hundreds of billions of dollars flow annually through a network of tax havens, located in a range of seemingly peripheral micro-states. The economic and fiscal effects of such offshore finance which robs weak governments of tax revenue and retargets investment capital around the world have been well studied by scholars. However, much less effort has gone into investigating the influence of such financial flows on the politics of authoritarian states. That is a mistake.

In fact, offshore finance is a crucial aspect of how modern dictatorships operate and a determinant of their longevity. Beyond their direct fiscal effects, tax havens influence shadowy bargaining between big businesses and officials over everythingfrom property rights protection to political contributions. Unlike many past dictatorships, todays autocracies are embedded in a complex web of international finance, the effects of which their leaders ignore at their peril. When Western states and international organizations seek to put pressure on "rogue" regimes, such as those in Belarus, Iran, Yemen, and Russia, one of their first steps is to cut access to the offshore system. Do such measures work? Or do they, perhaps, empower and embolden the sanctioned regime? To evaluate this, we need to understand the links between offshore finance and domestic politics.

This project attempts to analyze how business elites use offshore finance and the impact of the availability of tax havens on domestic politics. I advance two

theoretical claims. First, the availability of offshore zones makes autocracies stronger by facilitating the patron-client exchanges that keep regimes in power. Second, I argue that vulnerability to political risks prevents firms from using tax havens for tax avoidance.

1.1 Brief Overview of Arguments

My research offers several arguments regarding the consequences and causes of the tax haven utilization. I argue that the tax havens in authoritarian countries can impede regime change towards more openness and constraints because they facilitate intra-elite bargains. Since commitment problems are ubiquitous in authoritarian regimes, and country leaders always rely on the network of supporters, those supporters have every reason to demand either institutional protection of property rights or larger share or spoils to compensate for weak institutions. If the tax havens are available, elite members can use those jurisdictions instead of relying on domestic institutions. In the presence of tax havens, the elites can get protection from expropriation without strong domestic institutions. This demotivates elites to pressure the incumbent for institutional reforms.

I offer a simple formalization of this argument and explore two of its implications empirically. First, in the cross-national evidence, nondemocratic regimes with higher levels of offshore utilization are less likely move towards democracy. Secondly, in the case of Russia's economic elites, consistently with my theory, business leaders who suffered more from the western sanctions (i.e. whose assets suddenly became less safe in the offshore zones) were able to successfully pressure the Russian regime for subsidies and tax breaks, thus, receiving a compensation for additional risks.

After exploring the consequences of offshore utilization by economic elites in the authoritarian countries, I explore the causes of tax avoidance through tax havens by multinational firms. Current research documents a large variation in the extent of tax avoidance by firms; it is not uncommon that different firms

within one sector and of similar sizes exhibit different behaviors regarding the aggressive techniques of tax minimization (Dyreng, Hanlon, and Maydew, 2008). This variation is largely unexplained. I offer a new argument that might help explain these differences. I argue that an important determinant of tax avoidance is a firm's vulnerability to political risk. Firms that are more vulnerable will be *less* likely to avoid taxes, because the governments of host countries perceive the amount of taxes paid by a firm as an opportunity cost of expropriating or otherwise damaging that firm.

This theory runs against a conventional wisdom about political risk. Since Adam Smith's assertion in *The Wealth of Nations* that "where men are continually afraid of the violence of their superiors, they frequently bury and conceal a great part of their stock", the researchers have emphasized the importance of property rights for fiscal capacity. Besley and Persson (2009) offer a model where " investments in legal and fiscal capacity are often complements". Contrary to this view, I argue that, when it comes to corporate tax avoidance, the reasons for being "afraid" do not lead to firms hiding their profits from tax authorities, but to paying more taxes.

1.2 Brief Overview of Evidence

I test the theoretical arguments using new data. First, I test empirical predictions of the theory of tax havens as commitment devices for autocracies. The theory has two major predictions. First, the utilization of tax havens should prolong authoritarian spells and prevent regime change. Second, the marginal decrease in the safety of assets deposited in the tax havens should be offset by the increase in spoils that the authoritarian ruler shares with the elite.

I test the first prediction with cross-national data. Using newly compiled country-level estimates of offshore wealth, I find that an increase in one standard deviation in the offshore wealth to GDP ratio in 2007 is associated with a 7 percentage point decrease in a probability of a positive change in Polity score be-

tween 2007 and 2016. I control other predictors of democratizations and conduct a series of placebo tests to make sure that the result is not driven by a trend in regime dynamics.

The second prediction is difficult to test using cross-national data because it requires identification of an episode where offshore wealth from a particular country suddenly became less secure. To test this prediction, I use Russian firm-level data. In 2014, following Russia's involvement in a military conflict in Ukraine, several consecutive packages of economic sanctions were implemented by the U.S., European Union, and their allies. I treat those sanctions as exogenous decreases in safety of Russia's economic assets in offshore jurisdictions. My theory (explained in more detail in Chapter 3) predicts that following an episode of increased risk in offshore jurisdictions, the members of business elites should be compensated by the regime. I find that, indeed, in the following year 2014 (when the first rounds of sanctions were implemented), the Russian firms with affiliates in tax havens paid less in tax than the firms without known affiliates in tax havens.

Certainly, having an affiliate in a tax haven is not random, so the issue of endogeneity might threaten the credibility of this result. I try to alleviate these concerns. I use propensity score weighting and trim observations so that the worst possible control units are removed, making sure that the effect is estimated only with the sets of observations with overlapping propensity scores. For estimating propensity scores, I use all available firm-level financial data. Of course, the propensity score weighting can only help with the observed confounding and is useless if the omitted firm-level variables are unobserved. To alleviate the concern about unobserved confounding, I implement a simple placebo test: the same estimation, but with pre-2014 data. Because the sanctions started only in 2014, if the previously estimated effect captures the impact of sanctions on firms with tax haven affiliates, then I should not find any effect in the pre-2014 specification. If the post-2014 effect is driven by unobserved firm-level confounding, which is stable in time, then, I should find the effect in the pre-2014 data. But, as I find

no effect in the pre-2014 data, I conclude that the concern about unobserved firm-level confounding might be alleviated. Importantly, in all specifications, I control for sector-level fixed effects.

I also offer an empirical investigation of the predictions about the impact of vulnerability to political risk on corporate tax avoidance. For this, I compile a dataset on the richest firms from 77 nations from all the regions. In these data, I can observe whether each of the firm has an affiliate in a tax haven. To quantify their vulnerability, I calculate a measure of concentration of fixed assets and revenues. I find that the firms with higher concentration of fixed assets and revenue are *less* likely to have an affiliate in a tax haven and, on average, pay higher taxes.

This argument and empirical finding that support it show that, while the community of nations strives to protect the property right of international investors by creating and enforcing investment treaties, tax treaties, and various mechanisms of dispute settlements, those steps might end up hurting the fiscal capacity of developing nations by indirectly facilitating tax avoidance. A more balanced approach is needed.

1.3 Roadmap

This dissertation proceeds as follows. Chapter 2 gives some background about the tax havens, their history, and their political and economic significance. I review the most reliable estimates available in the literature on the size of offshore wealth as well as the the size of the lost revenue from the tax avoidance of individuals and firms. I also argue that the recent international efforts to combat tax avoidance through tax havens might have limited impact.

Chapter 3 presents a simple theory of patron-client exchange in autocracies that relies on a tax haven as a commitment device. I write up a simple game with two players: the ruler and the elite, where the ruler decide how much money to give to the elite, and the elite decides whether to rebel or not. The key assumption

is that the ruler might later renege on his/her promise and expropriate whatever he/she had given to the elite. In the presence of this risk, I argue, the elite would prefer to keep their wealth offshore, and the availability of offshore zones can prevent the pressure for the elite towards more open and constrained political regime.

Chapter 4 offers cross-national evidence that explores some of the implications of the theory. In particular, I use country-level estimates about the sizes of offshore holdings to test if the offshore utilization prevents democratizations. I find that the countries with higher offshore wealth in year 2007 were less likely to democratize (experience a positive change in their Polity score) between 2007 and 2016. I show an array of placebo tests and robustness checks to demonstrate that my results are unlikely to be driven by the previous regime dynamics, coup risk, or other potential confounders.

Chapter 5 explores another implication of my theory: an exogenous marginal decrease in the safety of the offshore assets should trigger an increase in the spoils the ruler shares with the elite. I use the recent rounds of international sanctions against members of the Russian business community linked to the Russian regime to explore this empirical prediction. First, I point out to several cases where the individuals who suffered from the sanctions were explicitly compensated by the subsidies and tax breaks. Secondly, I use the data on the connections of the largest Russian firms to tax havens to demonstrate that the firms linked to tax havens paid smaller taxes after 2014 (i.e. after the sanctions). This negative relationship does not hold for the years before 2014; thus, corroborating the theory.

Chapter 6 discusses corporate tax avoidance. In particular, it asks why some firms avoid local taxes by establishing affiliates in the tax havens while others do not. Contrary to conventional wisdom, I argue that firms that are more vulnerable to political risk are less likely to engage in income shifting since complying fully with the tax law makes firms more valuable to the government. I explore the empirical implications of my theory using a registry-based dataset that allows tracing connections between firms and tax havens. My findings improve our

understanding of tax capacity and can inform international efforts to combat tax avoidance.

Chapter 7 concludes, discusses policy implications of my analysis, and suggests avenues for future work.

CHAPTER 2

Background: The Rise of Tax Havens

What is a tax haven? Palan, Murphy, and Chavagneux (2013) defined tax havens to be jurisdictions that "assist nonresident persons or corporations to avoid the regulatory obligations imposed on them in the places where those nonresident persons or corporations undertake the substance of their economic transactions". Importantly, tax havens themselves can be too distinct from one another, and the definitive test that can say whether the jurisdiction can be labeled a tax haven is hardly possible. One of the influential attempts at an elaborate definition was made by the 1994 IMF report (Cassard, 1994). In this text tax havens are euphemistically called "offshore financial centers" (OFC). According to the IMF definition, several features define an OFC: they do business primarily with non-residents, offer low or zero tax rate, low transactions costs, lax or non-existent financial regulation, and they offer secrecy for all of the financial transactions.

The existence of tax havens is not a new phenomenon, as their history dates back at least to the 18th century, when the Great Council of Geneva, a governing body of Switzerland, passed a law forbidding bankers to disclose information about their clients [1]. Despite those old roots, before the financialization of wealth and the rise of welfare state, there was little demand for such secrecy in jurisdictions. Most of the wealth was in the form of land, and the pre-World War I states offered relatively low (or zero) tax rates on income in capital.

In the beginning of the 20th century, two major developments triggered the increased demand for tax havens. The first development was the change in the nature of assets that the affluent individuals used to store their wealth: land and

[1] Financial Secrecy Index 2018: Narrative Report on Switzerland, http://www.financialsecrecyindex.com/PDF/Switzerland.pdf

real estate has been replace by stocks, bonds, and other financial instruments that can be easily moved across jurisdictions. The second development was the domestic political pressures for higher redistribution that led to higher taxation (Scheve and Stasavage, 2010; Scheve and Stasavage, 2012).

Zucman (2015) traced the increase in the utilization of the first large tax haven – Switzerland – to the aftermath of World War I. After the war, many European countries started to increase their taxes to pay out the debts incurred during the war and to provide care for the veterans. This development created a demand for the jurisdictions where the rich could hide their incomes and assets from domestic taxation. By that point, the Swiss banking industry had already been the most advanced in Europe, and Swiss banks found themselves in a favorable position to take advantage of this demand.

The first well-documented influx of foreign wealth into Swiss accounts happened between 1920 and 1928, when the deposits in Swiss banks grew at an annual rate of 14 percent. Because of the secrecy of the accounts, it is hard to determine the source of the money, but the timing – it happened right after the French government sharply increased top marginal tax rate – suggests that the money originated from France. The growth of foreign wealth deposited in Switzerland continued after World War II. In the 1980s, an array of new tax havens emerged: the Bahamas, Jersey, Luxembourg, and others. According to the estimation of Zucman (2015), in 2013, ten percent of all the financial holdings of European households were in tax havens (60 percent of that amount in Switzerland, and 40 percent in the "new" tax havens)[2].

What are tax havens used for? As the name suggests, their primary usage is to facilitate tax avoidance of individuals and firms. Because of the secrecy, low tax rates, and low transactions costs, individuals and firms can circumvent their domestic regulations by depositing their wealth into tax havens. It should be noted that avoiding domestic taxation is not necessarily illegal since many of

[2]The amount of wealth in the tax haven from non-European countries is harder to estimate. Chapter 4 will use some of the available estimates

the techniques used to transfer the wealth are allowed under domestic laws of the individuals who use them (Chapter 6 looks into corporate tax avoidance in more detail).

Not all of the jurisdiction labeled as tax havens serve the purpose of tax avoidance exclusively. Many of them perform different sorts of financial intermediation. For example, Bahrain, Panama, and Singapore are involved in channeling funds from European and US markets into their regions to facilitate foreign direct investment. When a bank wants to expand its operations into certain regions, they often set up a branch in a local tax haven because of the financial infrastructure that already exists there, not necessarily for the purpose of avoiding any regulations[3].

Opinions differ on the normative effects of tax havens. The utilization of tax havens does two things: redistributes funds from the host governments to individuals and improves the efficiency of economic transactions. Because tax havens have low or zero tax rates, the funds that are deposited there or incomes that are booked there go to the individuals (either private owners of wealth or corporate shareholders) and do not go the host governments of the states where the income is generated. This redistribution lies on the Pareto frontier (whatever is lost by the governments is gained by the tax haven users)[4], but it might be normatively undesirable nonetheless.

If the government is "good" (it uses its tax revenue to provide goods and services) and public goods and services are mostly consumed by the citizens who are not on top of the income ladder, then tax havens facilitate the redistribution from the poor to the rich. Such redistribution might be undesirable. If the government is "bad" (it uses tax revenue for corruption, repression, or pointless wars), then the welfare consequences are not as straightforward. The funds are redistributed from the corrupt politicians and bureaucrats to the tax haven users.

[3]Palan, Murphy, and Chavagneux (2013) offer an example of Bank of America that set up a specialized market, Asian Currency Unit, in Singapore.

[4]Though, see Kim, Li, and Zhang (2011), who argue that tax avoidance increases the risk of firm managers hoarding bad news thus increasing the risk of stock market crashes.

These welfare considerations assume that the quality of government is exogenously given. In this work, I argue that this assumption might not necessarily be accurate since the availability of tax havens might influence the quality of government. I attempt to argue theoretically and to show empirically that the availability of tax havens might negatively influence the dynamics of the regime. In particular, my argument implies that the tax havens are used in a patron-client exchange between the rulers of authoritarian countries and their support groups, thus, making members of the elite more acquiescent and, thus, preventing possible regime changes.

How important are tax havens for the global economy? Coming up with the credible quantitative estimate of the offshore wealth and tax loss is hard because those jurisdictions protect the identity – and in many cases, nationality – of their clients and sometimes falsify the data they show to the international regulators (Zucman, 2015). Nevertheless, recently uncovered data – official statistics from the Bureau of International Settlements, as well as leaks (most notably, Swiss Leaks, Panama Papers, and Paradise Papers) – enable crude estimates.

Zucman (2013) used country-level balance sheets to come up with an estimate of global wealth stored in tax havens. The approach he used involves detecting anomalies on national accounts. If a UK individual owns US stocks from his account in Switzerland, then the US will record a liability (some foreigners own UK equity), and Switzerland will record nothing (Swiss authorities see that the stock is owned by a foreigner). This means that tax havens yield the following anomaly: all the countries in the world, taken together, become net debtors. This disparity between the total assets and total liabilities can be used to estimate the total amount of funds deposited. After validating the assumptions with the other sources of data and controlling for other possible explanations for the disparities in national accounts, Zucman (2013) estimated the offshore wealth to be 7.6 trillion dollars (eight percent of total household wealth of all the countries). This number is immense (for perspective, GDP of all nations in Sub-Saharan Africa is 1.7 trillion dollars, and GDP of all countries in Latin America combined is 10

trillion dollars). Even this number is a conservative estimate; other sources give an estimate of offshore wealth as high as 21 trillion dollars (Henry, 2012).

Another important question is how much money is lost by the domestic governments due to tax avoidance through tax havens. Out of 7.6 trillion dollars deposited in the offshore accounts, Zucman (2015) estimated 6.1 trillion to be undeclared to tax authorities. This leads to a crude estimate of 200 billion dollars per year in lost revenue for the host governments.

It should be noted that this estimate of lost revenue only concerns hidden household wealth and do not include *corporate* tax avoidance (which is the main focus of chapter 6 of this work). Estimating the extent of corporate tax avoidance through tax havens requires a different set of assumptions. Several estimates exist in the literature. The most reliable ones are provided by Toslov, Wier, and Zucman (2018). They start with an observation that, according to the firm-level financial data, firms in tax havens are always more profitable than the firms in non-havens; while, in non-havens, foreign firms are often less profitable than domestic firms. They assume that, conditional on the economic sector and other determinants of profitability, the profit in havens in the absence of tax avoidance should be the same as the profit of local firms in non-havens. According to this criteria, and 40 percent of multinationals engage in tax avoidance, 10 percent of global tax revenue is lost due to this practice the biggest loser being the EU (for the EU countries, the estimated loss is 20 percent of their corporate tax revenue).

The problem of tax avoidance through tax havens is familiar to policymakers. Unfortunately, the coordinated attempts to address it have not been successful so far. The most serious attempts at limiting tax avoidance through the offshore jurisdictions involve an automated exchange of information. Pioneered in Foreign Account Tax Compliance act and later adopted by OECD, the automatic exchange automatically gives the host country information about the bank accounts of their citizens in other countries. Most of the tax havens have either already joined such exchanges or intend to do so in the future.

Unfortunately, the effect of such automatic exchanges is limited. First, the US

has not yet joined the automatic exchange agreements (but demands that other nations automatically give the information about foreign accounts of US citizens to the IRS). So, the assets deposited in the US domestic "offshore zones" (such as Wyoming and Delaware) will be undetected. Second, many account holders in the offshore zones are not individuals but shell companies that are themselves registered in the offshore zones and have unknown owners.

These automatic exchanges can also be easily circumvented with the help of synthetic citizenship. For example, a French citizen who wishes to hide his/her wealth from French government can get citizenship from St.Kitts and Nevis for a 250,000 dollar donation and open a Swiss account as a citizen of those Caribbean islands. In this case, the financial information of that individual will be shared not with France, but with St. Kitts and Nevis.

Finally, there is no realistic enforceable punishment for the tax havens that misrepresent or conceal the data. Because many of the tax havens get their revenue from the registration fees and the taxes (however small) they collect from the registered firms and individuals, it is not in their best interest to fully comply with the automatic exchange agreements, even if they have joined them.

In sum, while the public and policy makers do attempt to regulate the utilization of tax havens, the problem of tax avoidance is unlikely to be solved in the near future. The technological advancements in the area of cryptocurrencies will facilitate capital exporting by the affluent individuals in the nations with strict capital controls. In the aggregate data, the utilization of tax havens shows no signs of abating: none of the recent treaties were able to slow down the growth of funds deposited in the tax havens.

My work advances our knowledge about tax haven utilization in two important respects. First, using the new data on cross-national offshore utilization, I show that the countries with more money in the offshore zones are less likely to undergo a regime change. I rationalize this finding with a model postulating that moving money to a tax haven prevents the elites in host countries from demanding property rights protection from their host governments. Second, I explore the

domestic determinants of corporate tax avoidance. I argue that the firms more vulnerable to political risk will be less likely to engage in tax avoidance.

The next section presents my argument about the effects of tax haven utilization on regime dynamics.

CHAPTER 3

How Tax Havens Facilitate Patron-Client Exchange in Autocracies: Theory

3.1 Introduction

What role do tax havens play in authoritarian survival? In this chapter, I offer a simple theory that clarifies the political importance of tax havens in the authoritarian regimes and produces additional empirical implications. I argue that tax havens serve as commitment devices for patron-client exchange between the rulers of authoritarian countries and their support groups.

Even in the most personalistic regimes, the dictators do not rule alone. They need supporters to provide them with funds and carry out necessary tasks for the regime (Egorov and Sonin, 2011). One of the defining features of authoritarian governments is the impossibility of commitment (Acemoglu and Robinson, 2011). Without the institutions that would constrain authoritarian leaders, the promises of those leaders can just be cheap talk, and the potential supporters among the elites have no reason to believe those promises. Whatever spoils the dictator gives to his supporters today can be taken back tomorrow. In fact, it is not uncommon for authoritarian governments to expropriate the assets from domestic and foreign individuals and firms.

This impossibility of commitment poses a serious problem for authoritarian governance. An authoritarian ruler needs the support of the elites; however, any bargain he/she makes with them cannot be enforced. Thus, the bargain becomes nearly impossible. This is where the tax havens become really useful. Because those jurisdictions offer secrecy and protection, which is impossible to achieve

domestically, once the money is moved there, the dictator cannot expropriate them. Tax havens provide the necessary commitment mechanism for the exchange between the authoritarian ruler and the elites.

In this section, I formalize this argument in a simple two-period game. I will show that, in equilibrium, when tax havens are present, achieving political survival will be less costly for the authoritarian ruler than in the situation when tax havens are not present. I also derive an additional prediction, which is important for testing the theory: once the tax havens become marginally less secure, the ruler would need to compensate the elites for the increased risk.

I keep the model relatively simple and straightforward. It is not my goal in this exercise to contribute to economic theory but just to outline the simplest and the most transparent formalization of my argument that would allow the formulation of empirical implications.

My theory complements other theories of autocracy. Specifically, Gehlbach, Sonin, and Svolik (2016) offered a generic setup for "selectorate" theories, where defection from the leader's support group happens if the members of the support group (referred to as "winning coalition") are promised higher rewards by the challenger than by the current leader.

Theories of this nature are ubiquitous in the literature on autocracies. Bueno De Mesquita (2005) proposed a theory of "selectorate," which implies that authoritarian leaders are selected and supported by a group ("winning coalition") within a larger group of members of the regime responsible for selecting the leader. It is the job of the leader, then, to make the winning coalition happy; otherwise, they might defect. While the exchange between the winning coalition and the ruler is implied by this theory, it is never clarified why the members of the selectorate would believe the ruler (or the challenger), given the impossibility of commitment.

Several theories have been proposed to address the problem of the lack of commitment devices. Boix and Svolik (2013) argued that authoritarian legislatures can serve this purpose. According to their argument, the institutions allow

members of the elite to monitor whether the ruler is violating the power-sharing arrangements or hiding the spoils. A related argument has been proposed by Gehlbach and Keefer (2013), who argue that the ruling party institutionalization serves as a device for property rights protection.

While I do not disagree with this claim, the specific mechanism of the commitment remains vague. In the authoritarian legislatures, the leadership usually has tight control over the legislative agenda. While the members of the legislatures might sabotage or delay certain initiatives (Noble ans Schulmann, 2018), and sometimes be consulted for their expertise in certain policy areas (Truex, 2016), and have opportunities to enrich themselves (Truex, 2014; Szakonyi, 2018), they certainly lack power to protect the members of the winning coalition from purges or expropriations.

My theory addresses the issue in a straightforward way: while the assets that are within the country cannot be protected, the assets that are moved out of the country can be protected because the domestic political leadership does not usually have the power to expropriate assets from foreign jurisdictions. Such protections are necessarily limited in scope: they do not cover domestic businesses and assets that cannot be moved (real estate, land, etc.), and they do not cover the physical safety and freedom of the members of the elite. Nevertheless, they offer at least some level of assurance that the members of the "selectorate" will not lose everything in case of purges.

My theory has implications for the literature on the political survival of authoritarian leaders. Scholars have identified many different strategies modern autocrats use to remain in power and deflect potential challenges: projecting invincibility in the elections by winning with large margins (Magaloni, 2006) and implementing electoral fraud (Simpser, 3013; Gehlbach and Simpser, 2015), providing the arena for policy concessions (Gandhi, 2008), a mix of selective cooptation, persuasion, repression and censorship (Guriev and Treisman, 2015), and many others.

I add to this literature an argument that, based on the extent to which the

authoritarian survival depends on the patron-client exchange within the elite, tax havens facilitate this exchange, thus, contributing to the resilience of the authoritarian regimes. It should be noted that it would be incorrect to call tax havens "an instrument" for authoritarian survival because they cannot be strategically deployed by authoritarian leaders. The availability of tax havens is a feature of global economy that is not under the control of any single political leader[1].

The rise of tax havens is a feature of a global economic regime, which is a result of many different decisions by private and state actors. Most of these decisions were shaped by the economic competition between different firms and tax competition between nations. It is hard to imagine that contributing to the resilience of authoritarian governments was a goal of any significant group of actors. Nevertheless, as my theory demonstrates, it is reasonable to expect that improvements in authoritarian survival was one of the unintended consequences of the rise of tax havens.

This chapter proceeds as follows. Section 3.2 presents a formal model in two steps: section 3.2.1 presents a model of authoritarian patron-client exchange with tax havens; section 3.2.2 presents the same model without tax havens; section 3.2.3 compares the two models and presents and discusses key results; and section 3.3 discusses the limitations of the analysis and concludes. Subsequent chapters present the evidence in support of the theory.

3.2 Formal Model

In this section, I offer a simple formalization of the intuition presented earlier. I show two models: the first one is a model of the exchange between the rulers and their supporters when there is an option for the supporters to move their money to tax havens. In the second model, there is no such option. I will show that

[1]Domestic leaders can impose capital controls, but with the sophistication of modern informational and financial technologies, those measures can only have a limited effect on the capacity of affluent individuals to hide their assets in tax havens (Zucman, 2015)

the existence of the option to move money to tax havens is consequential for the political dynamics of the regime.

3.2.1 A Model with a Tax Haven

I start by presenting the assumptions of the model in section 3.2.1.1 and then continue by presenting the analysis in section 3.2.1.2.

3.2.1.1 Setup

A polity consists of a ruler and an elite. In the beginning of the game, the ruler extracts rent of size T, and then decides how much he/she wants to share with the elite. He/she gives the share $r \in [0, 1]$ to the elite. The elite decides whether they want to organize a coup or not. If they organize a coup, they have chance p_c to win the whole T, but if they lose, they lose their share r and also receive a punishment $-K$. If the elite decides to rebel and wins, the ruler loses her share of the rent $(1 - r)T$, and also gets a punishment $-M$ (an exile, imprisonment, or death). If he/she wins, he/she retains his/her share $(1 - r)T$, expropriates the elite's share rT, and incurs additional costs $-D$, which represents the cost of finding new allies within the selectorate and replacing the lost patron-client networks.

If the elite decides to not rebel, they can either move their share of the spoils offshore, to the tax haven, where the ruler cannot find it, or leave the share in the polity. If they decide to move the money offshore, they pay a price $-H$, which represents the cost of creating offshore accounts, and they also face the risk of expropriation p_e, a usually small risk that the assets will be frozen or expropriated by the government of the offshore jurisdiction. If the elite decides to leave the money in the polity, then the ruler decides whether to expropriate it back or not. If the ruler decides to expropriate it, he/she is successful with the probability p_k. In this case, the elite's payoff is zero, and the ruler retains the whole amount of rent T. If the ruler is not successful in expropriating the elite, the elite's payoff remains rT, and the ruler's payoff is $(1 - r)T$.

To make the game more tractable and qualitatively interesting, I make several simplifying assumptions.

First, the assets are safer offshore than at home:

$$p_k > p_e \tag{3.1}$$

This assumption is realistic because the poor protection of property rights and the inability of authoritarian leaders to commit to not expropriating domestic assets is a feature of many authoritarian regimes.

Second, moving assets offshore is not prohibitively expensive:

$$H < 1 \tag{3.2}$$

This assumption reflects the relatively low cost of setting up offshore accounts. Of course, in reality, the dictator can influence H by implementing capital controls and other restrictions on economic transactions. However, given the current levels of financial development and informational technology, it can be very hard to prohibit moving money to other jurisdictions entirely. For simplicity, I treat H as constant. This is not too restrictive, since given $H < 1$, my results would hold for any level of H.

Third, if the elites decide to rebel, their chances of winning is not high:

$$p_c < \frac{1}{2} \tag{3.3}$$

This assumption is realistic as otherwise it would always be in the best interest of elite to rebel. Because actual coups are rare, the ex-ante chances for success must not be high.

Fourth, the punishment for the ruler is high if the coup wins:

$$M > T \tag{3.4}$$

This assumption implies that the ruler faces grim circumstances, if the coup is successful. It captures the stylized fact that the fate of the dictators is usually not good: they are often killed, imprisoned, or exiled. I assume that if an authoritarian leader knows with certainty that a coup will succeed (so he/she would

face a punishment of $-M$), he/she would prefer to abandon the office peacefully (thus losing T at most).

Fifth, the cost that the ruler pays when the rebellion happens and is defeated is also nontrivial:

$$D > \frac{1}{2}T \tag{3.5}$$

This assumption ensures that even when the coup of the elites is defeated, the ruler still incurs some costs as he/she needs to purge the disloyal members of the elite, find new allies, and rebuild the damaged patron-client hierarchies.

These assumptions complete the setup of the model. The next section offers the analysis of the game.

3.2.1.2 Analysis

I solve this simple model by finding the subgame perfect Nash equilibrium (SPNE). In the last step, the ruler tries to expropriate the elite if:

$$(1 - r)T + p_k rT \geq (1 - rT) \tag{3.6}$$

This equation always holds, given that $p_k \in [0, 1]$. This result exemplifies the commitment problem of the regime. At the end of the game, it is always in the best interest of the ruler to attempt expropriation. Given this strategic situation, the elite members are motivated to seek additional protections.

Given the previous result, the elite will move their share of spoils offshore if:

$$(1 - p_e)rT - H \geq (1 - p_k)rT \tag{3.7}$$

This equation always holds under assumptions 3.1 and 3.2. Intuitively, if the funds were to be reliably more secure offshore, and if the fixed cost of moving them is not high, the elite will always prefer to keep their shares offshore.

Then, the elite will not rebel, when the opportunity costs of rebelling is (weakly) smaller than the opportunity cost of not rebelling:

$$(1 - p_e)rT - H \geq p_c T - (1 - p_c)K \tag{3.8}$$

Hence, the share of spoils $r = r_{eq}$ that makes the elite indifferent between rebelling and not rebelling is:

$$r_{eq_1} = \frac{p_c T - (1 - p_c)K + H}{(1 - p_e)T} \tag{3.9}$$

Equation 3.9 is important because it determines the amount of compensation the ruler should provide the elite to deter them from rebelling. Intuitively, this amount is increasing in p_e (probability of successful expropriation): if the ruler has a higher chance of succeeding in taking the spoils from the elite in the next period, she should give them larger share of the spoils now. This amount is also increasing in p_c (probability of successful coup). This result is also straightforward: the stronger the elites, the larger the share of spoils they will demand. This amount is decreasing in K (the punishment for the elites in case the coup is not successful), and increasing in H, the cost of moving funds to tax havens.

It does not make sense for the ruler to pay the elite more than r_{eq} because, in this case, he/she will be losing money without the added benefit. It also does not make sense to pay anything between 0 and r_{eq} because, in this case, the elite will rebel anyway, and the payment will yield no result. So, the ruler is facing a choice between paying 0 and paying r_{eq}.

The ruler pays r_{eq} when:

$$(1 - r_{eq})T \geq (1 - p_c)(T - D) - p_c M \tag{3.10}$$

Under assumptions 3.1 - 3.5, the equation 3.10 always holds. Intuitively, if the cost of cleaning up after the failed coup attempt is high enough, then the ruler will prefer to buy the loyalty of the elite by sharing the r_{eq_1} share of the spoils.

So, in the SPNE, the ruler gives the elite r_{eq_1} share of the spoils, the elite does not rebel and moves the money offshore.

In the next section, I consider the similar model, but without the option to move money offshore. I will demonstrate that in this case, the acquiescence of the elite becomes more expensive.

3.2.2 A Model without a Tax Haven

In this section, I offer a game which is analogous to the previous game. The only difference is that this version does not give the elites an option to move money to the offshore jurisdictions. Section 3.2.2.1 outlines the assumptions of the model, and section 3.2.2.2 performs the analysis.

3.2.2.1 Setup

A model without an option to move money offshore follows the same logic as the model outlined earlier, but the step when the elite chooses whether to keep the money in the country is removed. So, in the beginning, the ruler chooses the share r that he/she will give to the elite. The elite observes r and decides whether to rebel or not. The rebellion is successful with the probability p_c, and, in the case of success, the elite gets the whole T, and the ruler is forced to pay M. In case the rebellion is not successful, the elite loses its share r, and the ruler pays the cost M of defeating the coup and restoring the patron-client networks. If the elite does not rebel, the ruler can attempt to expropriate the elite. The ruler succeeds with the probability p_k and gets the whole T. If the ruler fails, the elite retains rT, and the ruler gets $(1 - r)T$. I assume that conditions 3.1 and 3.3-3.5 hold.

3.2.2.2 Analysis

As in the model with tax havens, it is always beneficial for the ruler to try to expropriate the elite because it is always true that:

$$(1 - rT) + p_k rT \geq rT \tag{3.11}$$

Like in the model with tax havens, the ruler has nothing to lose if he/she tries to expropriate members of the elite in the last round of the game, so the elite should act in expectation of the expropriation attempt.

The elite will not rebel if the following inequality holds:

$$(1 - p_k)rT \geq p_cT - (1 - p_c)K \tag{3.12}$$

Intuitively, the reward that the elite gets should be large enough to compensate the elite for the chance of successful expropriation in the final round of the game.

The $r = r_{eq2}$ that makes the elite indifferent between rebelling and not rebelling is the following:

$$r_{eq2} = \frac{p_c(T + K) - K}{(1 - p_k)T} \tag{3.13}$$

The ruler effectively chooses between paying r_{eq2} (thus preventing a rebellion) and paying 0, thus, provoking a rebellion. The ruler prefers to deter the rebellion if:

$$(1 - r)T + p_kT \geq (1 - p_c)(T - D) - p_cM \tag{3.14}$$

As in the version of the model with tax havens, the ruler chooses to pacify the elite (instead of taking chances with the coup) in the costs of replacing lost allies after a defeated coup is sufficiently large.

3.2.3 Key Results

A simple model I have proposed offers a stylized representation of the interactions between the elite and the ruler in a situation where the ruler cannot commit to honoring the elites' property rights. Two implications are important. First, it is easy to demonstrate that under assumptions 3.1-3.5, $r_{eq1} \leq r_{eq2}$. In other words, the share of the spoils that the ruler has to give to the elite is always smaller in the game with the tax haven. Intuitively, when there is no tax haven, the elite cannot hide their share of the spoils from the ruler once the ruler decides to renege on his/her promise.

Because the members of the elite understand the incentives of the ruler, they demand higher compensation for the risk of being expropriated. While this is not modeled explicitly, it is easy to imagine the situation when the risks become so high that it would be beyond the budget constraint of the ruler to deter the elites from demanding institutional change. In this case, the tax havens can ease

the pressure. It follows that, in the presence of tax havens, the regime will be less likely to change towards a higher rule of law and democracy. I study this empirical implication in chapter 4.

The second implication is that r_{eq1} is increasing once p_e is increasing (follows immediately from 3.10). In other words, once the tax haven becomes less secure, the share of the spoils that the elites demand will go up. This implication is also intuitive. Because the elite is modeled as risk-neutral, higher risk would imply the need for proportionally higher reward. This prediction is important because, unlike the previous prediction, which can only be tested on cross-national evidence, this one can be tested in a within-country setting. In chapter 5, I use firm-level data on the tax haven connection of Russian firms to evaluate this empirical prediction.

3.3 Conclusion and Limitations of Analysis

This chapter offers a simple model that clarifies the role of tax haven in autocracies. I start with an assumption that the dictators always need supporters, but cannot commit to not expropriating the rewards of the supporters. I show formally that, in case there is an option to move the funds to tax havens, the supporters will demand a lower reward for their loyalty. I also show that the reward goes up once the funds in the havens become less secure.

The analysis in this chapter has its limitations. First, I assume that both the ruler and the elite are unitary actors, and the collective action problem among the elite does not exist in my analysis. Other studies have pointed out that coordinating the demands among the elite members and organizing a coup is immune to neither the problem of coordination nor the problem of collective action (Boix and Svolik, 2013).

A problem of collective action implies that as long as successfully pressing the demands against the ruler needs contributions from every member of the elite, but can succeed if some abstain from contributing their efforts, then it would be

in the best interest of each member of the elite to abstain and become a "free rider" on the contributions of others (Olson, 1971). In this case, the aggregate amount of effort will be undersupplied, and the regime change will not happen.

This problem is important in public goods provision, and to the extent to which the regime change is a public good, this problem is present in the phenomena I study. While the regime change has attributes of a public good (if the next regime is better, then even those will benefit from it who have not themselves participated in the ousting of the previous regime), it also has the features of a "club good", because those people who participated in removing the previous regime are expected to be in the privileged position in the new regime (Acemoglu and Robinson, 2005a). If the participants of the coup get higher rewards than non-participants, the collective action problem is alleviated since, in case of the coup, the agents will be motivated to participate to get private rewards.

Another problem assumed away in my simple model is the problem of coordination. Even if the agents participate in the regime change expecting private rewards, those rewards might still not be sufficient to trigger a regime change. If it is necessary for at least several agents to participate in the regime change in order for it to be successful, multiple equilibria may rise. If no one participates in the regime change, then it is a best response for every single elite member to abstain from participation. If enough people do participate, then it is a best response for every elite member to participate. From a formal standpoint, this problem does not have a universally accepted solution. Sometimes, such strategic situations are modeled as a "global game" in the spirit of Morris and Shin (2001). Those models are popular; however, as Bueno De Mesquita (2014) argued, the assumptions needed for equilibrium uniqueness can be unreasonable in the context of regime change. Specifically, to achieve equilibrium uniqueness, one should assume that potential participants of a coup assign substantially large probability to the outcome of regime failing even if no one is participating in a coup. At the same time, the private benefits for the participants should still be higher than the benefits for non-participants – even though their participation was irrelevant.

I chose to get equilibrium uniqueness by assuming that "the elite" is a unitary actor and, thus, abstracting away from the collective action problem and coordination problem. This solution is also not ideal since those problems are indeed the features of any attempt to change the regime, but those problems are also not the focus of my analysis in this theory. I leave the extension of my analysis to include the consideration for coordination among the members of the elite for future research.

My analysis also presents a one-shot game that proceeds in several steps. Of course, in the real world, the situation is not one-shot: the patron-client interaction between a ruler and his support group occurs repeatedly. One way to extend my model to repeated interactions and still get a unique equilibrium is to assume that, in every period, a fiscal shock that can trigger an attempt at expropriation occurs. The conclusions in this extension most likely will be similar to the conclusions in my analysis.

I also assume, unrealistically, that the ruler cannot influence the costs of using tax havens. This assumption captures a simple observation from chapter 2 that it is difficult for domestic governments to prevent its citizens from moving their wealth to tax havens. However, of course, the government can make it more difficult by imposing restrictions, penalties, and using financial surveillance technologies. I argue, informally, that it might not be in the best interest of authoritarian governments to increase the costs of tax havens, and I concede that, in a more realistic model, this cost should be made an endogenous parameter.

The next two chapters test the predictions of the model with the data. Chapter 4 offers cross-national evidence, and chapter 5 looks at the example of Putin's Russia in more detail.

CHAPTER 4

Tax Havens and Authoritarian Survival: Cross-National Evidence

4.1 Introduction

The previous section outlined a simple theory of authoritarian survival based on the patron-client exchange between the rulers and their support groups in the authoritarian countries. One of the most obvious empirical implications of the model is that the utilization of tax havens should be correlated with the authoritarian survival. The mechanism behind this prediction is straightforward; because tax havens allow the ruler to commit to not expropriating the members of the support group, the members of the support group, in the presence of tax havens, do not feel threatened by the ruler, and thus is more docile and less likely to revolt against the regime.

This section uses a new dataset on the country-by-country estimates of the wealth held offshore to test an empirical implication of my theory: that countries with higher amount of wealth held offshore are less likely to democratize. Because the rise of offshore havens is a relatively recent phenomenon, and the reliable estimates are only available for the year 2007, the effect of offshore wealth on democratization can only be estimated from relatively minor changes in the nature of political regimes.

To test the theory, I estimate a set of regressions, controlling for other possible determinants of democratization, and find that, indeed, an increase of one standard deviation of offshore wealth is associated with 7 percent lower chances for democratization (operationalized as a positive change in Polity score) between

2007 and 2016. I also find that the estimates for other covariates in the regression have signs predicted by other theories of democratization.

I control for the most obvious alternative explanations: natural resource rents (that also happen to be correlated with the offshore wealth) and the coup risk (that might drive more wealth to tax havens). I find that the natural resource rents have (as expected) a negative association with the probability of democratization, and the coup risk has a moderate positive effect on the offshore wealth. Those effects, however, are too small to confound the relationship between the offshore wealth and democratizations.

These findings are relevant to several literatures. First, they contribute to the empirical literature on democratizations and authoritarian survival. As Geddes (1999) pointed out, after several decades of empirical investigation into the causes of regime change, the generalizable knowledge remains scarce. One reason for this lack of external validity is that different context-specific factors can become more or less important depending on other factors. For example, the technological advancements in the form of social media make the coordination among the citizens easier, thus, increasing the potential pressure on the authoritarian regimes from the public (Tuferkci and Wilson, 2012; Breuer, Landman, and Farquhar, 2015). However, the decades of the rapid growth of ICT technologies and social media coincided with the rise of tax havens, and those *improve* the chances for survival. To borrow terminology from Svolik (2012), while one sort of development influences authoritarian *control* negatively, another one influences authoritarian *survival* positively.

Of course, it is not my contention that the availability of tax havens is the only systematic factor influencing authoritarian survival. Scholars have identified many other factors: strategic deployment or repressions (Bhasin and Gandhi, 2013; Svolik, 2013; Rozenas, 2018), selective cooptation, censorship, and information control. My theory implies that the bargains that the rulers make with their support groups will be more credible once the members of the support groups are using the tax havens to hide their share of spoils from future expropriation.

My findings also contribute to the study of the political effects of economic globalization. In particular, Arias, Hollyer, and Rosendorff (2018) argued that one of the commitment devices that the authoritarian rulers might use is joining Bilateral Investment Treaties (BIT). BITs allow the authoritarian governments to signal their creditworthiness and, thus, attract more investments. While this argument applies to foreign owners of capital, it might not apply to domestic economic elites who are not protected by the treaties. However, domestic economic elites are arguably at least as important as potential foreign investors. [1]. My results are consistent with the tax havens playing a role as a commitment device for the exchange with the domestic economic elites.

This chapter proceeds as follows: section 4.2 describes some of the empirical predictions of my theory, section 4.3 describes the sources of the data and provides empirical specifications, section 4.4 describes the results of the estimation, section 4.5 offers additional tests, and section 4.6 describes some of the limitations of the analysis, and concludes.

4.2 Empirical Predictions

The theory outlined earlier implies that tax havens serve as a commitment device in the patron-client exchange between the rulers and the support groups in authoritarian countries. This mechanism should prolong authoritarian spells and inhibit regime change. The effect operates through the complacency of economic elites. If the economic elites are more likely to put their money into offshore havens, they are less worried about the protection in their home country and do not demand institutional change from the regime. Thus, we should see fewer democratizations, if the offshore utilization among the economic elites is high.

Because the rise of the offshore tax havens is a relatively recent phenomenon, and regime changes are rare, one can only expect to find observable implications

[1] Wellhausen (2014) showed that, regarding foreign investors, the government can substitute investors from one country with the investors from other country, if the mix of FDI in the country is diverse enough with respect to its sources

in relatively marginal changes in the dynamics of political regimes. The detailed data on the cross-national offshore utilization is available as one snapshot from the year 2007 (see more on the sources of data in Section 4.3). Hence, my theory would predict that, conditional on all the relevant variables, the nondemocratic regime with higher levels of offshore utilization in 2007 are less likely to move towards democracy after 2007.

As has been noted in Section 2, offshore havens are used for multiple purposes: tax avoidance, minimization of transaction costs, and parking household wealth. For the purposes of my theory, the third goal, parking household wealth, is the most important (chapter 6 discusses using tax havens for tax avoidance in some detail). Because the tax havens provide some measure of secrecy and protection, they can be used by economic elites in authoritarian countries to hide their wealth from potential expropriation.

One problem with formulating regime-level predictions about the connection between offshore wealth and the probability of democratization is that the rise of tax havens is a global phenomenon. As discussed in chapter 2, the opportunities for moving wealth to tax havens can be exploited by economic elites all over the world. The community of nations only recently started paying significant attention to this issue, and even the measures of monitoring and control of the offshore accounts that have been implemented are either only half-heartedly enforced by the tax havens or can be easily circumvented. Strictly speaking, the exposure to the opportunity to move the household wealth to tax havens does not vary much among nations.

One should, thus, expect a global effect: the rise of tax havens should coincide with the slowing down of democratizations. But, of course, this effect is not identifiable, because many other things happened during the recent decades, such as the proliferation of social media, increase in global trade, and advances in surveillance technologies. Each of those trends could potentially explain the global regime dynamics. Thus, even though the cross-national variation in exposure to tax havens is minimal, it is the only kind of variation that would come

closer to testing the theory and controlling for other potential explanations.

In the following sections, I will use the changes and Polity2 scores and the estimates of country-level offshore wealth in a regression framework to test the theory. The theory predicts that authoritarian regimes with higher levels of the wealth held offshore would be less likely to democratize because the pressure from the economic elites for the rule of law and institutional change will be lower.

4.3 Data and Empirical Specification

To test the theoretical prediction with the data, I need to measure two main variables: the outcome, democratization, and the explanatory variable and country-level offshore utilization. Both variables cannot be measured directly, since measuring political regimes can only be done through expert judgement, and the offshore wealth is not observed directly (which is the primary reason why people use offshore jurisdictions in the first place). This section briefly discusses sources of my data and outlines an empirical procedure used to test the theory.

Country-level estimates of the wealth held offshore is hard to achieve. For this analysis, I use the data compiled by Alstadsaeter, Johannessen, and Zucman (2018) that contains estimates of the wealth held offshore by the residents of every country in year 2007. Those estimates have been compiled using diverse sources. The first source is the publications by the Swiss Central Bank that shows the aggregate statistics on the foreign account holders in Swiss banks. These statistics, however, can be misleading, because many of those account holders are shell companies registered in the offshore zones. To estimate the offshore wealth accurately, Alstadsaeter, Johannessen, and Zucman made several assumption about the distribution of the real countries of residence of the beneficiaries of those shell companies and verified those assumptions with the data on the real account holders leaked from HSBC Swizerland (a cache of documents known as "'Swiss Leaks')[2]. After producing the estimates of the wealth held in Switzerland for

[2]The documents have been published by the International Consortium of Investigative Journalists: https://www.icij.org/investigations/swiss-leaks/

every country, the authors attempted to come up with country-by-country estimates for every other tax haven. To achieve this, they used bilateral banking statistics published by the Bank of International Settlements. Of course, this source has the same drawback as Swiss banking data, so the authors had to make assumptions again and validate them with leaked data. To come up with the final estimates, the authors summed up their Swiss estimates with their non-Swiss estimates, thus, producing country-by-country estimates of the offshore wealth.

The data from Alstadsaeter, Johannessen, and Zucman are not without drawbacks. Their estimates rely only on official data either from the Swiss Central Bank or from the Bank of International Settlements (they use leaked data only to validate assumptions needed for extrapolation). This makes their estimates conservative, since they omit the wealth that are not accounted for in official statistics. The second source of possible inaccuracies is their omission of non-financial wealth. Because they rely on financial data, non-financial wealth (real estate, art, rare wines, etc.) is not included in the estimates. Despite these disadvantages, the estimates of Alstadsaeter, Johannessen, and Zucman are close in its aggregate numbers to other estimates available in the literature and have the added advantage of allowing country-by-country disaggregation. Unfortunately, because of the data limitations, the estimates are not longitudinal and are available only for the year 2007.

For my main dependent variable, I construct a simple indicator for democratization from Polity2 scores. For every country, I subtract the Polity2 score of 2007 from the Polity2 score of 2016 and assign a value of 1 to the indicator, if the difference is positive (the country is relatively more democratic in 2016 than in 2007) and 0 otherwise (the country is not more democratic in 2016 than in 2007). Because my theory only applies to nondemocracies, I remove democracies (countries that had Polity2 scores larger than 6 in 2007) from my sample.

With these data, I estimate the following specification:

$$Democ_i = \alpha + \beta_1 Offshore_i + X_i\beta + \epsilon_i \tag{4.1}$$

Here, $Democ_i$ is an indicator for the democratization of country i (calculates

as a long difference between the Polity scores between 2016 and 2017), $Offshore_i$ is a ratio of offshore wealth to the GDP of the country i in 2007, and X_i is a vector of the socio-economic control variables that can influence democratization (GDP per capita, natural resource wealth etc.) To avoid post-treatment bias, all control variables are measured for the year 2006 (a year preceding the year for which the estimates of offshore wealth are available).

4.4 Results

Table 4.1 presents the results of the estimation. The amount of observations (number of autocracies in 2006 for which the data on offshore wealth is available) is not large. I find that the offshore wealth is negatively associated with the probability of democratization. One standard deviation in the offshore wealth is associated with 7 percentage points smaller chances of a democratization. This result is consistent with my theory that asserts that offshore utilization improves the chances for authoritarian survival since tax havens serve as commitment devices for the rulers to not expropriate members of their support groups.

Other coefficients in this regression are consistent with current literature on the determinants of democratization. Most notably, the growth rate (in 2006) has a negative impact on the probability of democratization. This result is consistent with Treisman (2015) who showed that, as long as the authoritarian leader is alive, economic growth helps their political survival. Since very few authoritarian leaders died during the period under study (2007-2016), Treisman's argument would imply that the association with growth rate and democratization in this sample should be negative.

Similarly, the association between natural resource rents and democratization is also negative. This result is consistent with the "resource curse" theory of democratization (Ross, 2001; 2012). It is also consistent with the detailed analysis by Wright, Frantz, and Geddes (2015) who showed that oil rents increase the chances for authoritarian survival.

Table 4.1: Offshore Wealth and Democratization

	Model 1	Model 2	Model 3	Model 4
Offshore	-0.07^{*}	-0.07^{*}	-0.07^{*}	-0.08^{*}
	(0.04)	(0.04)	(0.04)	(0.04)
Growth	-0.02^{***}	-0.02^{**}	-0.02^{**}	-0.02^{**}
	(0.01)	(0.01)	(0.01)	(0.01)
GDP		−0.04	−0.04	−0.04
		(0.04)	(0.04)	(0.05)
Resources			0.76	−1.24
			(2.42)	(2.66)
Internet				−7.45
				(19.36)
R^2	0.12	0.14	0.14	0.16
Num. obs.	69	69	69	60

Note: *Offshore* is a standardized offshore wealth to GDP ratio. *Growth* is growth rate in 2006. *Resources* is an indicator for natural resource dependence from the World Bank WDI. *Internet* is a number of Internet users per 100,000 people. All control variables are measured in 2006.*p<0.1; **p<0.05; ***p<0.01.

The Internet penetration has a small, negative on average and imprecisely estimated effect. Other studies have found that social media and cell phone penetration increases the probability of protests (Enikolopov, Makarin, and Petrova, 2016; Chistensen and Garfias, 2018). It is worth pointing out that, to avoid post-treatment bias, Internet penetration was measured in 2006, before the widespread adoption of the mobile Internet technology in the developing world.

In sum, it follows from the cross-national regressions that, conditional on other predictors of the regime change, the size of the offshore wealth is negatively correlated with the probability of democratization. These results should be interpreted with caution, since the time interval is relatively short and the number of observations is relatively low. Also, several alternative explanations are possible; most notably, the utilization of tax havens can be a response to domestic political risks. The next section considers this and other explanations.

4.5 Alternative Explanations and Robustness

It is reasonable to expect that rich individuals move their wealth offshore as a response to domestic political risks. My theory postulates that, in authoritarian governments, members of the support group of the ruler move the wealth offshore, strengthening the bargain that keeps the regime in power. I find that the size of the offshore wealth is negatively correlated with the probability of subsequent democratization.

One possible alternative explanation is that the rich individuals move their wealth offshore not to hide it from the current government, but from the potential future government or other domestic predatory agents. Another explanation would be that the countries with larger amount of offshore wealth are already trending towards being autocratic and the wealth is moved in response to that trend.

Table 4.2 controls for these alternative explanations. Baseline column repeats the estimate from Model 2 in Table 4.1, while the second column adds a control

Table 4.2: Robustness Check: Controlling for Coup Risk and Regime Trends

	Baseline	Model 1	Model 2
Offshore	-0.07^{*}	-0.07^{*}	-0.07^{*}
	(0.04)	(0.04)	(0.04)
Polity 2000-2007		-0.01	
		(0.02)	
Coup Risk			0.00
			(0.28)
Controls	✓	✓	✓
R^2	0.14	0.14	0.14
Num. obs.	69	68	68

Note: *Offshore* is a standardized offshore wealth to GDP ratio. *Growth* is growth rate in 2006. *Polity 2000-2007* is the difference between the Polity score in 2007 and in 2000. *Coup Risk* is an estimate of coup risk from the REIGN dataset. REIGN uses a statistical model to predict coups, and then imputes the predicted probabilities from that model an estimate for coup risk even in those country-years when coups did not happen. In all specification, all the controls from Table 4.1 are included. All control variables are measured in 2006. *p<0.1; **p<0.05; ***p<0.01.

for the change in the Polity score between the year 2000 and the year 2007 and the third column adds an estimate for coup risk from the REIGN dataset (Bell, 2016). I find that adding those controls does not change the main estimates.

4.6 Conclusion and Limitations of Analysis

The results of the analysis presented in this chapter is consistent with the theory outlined earlier: the estimated amount of money in the offshore havens is negatively correlated with the subsequent democratization (operationalized as the probability of the positive change in the Polity score). This result is robust to an array of control variables that might have a causal impact on the democratization.

This empirical analysis, however, has a number of drawbacks. First, as I

mentioned earlier, the meteoric rise in the role of tax havens is a relatively recent phenomenon fueled by the globalization, financialization, and technological advancement. Because of this recency, the time series of the regime changes are quite short. Since regime change is rare, influenced by many different factors, and can only be measured in a noisy way, the capacity of any statistical model to detect the effect of offshore usage on the regime change remains limited.

Potential endogeneity concerns are also important. Since the offshore wealth is not randomly assigned, potential unobserved confounders might bias the results. In my statistical estimates, I add statistical controls for other potential determinants of democratizations, but because the exogenous variation in the size of offshore wealth is nonexistent, my results should be interpreted with caution.

CHAPTER 5

Tax Havens and Patronal Exchange: Evidence from Russia

5.1 Introduction

In the previous chapter, I showed the cross-national correlations that were consistent with my theory: nondemocracies with larger offshore wealth are less likely to democratize. While this result is consistent with my theory, the approach of relying on cross-national data has a number of drawbacks. Most importantly, the units compared in a cross-national analysis are so different from one another that it would be impossible to adjust statistically for all the potential confounders.

This chapter takes a different approach and explores another important implication of my theory: once the security of the offshore assets goes down, the ruler should increase the share of spoils shared with the elite to compensate for additional risk. To test this proposition, I look at the firm-level data from Russia. In 2014, after Crimea was officially declared by the Russian authorities to be a part of Russia, several rounds of economic sanctions were implemented by the US, EU, and their allies. Those sanctions involved restrictions on financial transactions with certain companies, visa bans, and prohibition to buy securities issued by government-owned companies. In the beginning, the sanctions only applied to government-owned companies and to a set of bureaucrats, but it was expected that, eventually, Russian business elite would come under scrutiny.

This expectation materialized later. In 2017, the US Congress passed Countering America's Adversaries Through Sanctions Act that mandated the US government to publish a list of Russia's bureaucrats and oligarchs who were enablers

of Russia's regime. This list was compiled by the US Treasury and published in January 2018. It included all Kremlin officials as well as all Russian businessmen whose fortune, according to the estimates of Forbes Magazine, exceeded 1 billion dollars. Sanctions against some of the individuals on the list followed; in April 2018, seven "oligarchs" from that list and twelve firms were blacklisted by the US government. All US entities were forbidden from having financial transactions with them, and non-US entities doing business with them were risking the sanctions against themselves.

The theory outlined in 3 would predict that when individuals among the supporters of the regime face additional risks in foreign jurisdictions, they should be compensated by the regime. This is exactly what happened after the U.S. sanctions. In 2017, Vladimir Putin signed a bill easing tax reporting requirements for the individuals and firms effectively reducing the amount of taxes collected from them.

In 2018, after the restrictions against Russian business leaders were implemented, the government decided to compensate them. According to the ambitious plan, proposed by one of the affected businessman, Viktor Vekselberg, he should receive around 820 million Euros in government-sponsored loans. In case additional sanctions are to be implemented, Vekselberg wanted 4.5 billion dollars of additional guarantees. The measures, similar in scope, are likely to be implemented not only for Vekselberg, but for other members of the business elite. According to Kommersant, a leading Russian business daily, the proposals that are being considered by the Russian government amount to creating inner offshore zones for the individuals whose businesses have been targeted by the sanctions[1].

In this chapter, I use firm-level data to test if the firms exposed to the increased risk in offshore jurisdiction paid less in tax domestically after the implementation of the first round of the sanctions in 2014. Section 5.2 describes the data, section 5.3 presents an empirical strategy based on the propensity score weighting and

[1]Kommersant, May 3, 2018: https://www.kommersant.ru/doc/3619266?

shows the results, chapter 5.4 shows placebo tests, and section 5.5 discusses some limitations of my analysis and concludes.

5.2 Data

An exchange between a member of the elite and an authoritarian ruler is almost impossible to observe. The rise of the offshore finance is a relatively recent phenomenon, so the strategy of using time-series cross-national data to compare the survival rates of autocracies with high and low offshore utilization might have serious limitations. So, for the empirical test of my theory, I follow the advice of King, Keohane, and Verba (1994) and Geddes (2003) and offer a test of implications of the theory. In particular, I test that the share of the spoils that the ruler shares with the elite goes up once the assets become less secure in the offshore zones.

In 2014, several packages of economic sanctions have been passed by the US and European Union against several politically-connected individuals and firms in Russia. While not all Russian firms were placed under the sanctions, the sanctions increased the perceived risk that the assets of Russian individuals and companies will be frozen or seized once they are moved outside Russia. In the notation of my model, the sanctions effectively exogenously increased p_e, the probability of expropriation once the assets are moved offshore. According to the model, this should lead to the increase in r_{eq1}, the share of the spoils. In the empirical test, I operationalize r_{eq1} as a tax burden of the companies that have branches in offshore zones.

I use the firm-level financial data from the Orbis database. A unique feature of this dataset is that they collect the name of the Global Ultimate Owner the highest parent company for every firm. Thus, one can merge the list of companies registered in Russia with the list of companies registered in tax havens. I download the data from five thousand largest (by revenue in 2012) Russian companies, and merge them by their Global Ultimate Owners with the compa-

nies registered in known tax havens (BVI, Cyprus, Jersey etc). I remove all the state-owned companies and end up with the sample of 4452 companies. Nearly one third of those companies have an affiliate in a tax haven.

My main dependent variable is tax burden measured as tax-to-revenue ratio. I expect it to be lower after the 2014 sanctions for the offshore-connected firms. Importantly, I operationalize tax burden as tax divided by revenue, not by pre-tax profit, because it is customary for the firms which have affiliates in tax havens to shift their profits to their tax haven affiliates through the controlled transactions (Crivelli, de Moojj, and Keen, 2015).

5.3 Empirical Strategy

Ideally, I would like to assign the offshore use randomly and then compare the change in taxation across treatment groups. This experiment is clearly not feasible. Nevertheless, I contend that one can fruitfully exploit the variation in tax haven use. Because setting up the offshore infrastructure can be costly, only companies of a certain size can afford it and usually do it at a certain stage of their life cycle. Therefore, one can compare companies that have already established an offshore connection and those that have not yet done so. For this, for every firm in my dataset, I calculate a propensity score of having an affiliate in a tax haven with the pre-2014 financial data. More specifically, I estimate the following equation

$$P(HAVEN_i = 1) = logit^{-1}(\alpha + \sum_{year=2009}^{2013} \beta_{1,year} ASSETS_{i,year} + \\ + \sum_{year=2009}^{2013} \beta_{2,year} PROFIT_{i,year} + \sum_{year=2009}^{2013} \beta_{2,year} TAX_{i,year} + \gamma_k + \epsilon_i)$$

This specification estimates the probability of having a tax haven affiliate as a function of a three-year trajectory of the firm's assets, profit, amount of tax

paid, and the firm's economic sector. This equation is designed to capture the most important economic determinants of the use of a tax haven affiliate. The selection of covariates is motivated by the literature on tax haven usage.

The results are presented in Table 8.1 in the Appendix. I find that the firms in construction are less likely to use tax havens than firms in other sectors, but manufacturing firms and services firms are more likely to use tax havens. As predicted by economic theory, the firms with larger previous tax burdens are more likely to use tax havens. The amount of assets is also positively related to tax haven utilization.

After estimating the propensity score for every firm in my dataset, I prune the observations removing firms with a propensity score higher than 0.9 and lower than 0.1. This is a recommended procedure to ensure that the estimation of the effect of interest is implemented using comparable groups (Caliendo and Kopeinig, 2008). As a result, out of 2974 observations, 2722 remain in the sample. Figure 5.1 shows the common support after pruning. It shows that firms of different tax haven status have the overlapping regions of propensity score, which makes those firms comparable with respect to my outcome of interest: post-2014 tax burden.

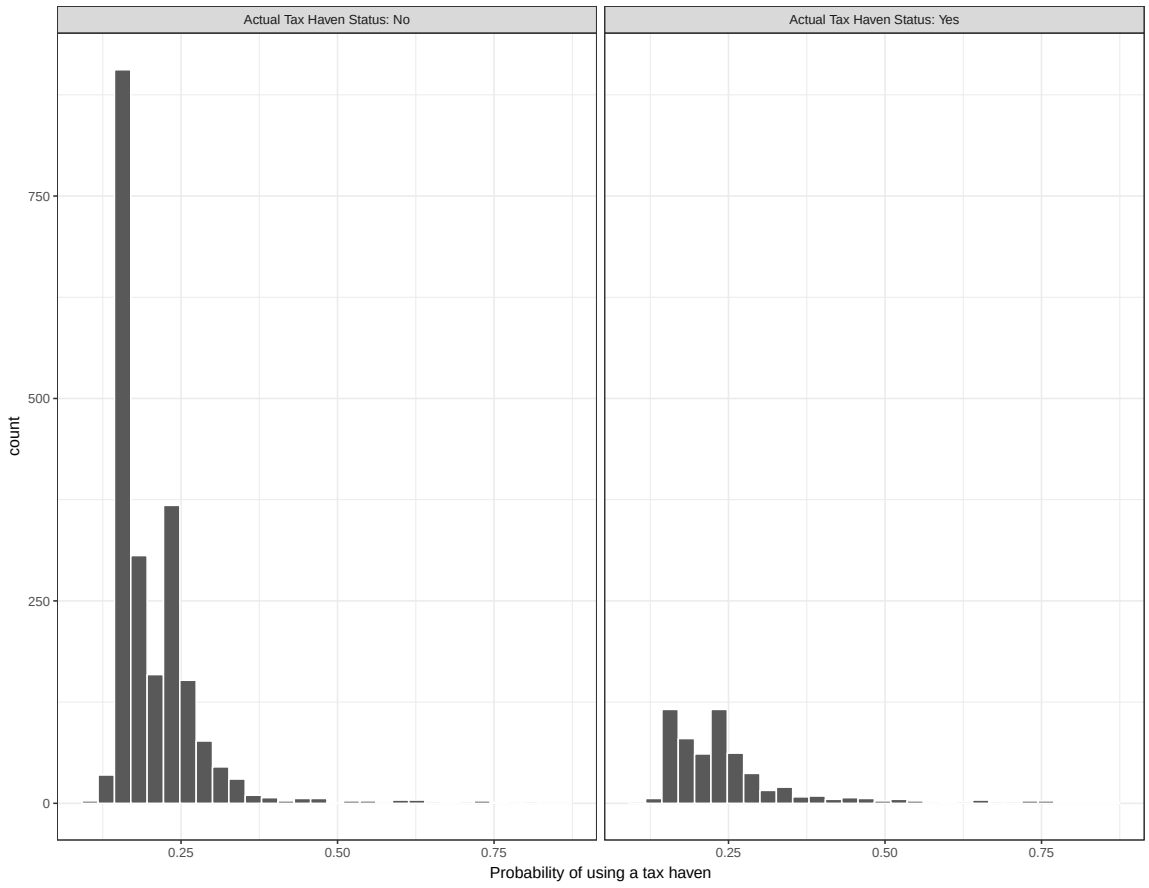
After pruning the observations, I estimate the effect of interest using the regression, weighted by the inverse propensity score:

$$TRR_i = \alpha + \beta_1 HAVEN_i + \beta_2 TTR_{i,t-1} + \sum_{k=1}^{P} \delta_k X_k + \xi_i$$

Here, TTR_i is the main dependent variable, average ratio of tax to revenues for years 2014 and 2015, $HAVEN_i$ is an indicator variable that equals 1 if a firm has an affiliate in a tax haven, and 0 otherwise. X_k is a vector of control variables: size of the company, number of employees, etc. The results of the estimates are presented in Table 5.1.

In all of the specifications, the indicator for having a tax haven affiliate is statistically significant and non-trivial in magnitude; on average, firms that have an offshore affiliate paid 1 percent less in tax burden than firms that do not

Figure 5.1: Firms that Have/Have Not Affiliates in Tax Havens



Note: Estimated propensity scores of the firms of different tax haven status. The left panel shows the histogram of propensity scores for the firms that do not have tax haven affiliates. The right panel shows the histograms of propensity scores for the firms with tax haven affiliates.

Table 5.1: Tax Burden and Tax Haven Usage

	Dependent variable: Average Tax Burden in 2014 and 2015				
	(1)	(2)	(3)	(4)	(5)
Haven	-0.010^{*}	-0.011^{**}	-0.011^{**}	-0.011^{**}	-0.011^{**}
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Tax Burden in 2013	0.693^{***}	0.681^{***}	0.685^{***}	0.686^{***}	0.682^{***}
	(0.087)	(0.088)	(0.089)	(0.089)	(0.092)
Assets	0.005^{**}	0.006^{***}	0.006^{***}	0.006^{**}	0.006^{**}
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Industry Indicators		✓	✓	✓	✓
Observations	2,109	2,109	2,109	2,109	2,109

Note: Model 3 controls for employment, Model 4 additionally controls for the stock of fixed assets. Model 5 additionally controls for net income. All regressions contain constants. *p<0.1; **p<0.05; ***p<0.01

operate in tax havens.

5.4 Placebo Tests

It is certainly possible that firms that have an affiliate in a tax haven are paying less in taxes always, not just after the sanctions. For example, one can imagine that the firms that are allowed to create branches in tax havens are more politically connected. If this is true, then the relationship observed in Table 1 should hold not only after the sanctions but also before the sanctions. To test this, I estimate the same linear relationship, but use the tax burden in 2013 as a dependent variable and shift all the explanatory variables one period back.

The results are presented in Table 5.2. In this table, the coefficient on tax havens is positive, ten times smaller than in Table 5.1, and also is not precisely estimated. So these results are not consistent with the alternative explanations that involve some fixed characteristics of firms that impact both the tax haven utilization and the tax burden.

5.5 Conclusion and Limitations of Analysis

In this chapter, I offer a test of the theory outlined in Chapter 3 on the within-country firm-level data. I argue that, once the western sanctions take place, the assets of Russian firms become less secure outside Russia, even in the offshore zones. My theory implies that when this happens, the share of the spoils that the ruler gives to the elite should go up. I confirm my analysis that the tax burden indeed decreases for the firms that had affiliates in the offshore zones as compared to the firms that did not have them. This effect is only present in the data after the year 2014 and not earlier.

These results are consistent with my theory. However, since offshore affiliations are not randomly assigned to the firms, the results might be biased by unobserved confounders. One such unobserved cunfounders might be political

Table 5.2: Placebo Test: Tax Burden and Tax Havens in 2013

	Dependent variable: Tax Burden in 2013				
	(1)	(2)	(3)	(4)	(5)
Haven	0.001	0.001	0.001	0.001	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tax Burden in 2013	0.360***	0.345***	0.341***	0.341***	0.313***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Assets	0.002***	0.002***	0.003***	0.002***	0.002***
	(0.0005)	(0.0005)	(0.0005)	(0.001)	(0.001)
Industry Indicators		✓	✓	✓	✓
Observations	2,106	2,106	2,106	2,106	2,106

Note: Model 3 controls for employment, Model 4 additionally controls for the stock of fixed assets. Model 5 additionally controls for net income. All regressions contain constant. *p<0.1; **p<0.05; ***p<0.01

connections. In democracies and non-democracies alike, politically connected individuals and firms are more likely to pressure governments for contracts, tax breaks, and other favors. The same individuals might be more likely to establish affiliates in the offshore zones.

I do not control for having political connection, because such estimates are available only for the very top businessmen. However, any characteristics that are relatively stable in time (political connection, experience, etc.) cannot explain the differential effect of having an affiliate in a tax haven: it seems to matter after 2014 and not before. I leave a more detailed exploration of the role of political connections in tax haven utilization for future research.

CHAPTER 6

Political Economy of Income Shifting: A Protection Racket Approach

6.1 Introduction

Previous chapters explored an impact of tax haven utilization on regime dynamics in nondemocracies. I have argued that, because the tax havens provide secrecy to private fortunes, they can facilitate a bargain between rulers and economic elites that sustains authoritarian regimes. In this chapter, I continue exploring the political economy of offshore utilization, but from a different perspective. Instead of focusing on the consequence of offshore utilization, I focus on the causes. Specifically, I ask why some firms engage in profit shifting through the low-tax jurisdictions, while others do not. My main argument implies that the vulnerability to political risk is an important determinant of profit-shifting: firms that are more vulnerable will be less likely avoid taxes.

Take the example of the Seattle-based coffee chain Starbucks. Investors in Starbucks had every reason to be pleased with its performance in the UK. Between 1998 and 2012, the firm opened or licensed 735 stores, occupied 30 percent of the UK market, and earned approximately 4.5 billion dollars[1] (Hodge, 2016, p. 78). Indeed, business was so good that, according to Starbucks executives, the company's UK profits were fueling its expansion in Europe (Bergin, 2012).

UK tax authorities, however, were presented with a different picture. According to the firm's tax documents, its UK operations constituted an unmitigated

[1]Three billion UK pounds (GBP) converted to US dollars (USD) using the exchange rate 1.5 USD = 1 GBP

disaster. Between 1998 and 2012, the company operated at a loss in every single year except 2008. In 2009, for example, as Starbucks CFO was boasting about the profitability of the UK unit (Bergin, 2012), the company reported a net loss of 83 million dollars[2].

The reason why Starbucks executives and investors saw a different picture than the UK government was simple: tax avoidance (Bergin, 2012; Hodge, 2016; Campbell and Helleloid, 2016). Starbucks reportedly used several clever accounting techniques to shift profits from the place where the revenues were generated to jurisdictions where taxes were low. The revenue was moved by means of royalty agreements, high markups on coffee beans purchased from a Dutch subsidiary, and interest payments (Kleinbard, 2013).

That multinational firms use all the tools at their disposal to decrease their tax liability is not surprising. The most interesting aspect about the Starbucks case is what happened next. After an investigation by Reuters in October 2012 and widely publicized House of Commons hearings in November 2012, Starbucks changed its behavior. After several years of paying zero or almost zero tax, it started paying nontrivial sums to the Exchequer: 3.6 million dollars in 2013, 19.4 million dollars in 2014, 12.8 million dollars in 2015, and 8.7 million dollars in 2016 – all while sales had stayed constant or even moderately declined. While tax justice activists claim that Starbucks is still underpaying its fair share (Hodge, 2016, p 85), the difference from pre-2012 times is substantial.

Why did Starbucks suddenly change its tax behavior? If it had only been a matter of public relations, then why didn't Google and Amazon – other firms that were accused of unethical tax practices around the same time and with the same publicity– change their tax behavior?

Collecting taxes from individuals and firms is one of the most fundamental responsibilities of modern nation-states. Governments are expected to protect their citizens from foreign threats, enforce contracts, and provide public goods

[2]This and other figures are according to the financial statements of the Starbucks Coffee Company (UK) Limited, available in the BvD Orbis database (BvD identifier: GB02959325). The access is provided by the UCLA Anderson School of Management

and services. Without revenues from taxes, governments cannot perform those functions and the state itself can cease to exist. This makes the question about the determinants of the government's ability to collect taxes one of the most pressing in social science – from both a theoretical and a practical perspective.

Conventional wisdom explains the ability of states to extract taxes using a combination of institutional and cultural factors. Pioneered by North and Weingast (1989), the institutional theory asserts that the economic elite will be more responsive to the government's fiscal needs once it knows that the government is sufficiently constrained in its activities and will not spend taxes frivolously. In another classic contribution, Levi (1989) explains the evolution of taxation in Western Europe as a result of the transactions costs associated with intra-elite bargaining and implementation of different policies[3]. In a related theory, Besley and Persson (2011) argue that a strong protection of property rights ("legal capacity") leads to economic prosperity that allows governments to invest more in the infrastructure of tax collection ("fiscal capacity").

While these theories are helpful in explaining the evolution of taxation over time, none of them can explain the Starbucks case: Between 2012 and 2013, institutions in the UK did not change, the same party was in power, the corporate tax rate remained the same, and the overall level of fiscal capacity did not have much time to either evolve or deteriorate.

To those who followed the Starbucks controversy in real time, the explanation for the sudden change was obvious: once Starbucks had been put on the spot, it became too costly for it to continue with business as usual. The UK Prime Minister David Cameron, speaking to the Davos Economic Forum, announced that it was time for tax-dodging firms to "wake up and smell the coffee" (a statement interpreted as a barely veiled threat to Starbucks). The nature of

[3]A criticism of the early institutional argument has been proposed by Gehlbach (2008): "Levi and others largely treat economic structure as given: governments form tax systems around existing economic activity." Gehlbach then goes on to explain that in the case he was studying about taxation in post-communist Russia, governments were able to influence their tax base. In this paper, I argue that in the world of mobile capital, the government's influence on economic activity is large not only in the post-communist nations, but in other countries as well.

Starbucks's business – selling a physical product in well-identified locations – as well the availability of competing products made it an easy target for protests and consumer boycotts. Displeased, Starbucks executives reportedly threatened to withhold investments from the UK, but, after a brief standoff, a compromise that prompted Starbucks to increase its tax compliance was reached. In sum, it was not the change in the UK institutions that had led to the change in its behavior but a conflict with the UK public and government combined with Starbucks's vulnerabilities[4].

In this paper, I offer a new theory of tax capacity that follows this logic: Firms are more likely to pay taxes in situations where they are more vulnerable to value-destroying activities by the government or the public. The nature of those value-destroying activities can be different: From outright exproy7priations to policy changes and threats. The severity of the damage can also vary but it always pushes firms in the same direction – towards more tax compliance, thus increasing the overall tax capacity of the state.

This theory runs against the conventional wisdom that the firms that use tax havens will be those that to exploitation by host governments. My prediction is just that opposite.

I explore the empirical implications of this theory using a proprietary firm-level dataset of 6158 large firms from 77 countries. Using the presence of a tax haven affiliate as a proxy for tax avoidance, I set up a Bayesian multilevel estimation that yields results consistent with my theory: Firms that have a higher concentration of fixed assets or revenue, that operate in vertically integrated sectors are *less* likely to have a subsidiary in a tax haven. Such concentration of assets and revenue increases vulnerability, as does reliance on other firms in a production chain. More vulnerable firms demonstrate more tax compliance.

I call this idea "a protection racket approach" following Charles Tilly's famous assertion that the state is a "quintessential protection racket" (Tilly, 1985). Like

[4]To be fair, Starbucks executives explained the change in the amount of taxes with the better real estate leases they were able to get.

in every protection racket, the state is both "a shield", and "a danger" (to borrow Tilly's terms). My contention is that in many cases, firms' vulnerability to that state-produced "danger" is an important determinant for the tax compliance of firms and the overall tax capacity of the state.

This theory differs from the existing approaches to the study of political risk and corporate behavior. Since Adam Smith's assertion from 1776 that "men bury and conceal... their stock" when they face a threat of "violence of their superiors", many scholars have been assuming that political risk pushes firms to hide their profits. For example, "political cost hypothesis" asserts that when firms fear expropriation they will hide their profits to avoid making an impression that their assets produce high rents (Watts and Zimmerman, 1978; Han and Wang, 1998). One of the possible formalizations of the political cost hypothesis has been proposed by Durnev and Guriev (2011). In their model, a firm decides how accurately they should report their profits, while government updates its expectation about the profitability of the firm. If the firm is deemed more profitable, then the benefits of expected expropriation might outweigh the costs. This strategic environment produces an equilibrium when firms hide their profits when they are more vulnerable to political risk. This theory is consistent with the empirical patterns of oil nationalizations: Mahdavi (2014) shows that oil nationalizations tend to happen when the oil price is high. Unfortunately, to the best of my knowledge, neither the theory of political costs nor corresponding empirics account for a simple fact that higher transparency in profits also implies higher and more reliable stream of tax revenue for the government, and that tax revenue increases the opportunity cost of expropriation thus making it less likely.

I also depart from the literature in my normative implications. The literature tends to see a threat of expropriation[5] as a bad thing: expropriations violate property rights and distort allocation of capital (Eaton and Gersovitz, 1984). But if vulnerability to expropriation leads to higher tax compliance (as I argue

[5]The term "expropriation" here is used in a broad sense: it includes not only direct asset seizures by the government (that are rare), but also changes in regulatory environment that decrease a firm's value

in this chapter), then the normative implications of expropriations become less clear. If the government is "bad" (it is corrupt and steals the revenue), then expropriation risk has no upside, but if the government spends tax revenue on public goods, services, and growth-enhancing projects, and an expropriation risk can make firms more tax-compliant, then the optimal expropriation risk might be higher than zero. Fiscal improvements might outweigh the losses in efficiency of capital allocation.

My research contributes to several strands of literature. Most importantly, it contributes to what Schumpeter called "fiscal sociology": the study of the determinants of tax capacity. In this area, Li (2006) argues that authoritarian states often offer tax incentives to firms to compensate for weak rule of law. Gehlbach (2008) showed that post-communist governments in Russia tended to actively promote businesses that were easier to tax. Fairfield (2015) demonstrated, with a selection of case studies from Latin America, that businesses can use their infrastructural power (the threat to divest) to shape tax policy in their favor. Hollenbach and Silva (2018), using data from Brazilian municipalities, showed that those with higher levels of inequality collect less revenue in property taxes. Theoretically, many of these contributions follow the state capture framework that asserts that economic elites are able, in one way or another, to shape redistributive outcomes in their favor (see, for example, Acemoglu, Ticchi, and Vindigni (2011) for an elaborate version of this theoretical argument).

My approach differs from many of these contributions. Instead of focusing on tax rates or the total amount of collected taxes, I look at tax compliance on the level of firms. This allows for the development and testing more nuanced theories with richer data. In this sense, the closest research to mine is a recent paper by Chen and Hollenbach (2018). That paper uses a dataset of 500,000 Chinese firms and shows that firms with higher capital mobility face higher tax rates and are less likely to use tax exemptions. They suggest an explanation: Firms that relocate more often have less time to acquire political connections required for a tax exemption. The authors concluded that more research is needed on firm-level

tax compliance.

The topic of firm-level tax compliance spans several disciplines in the social sciences. From the economic perspective, Durnev and Guriev (2011) argue that oil firms are more likely to engage in non-transparent financial accounting when the oil price is high. Beck, Lin, and Ma (2014) showed that the firms in countries with better information-sharing infrastructure are less likely to evade taxes. From the accounting perspective, Dyreng, Hanlon, and Maydew (2008) show that there is significant variation in the tax compliance of firms, Khan, Srinivasan, and Tan (2016) argue that institutional ownership leads to more tax avoidance, and Huizinga and Laeven (2008) show that international tax differentials play an important role in profit-shifting.

My approach is also relevant to the classic literature on the obsolescing bargain (Jenkins, 1986; Kobrin, 1987) which argues that once a multinational firm makes some tangible investment in a country, the government of that country acquires more bargaining power. My approach is consistent with the view that bargaining – either overt or tacit – occurs between firms and host governments. Unlike the theorists about the obsolescing bargain, I do not assume that it is the government's goal to get a larger share of gains from the firm. The goal of the government can be anything: It can attack a certain firm for ideological reasons or send a signal to domestic audiences (as in the model by Acemoglu, Egorov, and Sonin (2012)). I assume neither benevolence nor malicious intent on the government's side. The only assertion I make is that, whatever the goals of the government, the opportunity cost of damaging the firm goes up if the firms pay more taxes.

My argument has important policy implications. Policymakers often view the protection of property rights of international investors as one of the most important goals of international cooperation. If a government increases taxes or introduces a new regulation, a multinational firm, in many cases, can sue the state and win generous compensation (Franck, 2007; Schultz and Dupont, 2014; Wellhausen, 2016). Poor and middle-income states are often bullied into signing

"tax treaties" or "investment treaties" that limit the set of actions that they can implement in foreign firms. A huge part of international diplomacy is devoted to the protection of broadly defined property rights (Wellhausen, 2014). If my argument is correct, then the protections for firms from those courts, treaties, and diplomatic efforts might have an undesirable side effect of harming the tax capacity of host nations. The effort to protect property rights of international investors – however laudable it might be – should be balanced against the need to foster tax compliance.

6.2 Background: How Firms Avoid Taxes and Why It Matters for Governance

Countries differ in the tax rates they offer to firms. For example, in 2018, the United Kingdom taxes firms at 19 percent, Spain at 25 percent. Many countries, commonly referred to as tax havens[6] have zero or near-zero tax rates: Anguila, the Bahamas, Bahrain, Bermuda, Cayman Islands, Guernsey, and others[7]. According to recent scholarship, they play an increasingly important role in the global economy (Hampton and Abbot, 1999; Shaxson, 2011; Palan, Murphy, and Chavagneux, 2013; Zucman, 2015; Murphy, 2017).

These jurisdictions serve several purposes. First, they lower the transactions costs of international operations. In many cases, when firms decide on implementing a merger or an acquisition, they choose to do it using a "neutral" jurisdiction. The second function is providing secrecy to the financial holdings and operations of individuals and firms. These jurisdictions usually conceal the true benefi-

[6]Literature uses several terms for those countries, and none of those terms are ideal: Tax havens (though they are not always used for tax avoidance), offshore jurisdictions or just offshores (though not all of them are located off-shore, most notably landlocked Switzerland), offshore financial centers (though many of them do not have a financial sector, besides registering companies and selling synthetic citizenship). I will use the term "tax havens" since it is most the common one in non-technical literature; tax avoidance is the focus of this chapter

[7]Importantly, some countries that have a non-zero statutory tax rate offer zero or near-zero to foreign firms, while domestic firms are taxed at a higher rate. The examples include Ireland and Switzerland

ciaries of the entities registered there and the true owners of bank accounts[8]. Proponents of such secrecy argue that it allows people protection against abusive governments[9] (Adams, 2011), while critics point out that it facilitates tax evasion, money laundering, and corruption (Christensen, 2012). According to recent scholarship, elites in some countries hide amounts in tax havens that are comparable to the total household wealth of those countries (Novokmet, Piketty, and Zucman, 2017). This kind of evasion has been shown to be an important driver of income inequality and wealth inequality (Alstadster, Johannesen, and Zucman, 2017).

Most importantly for the analysis in this paper, tax havens serve as vehicles for the minimization of tax burden on multinational corporations. If a firm earns revenue in a high-tax jurisdiction (for example, the UK) but also has an affiliate in a low-tax jurisdiction (for example, the Bahamas), then in many cases, it becomes possible to "pay" the Bahamas' tax rate of 0 percent on the revenue that has been earned in the UK. This can be achieved by several methods that often are not illegal, but occupy a gray area between tax evasion and full tax compliance (Palan, Murphy, and Chavagneux, 2013).

Those methods include arranging a corporate multinational structure in such a way that an affiliate in a high-tax jurisdiction customarily pays huge sums of money to an affiliate in a low-tax jurisdiction. From the point of view of a high-tax jurisdiction, those are usually legitimate expenses that decrease the profit of a firm. But from the point of view of economic substance, those transactions leave the money within a multinational firm, and the only difference such transactions make is the adjustment of tax liability. Because this process reduces the tax-

[8]Recently, G20 and OECD states attempted to enact new regulations designed to limit the secrecy provided by those jurisdictions. However, as Johannesen and Zucman (2012) demonstrate, those measures had limited success, only causing the reallocation of accounts into the least compliant jurisdictions. Also, the experts from the financial and accounting industries, whom I had interviewed, pointed out several loopholes that are often used by the affluent individuals seeking secrecy, which allow relatively easy circumvention of those provisions. These loopholes render many of those provisions meaningless for practical purposes.

[9]"A tax haven is a kind of... economic sanctuary – a modern city of refuge for those oppressed by the fiscal laws of their homeland" (Adams, 2011)

able base in high-tax jurisdictions, it is sometimes referred to as "base erosion" (Dharmapala, 2014).

One of the most widely studied cases of tax avoidance through income shifting is the set of techniques used by UK Starbucks (Hodge, 2016). First, the UK Starbucks paid royalties for using the brand (6 percent of turnover) in another European Starbucks branch located in Netherlands (a low-tax jurisdiction)[10]. Second, the UK Starbucks had to buy expensive coffee beans from a Starbucks branch located in Switzerland (also a low-tax jurisdiction)[11]. Third, the UK Starbucks had to borrow from the Amsterdam branch and pay "exorbitant" interest rates. These payments had been conveniently consuming the UK Starbucks's profit margin for many years. Those techniques – royalty payments, buying intermediate goods and services from low tax affiliates, and paying high interest rates on intra-firm loans – are common in firms that engage in income shifting (Palan, Murphy, and Chavagneux, 2013).

From the perspective of Pareto efficiency, this practice is neutral since the incomes are essentially redistributed from the budgets of high-tax jurisdictions to the shareholders of the firms. Nevertheless, this practice is often considered normatively undesirable for several reasons. First, it exacerbates inequality since only relatively rich firms can afford to create effective profit-shifting processes (Krautheim and Schmidt-Eisinlohr, 2011). Secondly, it damages the tax capacity of the host jurisdictions. This activity is even more damaging for poor and middle income countries because their budgets are more reliant on the corporate taxes (Crivelli, de Moojj, and Keen, 2015).

The extent of profit shifting is hard to measure, but several estimates are available in the literature. Baker (2005) estimated a yearly loss of revenue in the developing countries due to mispricing intra-firm transactions as not lower than

[10]Starbucks's European headquarters had been located in Amsterdam though the president of Starbucks Euorope had been running the operations from London. In 2013, after the scandal, the headquarters was officially relocated to London

[11]"Buying from Switzerland," as Hodge (2016) explains, just means transferring money to a Swiss branch, since "no coffee bean ever reaches Switzerland."

200 billion dollars. According to the estimates published by Christian Aid (Christian Aid, 2008), the loss of revenue in the developing countries was 160 billion dollars[12]. Other estimates available in the literature show the same magnitude. The intensity of tax haven utilization has been going up almost uninterruptedly since late the 1990's and probably will continue to grow (Zucman, 2014).

6.3 Protection Racket Approach: Theoretical Arguments

This section offers a more detailed description of the theory of tax compliance proposed in this paper. The basic intuition is that the firms that pay more tax are more valuable to the government because they provide the much-needed cash. So, the government should be more careful with those firms and less willing to damage them. Thus, firms that feel more vulnerable because of the nature of their operations – such as having a lot of income coming from just one country – must be more tax compliant.

I start by assuming that there are two relevant actors: The government and the firm. The firm decides the degree of tax compliance, and the government decides whether to damage the firm or not. The following assumptions about the strategic situation are required for my theory.

The first assumption is the following: In their decisions, firms maximize expected profits. This is a "texbook" assumption of firm behavior. Of course, it is almost always violated in real life, especially in large public corporations that might have all sorts of conflicts of interests when CEOs and directors pursue their own short-term goals at the expense of the shareholders (Bebchuk and Fried, 2003). Nevertheless, for the purpose of this analysis, it is sufficient to assume that firms prefer not to be expropriated or otherwise damaged by their host governments and would like to pay less tax if possible. These assumptions might be plausible even in the presence of agency costs.

[12] A useful reference point to have is 1 trillion dollars: This is the total GDP of all Sub-Saharan Africa (in current US dollars) in 2008.

The second assumption is that firms take tax rates as given. This is another simplifying assumption that abstracts away many important political dynamics. Certainly, tax rates are set by politicians, and politicians can be influenced by special interests and corporate lobbies (Fairfield, 2015). However, while tax laws certainly change from time to time, they tend to have a status quo bias while the decision about the extent of tax compliance has to be made every year. Thus, while firms certainly do influence tax rates, in the short term, which is the most relevant time interval for tax compliance decisions, they might view those as fixed.

The third assumption: different locations where a firm operates are not perfect substitutes.This assumption means that the firm cannot relocate its value-creating activities costlessly across jurisdictions. For example, once Starbucks becomes more vulnerable in the UK, it cannot find another jurisdiction where the expected revenues would be the same as in the UK before it had been targeted by the campaigners.

These are the assumptions about corporate behavior: Firms maximize profits, view the given tax rates, and are not able to relocate its activities costlessly. Given these behavioral assumptions, firms face decisions about the extent of tax compliance.

Several assumptions are required about the government's behavior as well.

The fourth assumption: the government has an opportunity to damage the firm, and might benefits from doing it. This assumption is rather abstract and can describe many situations: An authoritarian government takes assets from a firm whose shareholders are deemed not trustworthy politically, populist government expropriates land to distribute it to landless peasants, and an environment friendly government introduces new regulations of emissions. Government of democracies and autocracies alike have a lot of means at their disposal to reduce the value of private firms. Some of them are more opportunistic than the others, some require actions (such as overtaking the land), and some only make veiled or not so veiled threats (such as a call to "wake up and smell the coffee"). It is also

important that the potential of that damage be higher than their tax liability in case of full compliance.

The fifth assumption is the following: The opportunity cost of expropriation of a firm is the tax revenues collected from that firm. This assumption postulates that governments like to get money from the firms in the form of taxes [13]. Governments can damage firms if they can benefit from doing so, but by damaging the firms, they risk losing the tax revenues generated by those firms. Thus, conditional on the benefits of damaging a certain firm, the larger the taxes paid by the firm, the more costly it is for the government to damage it. In this sense, official tax payments to the government serve the same goal as the informal payments to a protection racket.

It follows from these assumptions that if the firm is structurally more vulnerable to the potential damaging actions by the government, the more enthusiastic it should be about taxes.

Thus, the main theoretical prediction follows the assumption that more vulnerable firms should engage *less* in profit shifting than less vulnerable firms.

What kind of factors make a firm vulnerable? One can come up with many different aspects of vulnerability (the theorists of obsolescing bargain, for example, talked about the immobility of capital), but I will be using four of them:

1. *Concentration of revenue.* if a firm earns revenue in one or two countries, then it is more vulnerable to government actions than a firm that operates in many different countries and earns a little bit from everywhere. To illustrate this idea, consider two firms, both selling meat products in two countries: Argentina and Brazil. One of the firms (firm A) sells 50 percent of its meat in Argentina and 50 percent in Brazil, while the second firm

[13] Of course, in certain countries they also like to get them in the form of bribes. However, even in corrupt countries, where the stories of government officials accepting bribes often resurface, redistributing money to those officials from the state budget might be a safer option. When asked about the "bribability" of Russian government officials,one of my interviewees in London, a senior manager of one of the investment funds that had, in the past, been one of the largest foreign investors in Russia, told me that, according to his knowledge about the matter, what those officials get from businesses is not insignificant but that it is far less than what they get from state budget. (Interview with an anonymous expert, London, UK, July 20, 2017)

(firm B) sells 90 percent of its meat in Argentina and only 10 percent in Brazil. Firm B has a more concentrated stream of revenue.

2. *Concentration of fixed assets.* The same logic applies to fixed (immobile) assets that applies to the revenue. A firm that only has fixed assets in one or two countries is more vulnerable than a firm that has fixed assets scattered across the globe.

3. *Vertical integration* of a sector where the firm operates (a measure of how many intermediate goods are produced within the boundaries of the firm). The firms in a sector where vertical integration is higher should be vulnerable to governmental integration because the damage done to any component of a value chain is going to reduce the value of the whole chain, since in a vertically integrated sector, a substitute for the damaged/expropriated assets is more difficult to find.

4. *Country-level expropriation risk.* Firms that operate in countries where the government faces fewer constraints are more vulnerable since checks on the government's behavior are lacking.

Thus, the theory outlined above produces at least four testable implications: Each of the enumerated measures of the firm's vulnerability should be *negatively* correlated with income shifting.

Several features of the theory might merit additional discussion. First, I do not assert that the governments are driven by any "benevolent" goals or any public interest and use the threat of intervention strategically. They certainly might do that, but this is not necessary for the mechanism to work. Second, I do not argue that the vulnerability to the government's intervention is *the only* important factor that determines tax compliance. In fact, tax compliance is a complex phenomenon that has multiple intertwined causes. One of the important determinants of tax compliance that I, for conceptual clarity, omitted from the theory is political connections. Firms might be able to avoid adverse government actions due to their access to politicians and bureaucrats. This access might

allow them to implement various tax optimization techniques.

Another important determinant of tax compliance is the so-called "too big to jail" effect. A firm might be so large and so important for the economy that prosecuting its executives for tax evasion and other sorts of misbehavior might create undesirable externalities; therefore, it might be cheaper for the governments to put up with the firm's tax avoidance. It has been argued that the situation around some US financial firms might fit this description (Roe, 2014).

While I do not dispute that there are other important determinants of income shifting, in this paper, I focus on the measures of vulnerability.

6.4 Data and Descriptive Statistics

This section describes the data sources used to test the theory and offers the descriptive statistics. My main dependent variable is income shifting – the utilization of the low tax jurisdiction to ease the burden of taxation in host countries. For this, I use a relatively coarse measure: An indicator variable for whether a firm has a branch in a jurisdiction commonly described as a "tax haven." This measure is not ideal because not all branches in tax havens serve the purpose of avoiding taxation: Some of them are used because those jurisdictions provide smaller transactions costs for cross-border deals and for other reasons. Nevertheless, it has been documented in the literature that the firms with affiliates in tax havens usually have higher profits and lower tax burdens (see, for example, Jansky and Prats (2015)). I also validate that the same association holds in my sample (see Table 8.9), and, as a robustness check, I used tax-to-revenue ratio as a dependent variable in an additional set of specifications (see Table 6.3, Table 6.4, and Table 8.11)

To find out which firms have affiliates in tax havens, I used a proprietary database Orbis compiled by Bureau Van Dijk. The *Orbis* database has financial information for public and private companies around the world. It has infor-

mation on 54 mln companies from North America and Central America, 38 mln companies from South America, 7 mln companies from Africa, 1043 mln companies from Western Europe, 50 mln companies from Eastern Europe and Asia, and 24 mln companies from Australia.

Most importantly for the purpose of this research, it should be noted that *Orbis* contains a Global Unique Owner (GUO) in most of the firms. GUO is an individual, government, or firm that is at the beginning of the hierarchy of ownership and has at least 51 percent stock of its subsidiary. For example, the database has information about the US technology firm Apple Inc. and 134 of its subsidiaries. Such firms as Apple Operation Europe (registered in Ireland), Apple France (registered in France), and Apple Italy (registered in Italy) have the US firm Apple Inc. as their GUO. This allows them to observe the existence of branches in "tax havens" for a large sample of firms in many countries. I used the dummy for the existence of such branches as the main dependent variable in this study[14].

I collected the dataset as follows. First, I compiled a list of jurisdictions classified as "tax havens" following a definition supplied by Palan, Murphy, and Chavagneux (2013). I included all the jurisdictions that had ever been in the OECD Uncooperative Tax Haven list and augmented it using several jurisdictions that have not been in that list but are frequently mentioned in online lists of "world's best tax havens" compiled by journalists and consultants on tax optimization. As a result, I ended up with the list of 73 jurisdictions (reproduced in full in section 8.3).

Then, for all the other countries (the countries that are not in the list of tax havens), I downloaded one thousand firms that have the largest revenues in 2012 if a country had more than one thousand firms in the database. I downloaded information for all those firms in a country that had fewer than one thousand firms. I used revenue as as a selection criteria because I wanted to compile a list of

[14]I used GUO as the unit of analysis because the profit shifting behavior is, in most cases, determined by the headquarters of multinational firm (Dischinger, Knoll, and Riedel, 2014).

the largest potential taxpayers. As a result, I got 83836 firms. I then downloaded the revenue, industry (Orbis uses four digit indicator of an industry), total assets, and fixed assets of each firm.

Then I removed all the government-owned firms from the dataset (since my theory only applies to the private firms) and collapsed the firms according to their GUO. I then calculated the total assets (some of the assets of the subsidiary firms), total revenue (some of the revenues for all the subsidiary firms), and total fixed assets (some of the fixed assets for all the subsidiary firms)of every GUO.

The theory I outlined earlier suggests that there are three firm-level variables that can operationalize vulnerability: Concentration of revenue, concentration of fixed assets, and vertical integration.

To measure the revenue concentration, I calculated the Herfindahl-Hirschman Index (HHI):

$$RevHHI_k = \sum_{i=1}^{N} r_{ik}^2 \tag{6.1}$$

Here, $RevHHI_k$ is a concentration of revenues (as measured by HHI) of GUO k and r_{ik} is a share of revenue of GUO k that comes from country i, and N is the number of countries in my dataset.

HHI is widely used in the studies to measure market concentration (Rhoades, 1993), ethnic homogeneity of countries (Mauro, 1998; Roeder, 2001), and party competition (Laakso and Taagapera, 1979). It has a straightforward interpretation: If we randomly pick two dollars of revenue of a GUO, the HHI will show the probability of those two dollars coming from the same country. For example, if a firm operates only in one country, then its HHI equals 1 (the maximum possible level of concentration). If the firm relies on two countries for its revenue in equal proportion, then HHI is equal to $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$. I expect the GUOs where firms are concentrated (whose HHI is higher) to be more vulnerable to governmental intervention and thus be less likely to use tax havens.

HHI based on fixed assets is calculated in an analogous manner:

$$FixedHHI_k = \sum_{i=1}^{N} a_{ik}^2 \tag{6.2}$$

Here, $FixedHHI_k$ is a concentration of fixed assets of GUO k and a_{ik} is a share of fixed assets of GUO k that is located in country i, and N is the number of countries in the dataset. A higher concentration of fixed assets in one country means higher vulnerability to governmental intervention. Thus, a higher level of $FixedHHI$ should correlate with lower propensity to use low-tax jurisdictions.

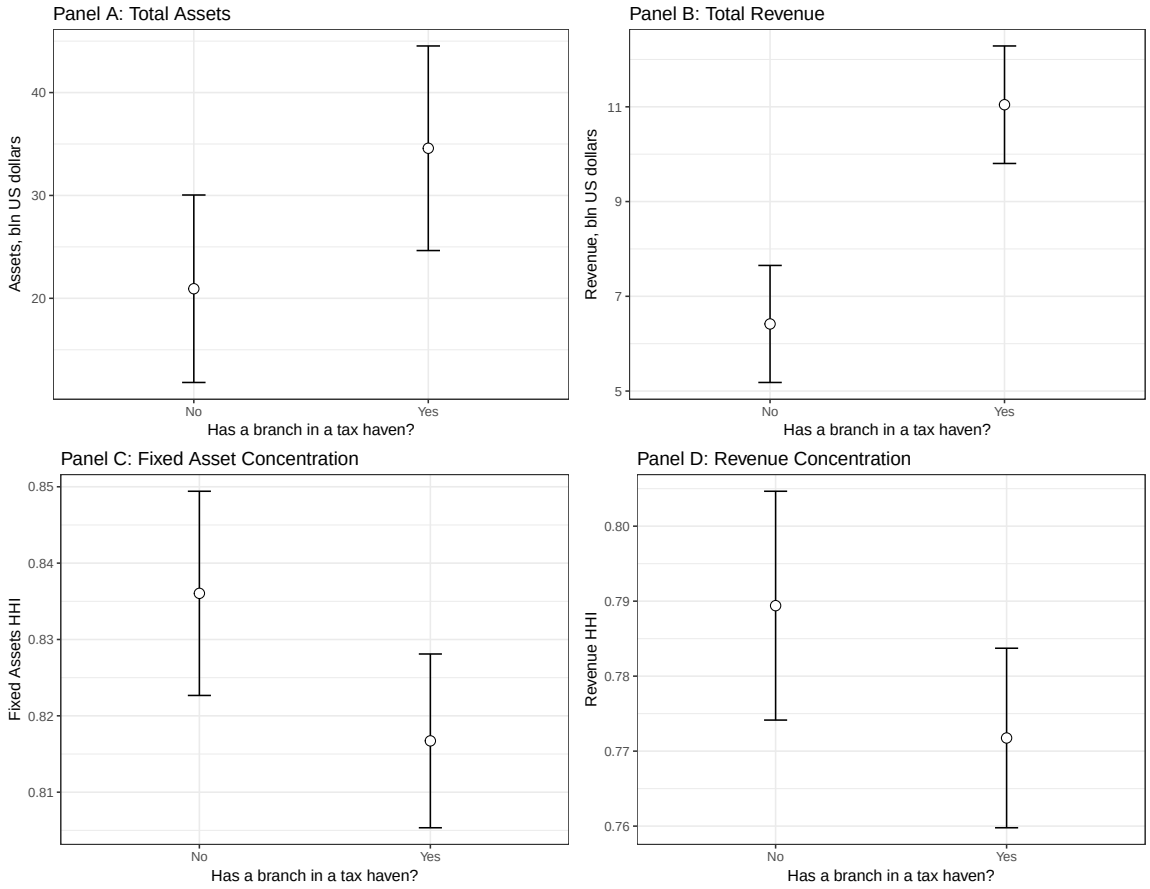
Another measure of vulnerability to the governmental intervention is vertical integration. Companies that are vertically integrated produce intermediate goods and services within the company boundaries, while companies that are not vertically integrated outsource intermediate goods to other suppliers. Vertically integrated companies are more vulnerable to expropriation because the damages done to any of the links in the supply chain can damage the whole chain.

Unfortunately, the data from Orbis do not provide information about the share of intermediate goods produced within the firms belonging to one global owner. However, the economic research on vertical integration shows that in many cases the economic determinants of vertical integration are fixed on the level of economic sector (Acemoglu, Johnson, and Mitton, 2009). Thus, to measure vertical integration, I used a share of intermediate goods produced within the sector from the US Bureau of Economic Analysis.

To make sure that my inference is not driven by the difference between big firms and small firms, I removed from the dataset firms that have more than 70 bn dollars revenue and firms than have more than 26 international branches (which have more than 95 percent propensity to have an affiliate in a tax haven). After these procedures, I ended up with 6158 firms. The descriptive characteristics of my sample can be found in Table 8.2. Also, Tables 8.3, 8.4, 8.5, and 8.6 show the distribution of countries in my sample (the number of firms per country is roughly proportional to the economic development of a country), and Table 8.7 shows the number of firms per economic sector.

Figure 6.1 shows the descriptive comparison of the multinational firms that have known affiliates in tax havens with the multinational firms that do not have known affiliates in tax havens (for a more informative comparison, I have excluded for this figure the firms that operate only in one non tax haven country).

Figure 6.1: Firms that Have/Have Not Affiliates in Tax Havens



Note: Averages and 95-percent uncertainty intervals of certain characteristics of multinational firms in the sample. On a vertical axis, Panel A shows total assets in billions, Panel B shows total yearly revenue in billions, Panel C shows the HH index calculated using fixed assets, and Panel D shows the HH index calculated using revenue.

Panels A and B of Figure 6.1 show, unsurprisingly, that firms that have affiliates in tax havens are, on average, richer in terms of the total assets and revenues even after the richest firms have been trimmed from the dataset. On average,

firms that use tax havens boast around 35 bn dollars in assets, while firms that do not use tax havens have only around 20 billion dollars in assets. Data about the revenues of firms show a similar pattern: Average revenue of a firm that does not use tax havens is around six billion dollars, while the average revenue of a firm that uses tax havens is 11 billion dollars.

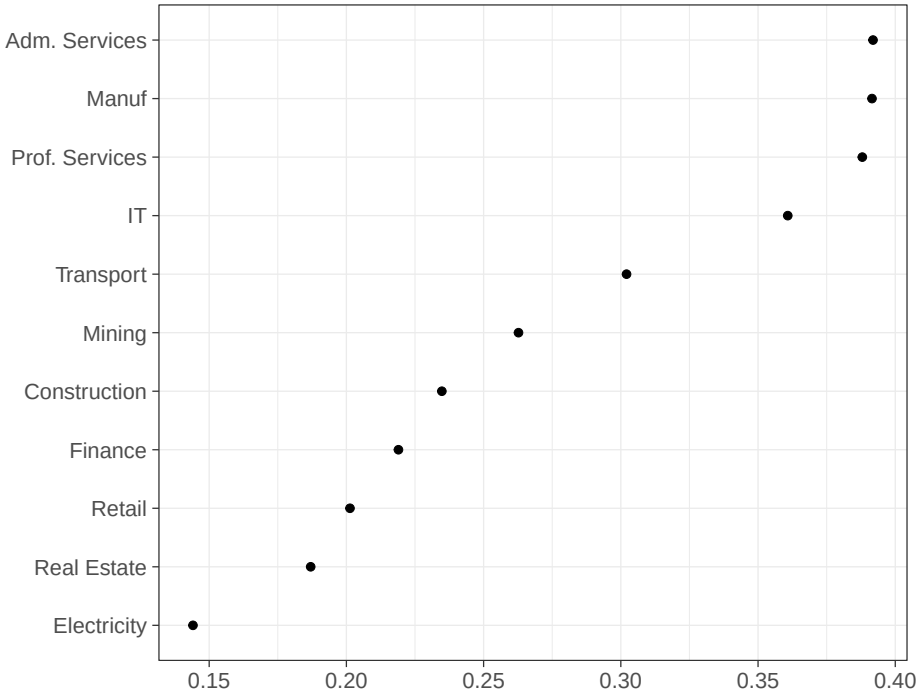
Panels C and D of Figure 6.1 show the differences in fixed asset concentrations and revenue concentrations among multinational firms. For both measures, we see the patterns that are consistent with my theory: Both fixed asset concentrations and revenue concentrations are larger among firms that do not use tax havens.

The rates of tax haven usage are also different between economic sectors. Figure 6.2 shows the shares of the firms that use tax havens in different sectors. We see that the largest proportion of tax having usage is observed among firms that operate in the administrative services sector and the manufacturing sector, while the lowest rate of tax haven usage is observed among the real estate and electricity.

The rates of tax haven utilization also vary across countries. Figure 6.3 shows the differences in the proportion of firms using tax havens in different nations. The largest proportion of tax haven-using firms are observed in Guatemala, Dominican Republic, United Kingdom, and Kuwait. Latin American nations (such as Chile, Argentina, and Brazil) demonstrate relatively low rates of tax haven utilization, while countries in Western Europe as well as the US, Russia, and India have relatively high rates of tax haven utilization.

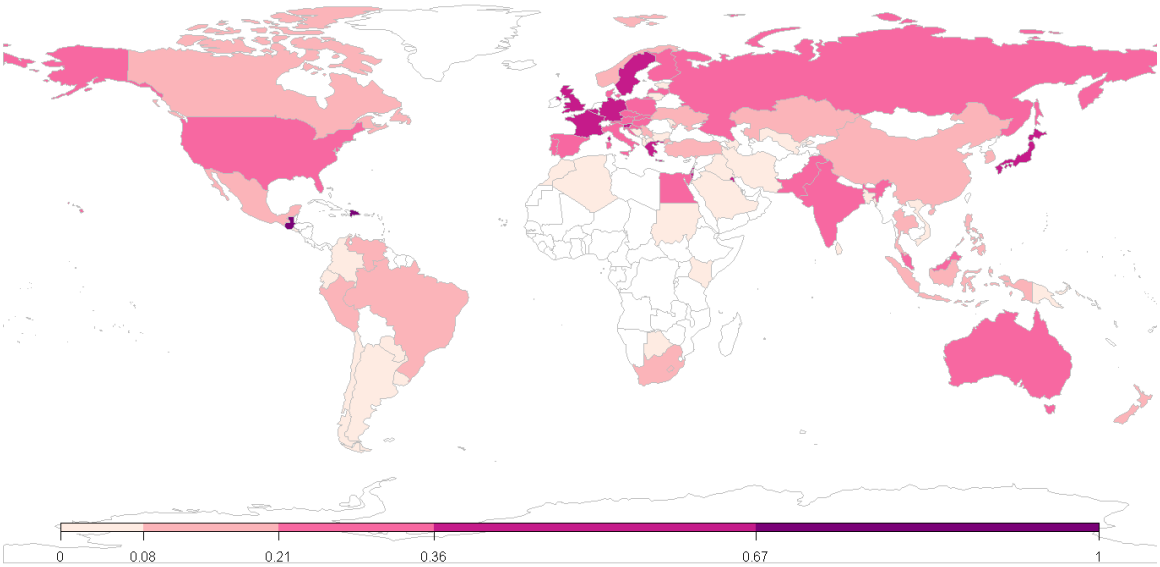
Figure 6.4 shows several informative correlations that might help systematize the data on the country-level prevalence of income shifting. We see that more number of firms engage in income shifting in countries that are richer (Panel A), have higher taxes (Panel B), have *lower* expropriation risk (according a Belgian consulting firm Credendo) (Panel C), and have higher stock of FDI (Panel D). All these results are consistent with the conventional wisdom on tax avoidance, except for the results in Panel C. According to the prevailing institutional theory, we would expect more profit shifting to the offshore jurisdictions from the firms

Figure 6.2: Tax Haven Utilization Across Sectors



Note: Each line represents a share for firms that are connected to an affiliate in a tax haven among the firms of that primary sector. Data come from Orbis and the author's calculations.

Figure 6.3: Tax Haven Utilization Across Countries



Note: The map shows, for every country, the share of firms with the affiliates in the tax haven among the firms from that country. The thicker the color, the larger is the share. Data come from Orbis and the author's calculations.

that operate in places with less secure property rights. Nevertheless, we observe just the opposite: The firms who operate in less secure countries are less likely to have affiliates in tax havens. This correlation is consistent with the protection racket theory presented earlier.

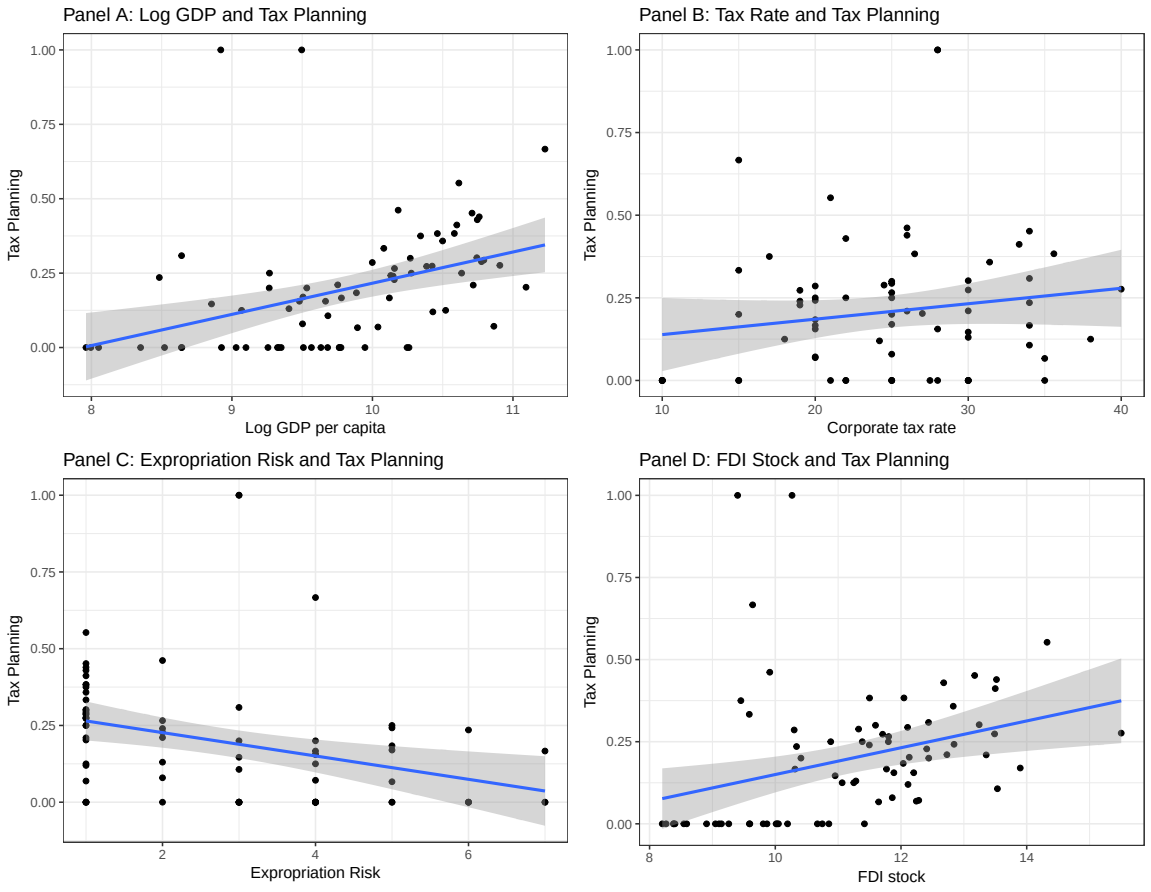
6.5 Statistical Evidence

Multilevel Specification

The nature of the theory outlined earlier as well as the nature of the data invite the usage of Bayesian multilevel models for statistical analysis[15]. My theory

[15]Many social scientists argue that there are strong philosophical reasons to prefer Bayesian inference (Jackman, 2009). While I do not dispute those arguments, my choice of Bayesian inference in my main specification is dictated mostly by computational considerations. For a robustness check, I estimated many models with different combinations of fixed effects and without any unit specific intercepts. When estimating those models, I used either MLE or OLS depending on the specification.

Figure 6.4: Country-Level Covariates for Income Shifting



Note: Vertical axis shows the share of firms with the affiliates in tax havens. On a horizontal axis, Panel A shows log GDP per capita, Panel B shows corporate tax rate, Panel C shows expropriation risk, and Panel D shows FDI stock.

generates predictions on three levels of analysis. The first level of analysis is the level of a firm: A firm's inclination to use tax havens should depend on its concentration of fixed assets and concentration of revenue. A higher concentration of assets and revenues (a proxy for vulnerability) should be associated with lower propensity to use tax havens. The second prediction is on the level of the economic sector. Firms that operate in more vertically integrated sectors are more vulnerable to governmental value-destroying interventions and thus should be less likely to engage in income shifting. Finally, my theory implies that firms operating in countries with poorer protections of property rights would be – contrary to conventional wisdom – less likely to use tax havens.

Because my theory generates predictions on three different levels, a multilevel model that allowed testing for all those hypotheses simultaneously seemed appropriate. An alternative would have been running a separate analysis for every level. This is not my preferred empirical approach for this problem. First, the lack of statistical power might be a problem – especially on a sectoral level since I only have 24 two-digit economic sectors. Secondly, running multiple tests for multiple levels can yield a global testing problem: p-values and confidence intervals would be inaccurate, but the attempt to adjust them for family-wide testing would diminish the statistical power even further. Bayesian multilevel modeling alleviates both these problems: Using adaptive regularizing prior allows units in small groups to "borrow strength" from the units in large groups, and the uncertainty intervals reflect the posterior distributions of the coefficient values, thus solving the problem of multiple testing (Gelman, Hill, and Yajima, 2012).

Another alternative would be to estimate a "fixed effects" specification, where the dummy variables are added for every country and every industry. Such a specification would allow estimating firm-level predictions but would make the estimation of country-level and industry-level coefficients impossible. Because of that, I do not use a "fixed effects" specification as my main specification (however, I do consider it as a robustness check for estimating the firm-level coefficients).

Because the main dependent variable is binary, I started with a simple Bernoulli

distribution, assuming that each observation $Haven_i$ (which equals 1 if a firm i uses tax havens, and 0 otherwise) is a draw from a Bernoulli distribution with an underlying (unobserved) probability p_i:

$$Haven_i \sim Bernoulli(p_i) \tag{6.3}$$

Probability p_i is an inverse logit function from a linear component that combines effects from firm-level covariates and three types of intercepts: Global intercept (α^1), Industry-specific intercepts ($\delta_{m[i]}$, where m is an index of an industry), and Country-specific intercept ($\gamma_{j[i]}$, where j indexes a country):

$$p_i = logit^{-1}(\alpha^1 + \beta_1^1 RevHHI_i + \beta_2^1 * FixedHHI_i + \delta_{m[i]} + \theta_{j[i]}) \tag{6.4}$$

Industry-level intercept is a function of industry-specific covariates:

$$\delta_m = \alpha_2^2 + \beta_1^2 VI_m + \beta_2^2 ROE_m + \xi_m \tag{6.5}$$

$$\xi_m \sim N(0, \sigma_2) \tag{6.6}$$

Here, VI_m is the measure for sector-level vertical integration, and ROE_m is return on equity, an important control variable that measures the profitability of a sector.

Country-specific random effects also come from the normal distributions, with the mean being a linear combination of country level covariates that might determine the level of profit shifting: the country's GDP per capita (GDP_j), corporate tax rate (Tax_j), stock of FDI (FDI_j), and expropriation risk ($ExprRisk_j$)[16].

$$\theta_j = \alpha^3 + \beta_1^3 GDP_j + \beta_2^3 Tax_j + \beta_3^3 FDI_j + \beta_4^3 ExprRisk_j + \epsilon_j \tag{6.7}$$

$$\epsilon_j \sim N(0, \sigma_3) \tag{6.8}$$

All the unobserved quantities are given non-informative (improper) priors so that their posterior distribution is only influenced by the data and not my prior expectations about their values.

Equations (3)-(8) describe my preferred specification. However, to demonstrate that my results are not driven by the specific choice of covariates, I fit

[16]To measure the expropriation risk, I got Credendo estimates, all the measures of government expropriation risk available on the World Bank website and take fist PCA component.

several models where an increasingly rich set of covariates is added in a consecutive way. I estimated the posterior distribution of the coefficients using MCMC sampling in Stan (Stan Development Team, 2017). For every coefficients, I ran four chains with 10 000 iterations, the first 5000 being treated as burn-in iterations and discarded from the calculation of the posterior density of the coefficients and other summaries.

6.5.1 Results

The results of the estimation are shown in Table 6.1[17]. Models 1-4 present increasingly rich multilevel specifications. In Model I, I only included firm level predictors, the logit coefficient on HHI Revenue (concentration of revenue) is -0.34, which corresponds to the log-odds of 0.72. The coefficient on HHI Assets (concentration of assets) is -0.21 (so corresponding log-odds are 0.82). Once I add more variables, those coefficients do not change substantively: the HHI Revenue coefficient becomes slightly smaller, while the HHI Assets coefficient becomes slightly larger.

In Model 4, my preferred specification, the mean of the posterior distribution for the coefficient on concentration of revenue is -0.35. Because all the coefficients are standardized, the most plausible values for the concentration of revenues vary from -1 to 1. When the concentration of revenue changes in my sample from -1 to 1, the log odds of having an affiliate in a tax haven go down by 0.7. This number implies that the predicted probability of a firm that have a baseline 50 percent chance of having an affiliate in a tax haven goes down by 17.5 percentage points.

The marginal effects are plotted on Figure 6.5. For both variables that measure the firm-level vulnerability the concentration of revenue, and the concentration of fixed assets, the plots display the effects that are relatively precisely

[17]In the tables that accompany my analysis, I present a coefficient and its 95-percent highest probability density interval (for Bayesian specification) or 95-percent confidence interval (for non-Bayesian analysis). I do not put "significance stars" or other decorations. If one wishes, nevertheless, to conduct a test with the α of 0.05, one might, as a rule of thumb, see if the intervals I present include zero. I recommended against this practice.

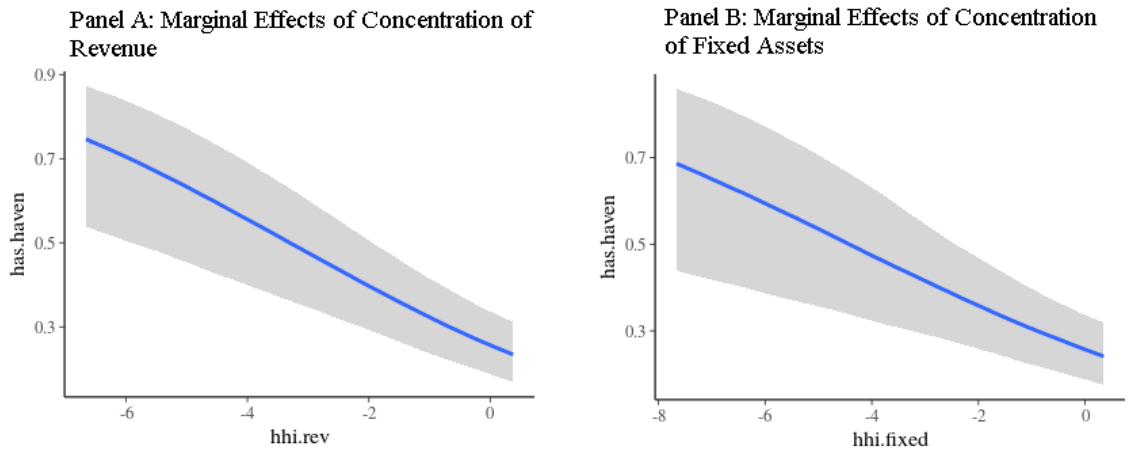
Table 6.1: Main Results: Vulnerability and Income Shifting

	Model 1	Model 2	Model 3	Model 4
HHI Revenue	−0.34	−0.33	−0.33	−0.32
	[−0.45; −0.23]	[−0.46; −0.21]	[−0.45; −0.22]	[−0.45; −0.21]
HHI Assets	−0.21	−0.23	−0.24	−0.24
	[−0.31; −0.08]	[−0.36; −0.11]	[−0.35; −0.13]	[−0.35; −0.10]
Revenue	0.27	0.32	0.31	0.31
	[0.16; 0.37]	[0.22; 0.43]	[0.20; 0.42]	[0.20; 0.40]
Assets	0.48	0.46	0.47	0.47
	[0.38; 0.58]	[0.34; 0.57]	[0.35; 0.59]	[0.36; 0.59]
Vert. Int.		−0.62	−0.73	−0.73
		[−1.04; −0.18]	[−1.07; −0.43]	[−1.21; −0.32]
ROE			0.28	0.29
			[0.06; 0.52]	[0.05; 0.53]
GDP				0.27
				[−0.10; 0.65]
Tax				−0.21
				[−0.45; 0.08]
Expr. Risk				0.07
				[−0.34; 0.46]
FDI stock				0.08
				[−0.17; 0.35]
Num. obs.	6158	6158	6158	6158

Note: Models 1-4 present different specifications based on Equations 3-8. The unit of observation is a firm. The dependent variable is an indicator for having an affiliate in a tax haven. Each model contains a global intercept and random intercepts for the country and the economic sector. None of the standard convergence diagnostics indicate non-convergence. Figures 8.3 to 8.10 show the density plots and MCMC plots for all MCMC chains. Table 8.15 shows the values of some common convergence diagnostics.

estimated and large in magnitudes. Once both the values of total concentration go up by its total range, the predicted probability of having an affiliate in a tax haven decreases from more than 70 percent to less than 30 percent.

Figure 6.5: Marginal Effects for the Measures of Firm Level Vulnerability



Note: Marginal plots for the measures of firm-level vulnerability (revenue HHI and fixed assets HHI) about the probability of having an affiliate in a tax haven. The plot constructed from the results of Model 4 in Table 6.1.

Analogously, the coefficient on the concentration of fixed assets has a mean estimate of -0.24, implying that a marginal firm (whose baseline probability of having a tax haven affiliate is 50 percent) would be 12 percentage point *less* likely to have an affiliate in a tax haven, as their standardized value of the concentration of fixed assets move from -1 to 1.

These results point to the direction implied by my theory: Higher levels of vulnerability tend to coincide with *lower* levels of utilization of tax havens.

Predictably, firms that are richer (in terms of assets and revenues) are more likely to have affiliates in the tax havens. This is understandable since establishing a multinational corporate structure that involves the affiliates in tax havens involves certain fixed costs and marginal costs (as De Simone, Klassen, and Seidman (2016) point out, "Efficient transfer pricing strategies can be expensive to

put in place"), and richer firms are more likely to be able to pay those costs. The largest coefficient in terms of magnitude is the coefficients on log assets: -0.47. It implies that for a marginal firm, there is a change in the predicted probability once the standardized value of assets move from -1 to 1 and the probability to be associated with a tax haven goes up by 23.5 percentage points. For the effect of log revenue, the magnitude is smaller. Conditional on other predictors, the effect in terms of log odds ratio is 0.31. This implies that once the standardized value of log revenue moves from -1 to 1, the probability of a firm having an affiliate in a tax haven goes up by 15.5 percentage points.

I included the proxies for the size of a firm (log assets and log revenue) for two reasons. First, they can be important confounders for the association between the revenue vulnerability and income shifting: Larger firms can have either higher/lower concentration of revenue but they must also have a larger propensity of having an affiliate in a tax haven for the regions unrelated to their vulnerability. Thus, if those variables are omitted from the specification, the analysis might suffer from the omitted variable bias. The second reason for the inclusion of those variable is their connection to the probability of having a tax haven serve as a simple "sanity check" for data. Since it is reasonable to expect that, larger firms will have higher rates of tax haven utilization. Had we seen another result in the data (a negative association or even the absence of association), it would be a reason to doubt the validity of the data.

Once we look at the sector-level predictors, we find that the effect of vertical integration is also negative and substantial. The point estimate of -0.72 implies that if the standardized levels of vertical integration go up from -1 to 1, the probability goes down by 36 percentage points for a firm with baseline probability of having an affiliate of 50 percent in a tax haven.

The effect on expropriation risk is close to zero and not precisely estimated. Table 6.1 shows that approximately the same share of the posterior probability density lies above zero as that which lies below zero.

In sum, out of the four empirical implications of my theory, three results

are consistent with it (both firm-level and sector-level measures of vulnerability consistently coincide with smaller utilization of tax-havens). Country level results are too imprecise to be conclusive, probably because the most commonly used measures of expropriation risk are too noisy.

6.5.2 Goodness of Fit

How well does the statistical specification outlined earlier explain the variation in my data? Because I have the binary outcome data, the standard measure of goodness-of-fit in a regression framework might not be applicable since the fitted values are interpreted as probabilities, while the outcomes are probabilistic realizations of a Bernoulli random process parametrized by those probabilities. Values of R^2 calculated out of those quantities would be very low, but those low values would not imply low explanatory power of the model.

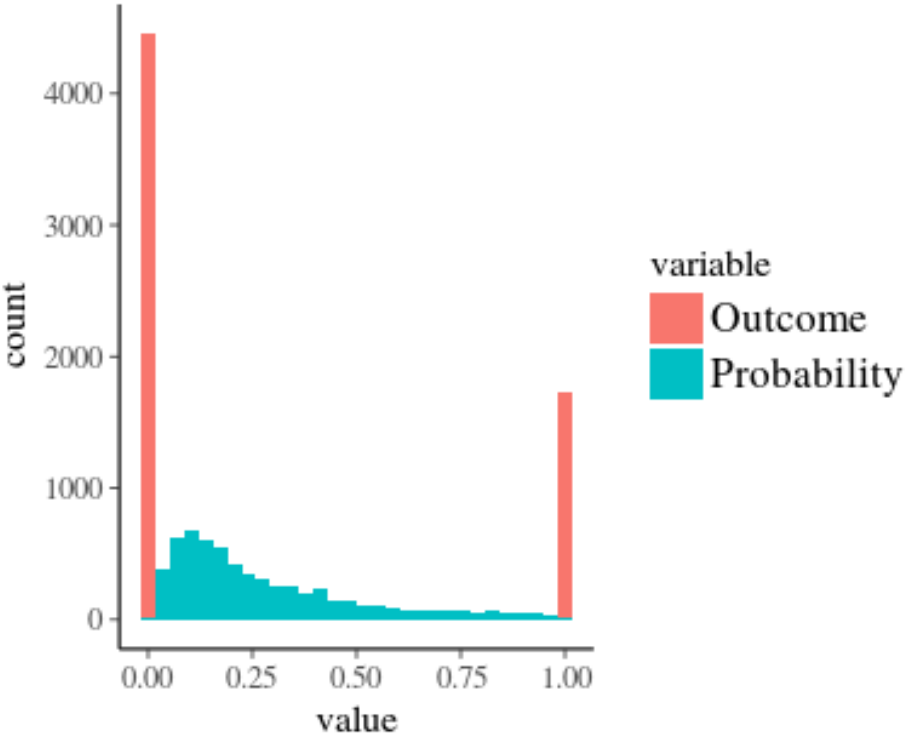
Figure 6.6 presents the histogram of actual outcome data (in red), and the histogram of predicted probabilities from Model 4 in Table 6.1 (in blue). As one might see, the distribution of predicted probabilities peak around low values, which is consistent with most of the firms in my dataset that do not have a known connection with tax havens.

One can also see a significant proportion of probability density lying above the value of 0.5, indicating that there is still a proportion of firms that the model would classify as having an affiliate in a tax haven.

To calculate the explanatory power of the model, I used an in-sample predictive accuracy: I used a fitted value for the p_i and then predicted that those firms that have fitted value of p_i larger than 0.5 do have an affiliate in a tax haven, while the firms whose predicted p_i is less or equal to 0.5 do not. As a result, I can compare how well my model explains the outcome and compare its performance against the relevant benchmarks: A random prediction[18], or assigning to all the

[18]Treating the outcomes as equally likely would yield an accuracy of 50 percent.

Figure 6.6: Outcomes and Posterior Probabilities



Note: A histogram of the outcomes (red) and predicted probabilities (blue). Outcomes are taken from the data (1 if a firm has an affiliate in a tax haven, 0 if a firm does not have an affiliate in a tax haven). Predicted probabilities are produced by Model 4 in Table 6.1.

variables as a prediction, the most frequent outcome[19].

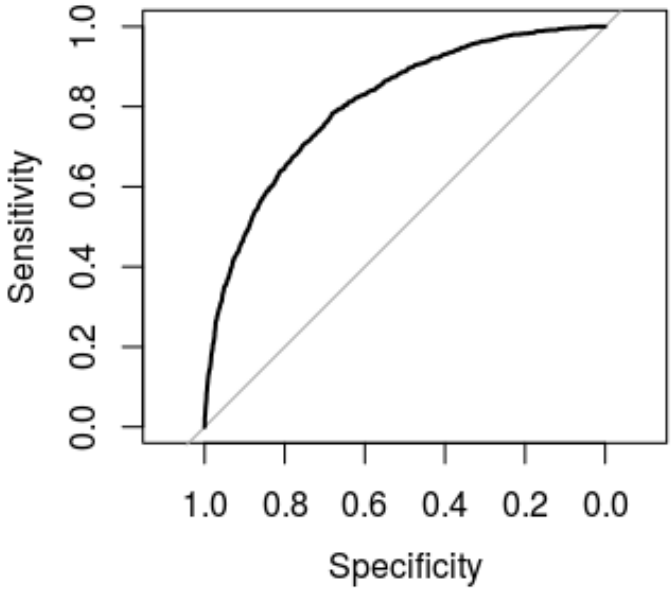
I calculated the predictive accuracy as $Accuracy = \frac{number\_of\_correctly\_predicted}{N}$, a ratio of correctly predicted to the total number of cases. This calculation yields a value of 0.78. This value is larger than potential accuracies from random assignment of the outcomes and from the assignment of most frequent cases. A more general approach to assess the explanatory power of the model is to create an ROC curve that would, for each of the potential value of a cutoff (not just the value 0.5), calculate the true positive rate (number of firms correctly predicted to have tax haven affiliate divided by the total number of firms that have tax haven affiliates), and 1- false positive rate (number of firms incorrectly predicted to have tax haven affiliate divided by the number of firms that do not have a tax haven affiliate). This curve will show the quality of the explanatory model in explaining the outcomes for every possible fitted value of p_i used as a threshold for classification. The resulting ROC curve is shown in Figure 6.7. The curve shows that for all nontrivial values of the cutoff, the classifier outperforms the random assignment benchmark.

Another important question that can be asked is what is the role of the proxies in vulnerability in the explanatory power of the model? One way to answer this question is to use an information criteria based on leave-one-out (LOO) cross-validation (Vehtari, Gelman, and Gabry, 2017). To investigate whether the proxies for vulnerability can improve the predictive power of the model, I considered two models. In the first one, the baseline model, I removed all the proxies for the vulnerability and kept only the control variables: Log revenue, log assets, ROE, FDI stock, GDP per capita, and corporate tax rate. In the second model, I added back the proxies for vulnerability: Concentration of fixed assets, concentration of revenue, sector-level vertical integration, and country-level expropriation risk. For both the models, I calculated the value of LOO information Criteria (LOOIC) and its standard deviation.

Figure 6.8 shows the result. Vertical axis shows the values of LOOIC and its

[19]This procedure would yield an accuracy of 72 percent.

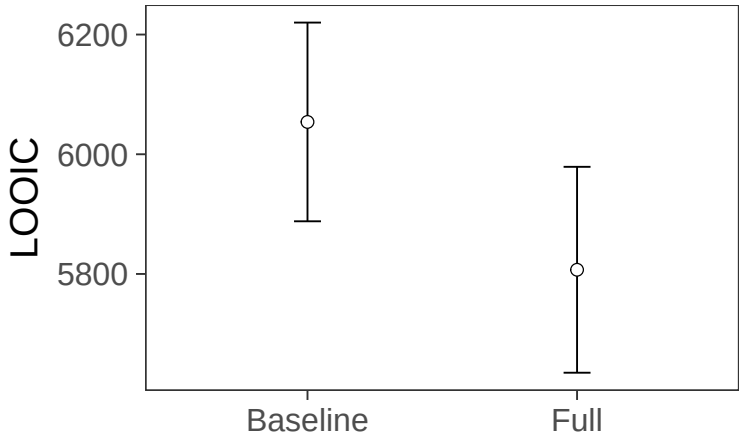
Figure 6.7: ROC Curve for the Classifier



Note: The ROC curve is based on the fitted values from Model 4 of Table 6.1. Sensitivity, depicted on the vertical axis is the true positive rate. Specificity, depicted on the horizontal axis is 1-false positive rate. The black curve shows the characteristics of the classifier based on Model 4 of Table 6.1. The gray line shows the characteristics of the random classifier. The area between the gray line and the black curve can be used for the assessment of the quality of the classifier

95-percent uncertainty intervals. While the values itself are not interpretable, the smaller values indicate better fit. As one can see from Figure 6.8 the full model is displaying a considerably better fit than the baseline model (the model without the proxies for vulnerability).

Figure 6.8: Leave-One-Out Criteria



Note: Leave-one-out cross-validation information criteria (LOOIC). Baseline model (the model with all the covariates except for the proxies for vulnerability) is shown on the left. Full model (baseline + proxies for the vulnerability) is shown on the right. Smaller values indicate better fit.

In sum, this subsection demonstrated that the Bayesian multilevel specification used for the analysis lead to the classification that fits the data better than the appropriate benchmarks, and, as implied by the protection racket theory of tax compliance developed earlier in this paper, the measures of the firm's vulnerability lead to better predictions of firm-level utilization of tax havens.

6.6 Robustness and Sensitivity Analysis

This sections considers an additional analysis aimed at exploring whether the results of the previous analysis are robust to changing the specification, assumptions, and selection of firms into the sample.

6.6.1 Fixed Effects Estimates

My main specification uses a multilevel specification, where the information about industry-level and country-level intercepts are pooled across different units. The estimation I am using is sometimes called "semi-pooling" estimation since it is a compromise between not including unit-level intercepts and thus pool all the units together and including unit-level intercepts as fixed effects thus prohibiting the aggregation of information about the sizes of the intercepts across units.

This section demonstrates that the results shown earlier are robust to using different estimation procedures. To explore the robustness with regard to the inclusion of fixed effects, I estimated the versions of Model 4 from Table 6.1 using different combinations of fixed effects. Figure 6.2 presents the results of the estimation. Here, I choose to fit models using OLS since the main rationale for using fixed effects given by applied researchers is to control the by factors that are common for the group and contribute to risk difference in an "additive and constant" way (Angrist and Pischke, 2008, p. 222). This advantage is lost once the regression equation is subjected to inverse logit transformation. As a robustness check, I presented the estimates from logistical regression with fixed effects in Table 8.10.

In Model 1, I added fixed effects for the country; in Model 2, I added fixed effects for the industry; in Model 3, I added fixed effects for the country and industry; in Model 4, I added fixed effects for an interaction between the industry and the country. The specification in model 4 is the most restrictive. In this model, the effects of concentration of revenue and concentration of assets are estimated within country-industry cell. It should be noted that the effect of firm-level vulnerability does not change much when I add different combinations of fixed effects. In model 4, the richest specification and the point estimate for revenue concentration is -0.05 (the confidence interval varying from -0.07 to -0.03). Thus, in the context of the linear probability model, when the concentration of revenue goes from -1 to 1, the predicted probability of having an affiliate in a tax haven goes down by 10 percentage points.

Table 6.2: Estimates with Fixed Effects

	Model 1	Model 2	Model 3	Model 4
HHI Revenue	−0.07	−0.07	−0.07	−0.05
	[−0.09; −0.05]	[−0.09; −0.05]	[−0.09; −0.05]	[−0.07; −0.03]
HHI Assets	−0.04	−0.05	−0.04	−0.04
	[−0.06; −0.02]	[−0.07; −0.03]	[−0.06; −0.02]	[−0.06; −0.02]
Revenue	0.06	0.05	0.06	0.06
	[0.04; 0.08]	[0.03; 0.06]	[0.05; 0.08]	[0.05; 0.08]
Assets	0.06	0.05	0.06	0.05
	[0.05; 0.08]	[0.04; 0.07]	[0.05; 0.08]	[0.04; 0.07]
Vert. Int	−0.10			
	[−0.11; −0.09]			
ROE	0.03			
	[0.02; 0.05]			
GDP		0.00		
		[−0.02; 0.02]		
Tax		−0.03		
		[−0.05; −0.02]		
FDI Stock		−0.01		
		[−0.03; −0.00]		
Expr. Risk		−0.03		
		[−0.05; −0.01]		
Country	✓		✓	
Industry		✓	✓	
Country × Industry				✓
R^2	0.24	0.19	0.25	0.32
Num. obs.	6158	6158	6158	6158

Note: Fixed effects estimates of the specification analogous to the Model 4 in Table 6.1. HHI Revenue is HH index calculated using the firm's revenues in different countries, HHI Assets is HH index calculated using the firm's fixed assets in different countries. Other covariates are also analogous to model 4 in Table 6.1. All specifications are estimated using OLS (command *lm* in R).

The effects of country-level predictors can only be estimated once country-level fixed effects are not included. In model 2, only industry level effects are included, the point estimate of the coefficient on expropriation risk is -0.03. Thus, when the expropriation risk goes up from -1 to 1, the predicted probability that a firm will have an affiliate in a tax haven goes down by 6 percentage points. The effects of industry-level covariates can only be estimated only if the industry level covariates are not included in the estimations. In this respect, the most informative model is model 1. The point estimate of the effect of vertical integration is -0.1 implying that once the standardized vertical integration changes from -1 to 1, the predicted probability goes down by 20 percentage points on an average.

Thus, the estimation of the effect of the proxies regarding vulnerability on all levels produce the estimates of nontrivial magnitude in a direction implied by the theory.

Estimates with full pooling (no country-level or industry-level intercepts) are presented in Table 8.8. The results from that specifications are very close in magnitudes and precision to the ones presented earlier.

Using Tax/Revenue Ratio as Proxy for Tax Compliance

My main estimates used an indicator variable for whether a firm has an affiliate in a tax haven as a measure for whether a firm engages in income shifting. However, while it might be difficult to shift profits to low-tax jurisdiction without an affiliate there, not all of those affiliates might be involved in profit-shifting. Other reasons for their existence might include lower transactions costs and the need to have a "neutral" jurisdiction for cross-border mergers and acquisitions.

In this section, I estimated the model similar to the ones presented in Table 6.1, but using a different measure of tax compliance. I used the amount of taxes divided by the revenue. This gives the measure of how much money a firm has paid in tax. Importantly, I did not divide the taxes by profit (as it is usually done for accounting purposes) but by revenue. This is intentional, because the costs are often manipulated during the transfer pricing arrangements that inflate

the costs, thus inflating the observed share of taxes paid by the firm. Thus, to account for this effect, I have to divide by the parameter that cannot itself depend on the costs.

The results are presented in Table 6.3. The effect of concentration of the revenue is positive: One standard deviation in the concentration of revenue explains, on average, 7 percent of a standard deviation in tax to revenue ratio. This is consistent with the previous results: Vulnerability increases tax compliance. The effect of concentration of assets is also positive on average, but smaller in magnitude and less precisely estimated: On average, one standard deviation in concentration of fixed assets is associated with 3 percent of standard deviation of tax to revenue ratio.

It should be noted that the concentration of revenue and concentration of assets are correlated with one another (the correlation is 0.86). This correlation might increase the noise in the estimated coefficient. For this reason, in Table 6.4, I fit the models separately: Model 1 shows the results with the concentration of revenue and Model 2 shows the results with the concentration of assets. Both coefficients increase in magnitude and become more precisely estimated (now, all of the 95 percent HPD intervals lie above zero).

As for the effects of vertical integration and expropriation risk, those estimates are near zero and not precisely estimated. Probably, this particular set of estimations are not capable of identifying the effects of some sector-level covariates and country-level covariates. The analogous estimations with fixed effects are shown in Table 8.11.

Because the estimates of the firm-level measures of vulnerability has the same direction of effect here as in my main specification, this analysis addresses another important concern: Confoundedness by the multinational nature of operations. Firms that operate in more countries will have, arithmetically, lower values of HHI indices, and they might be more likely to set up a branch in a low-tax jurisdictions to minimize the transactions costs. So, one might argue that the results in Table 6.1 might be confounded for this reason. However, because the

Table 6.3: Vulnerability and Tax to Revenue Ratio

	Model 1	Model 2	Model 3
HHI Revenue	0.07	0.07	0.07
	[0.02; 0.12]	[0.02; 0.14]	[0.02; 0.13]
HHI Assets	0.02	0.03	0.03
	[−0.02; 0.08]	[−0.03; 0.08]	[−0.02; 0.08]
Revenue	−0.21	−0.20	−0.21
	[−0.26; −0.17]	[−0.25; −0.16]	[−0.25; −0.15]
Assets	0.27	0.27	0.27
	[0.22; 0.32]	[0.22; 0.32]	[0.21; 0.32]
Vert. Int.		0.02	0.01
		[−0.29; 0.32]	[−0.27; 0.26]
ROE		0.09	0.09
		[−0.05; 0.23]	[−0.05; 0.23]
GDP			0.02
			[−0.06; 0.12]
Tax			0.03
			[−0.04; 0.10]
Expr. Risk			−0.00
			[−0.11; 0.10]
FDI stock			−0.01
			[−0.09; 0.05]
Num. obs.	5201	5201	5201

Note: Dependent variable is the tax to revenue ration. Models 1 to 3 replicate the Models 1,2,4 from Table 6.1 with the continuous dependent variable instead of the binary dependent variable.

Table 6.4: Separate Models for Concentration of Revenue and Fixed Assets

	Model 1	Model 2
HHI Revenue	0.10	
	[0.06; 0.13]	
HHI Assets		0.09
		[0.05; 0.12]
Revenue	−0.21	−0.21
	[−0.26; −0.16]	[−0.26; −0.15]
Assets	0.27	0.27
	[0.22; 0.32]	[0.21; 0.33]
Vert. Int.	0.02	0.03
	[−0.24; 0.28]	[−0.21; 0.31]
ROE	0.09	0.09
	[−0.04; 0.21]	[−0.03; 0.22]
GDP	0.01	0.01
	[−0.07; 0.11]	[−0.07; 0.11]
Tax	0.03	0.03
	[−0.04; 0.09]	[−0.04; 0.10]
Expr. Risk	−0.01	0.00
	[−0.10; 0.10]	[−0.11; 0.11]
FDI stock	−0.01	−0.01
	[−0.08; 0.05]	[−0.09; 0.06]
Num. obs.	5201	5201

Note: Dependent variable is tax to revenue ration. Models 1 and 2 replicate Models 3 from Table 6.1 excluding one of the two firm-level vulnerability proxies.

tax to revenue ratio does not depend algebraically on the number of branches and the results are still of the same direction as my main results, this concern might be mitigated.

Correlated Predictors

In my sample, the correlation between the concentration of revenue and the concentration of assets is rather high (0.86) since it is reasonable to expect that the concentration of assets might naturally lead to a higher concentration of revenues. In order to explore whether the results presented earlier might be driven by such high correlation between two explanatory variable, I fit Model 4 from Table 6.1 separately with the concentration of assets and concentration of revenue. From the Bayesian standpoint, the difference between these two models are related to the priors with the size of the coefficient. If we omit the concentration of assets, this means that we believe that its coefficient is zero, but the coefficient on the concentration of revenue may be different from zero. If we omit the concentration of revenue from the regression, the opposite should be true about our beliefs. Of course, we cannot hold those beliefs simultaneously, but as a robustness check, Table 6.5 demonstrates that the results demonstrated earlier (negative associations between the firm-level proxies for vulnerability and sector-level proxies for vulnerability are consistent with both sets of beliefs).

6.6.2 Robustness to Outliers

I consider if the results presented earlier are driven by certain subsets of countries. It should be noted that the results are unlikely to be driven by any single country since they are robust to the inclusion of country-level fixed effects; but it is certainly possible that a narrow subset of countries are driving the results. To explore this possibility, I repeated Model 4 from Table 6.1 after excluding various categories of countries.

Table 6.6 presents the results of the analysis. Model 1 shows the specification where the US and Canada are excluded; Model 2 shows the results where three

Table 6.5: Main Model with the Correlated Predictors Omitted

	Model 1	Model 2
HHI Revenue	−0.52	
	[−0.59; −0.45]	
HHI Assets		−0.51
		[−0.58; −0.44]
Revenue	0.31	0.32
	[0.22; 0.43]	[0.22; 0.43]
Assets	0.48	0.48
	[0.34; 0.58]	[0.37; 0.61]
Vert. Int.	−0.73	−0.75
	[−1.07; −0.37]	[−1.09; −0.40]
ROE	0.28	0.29
	[0.09; 0.50]	[0.07; 0.49]
GDP	0.28	0.26
	[−0.09; 0.61]	[−0.07; 0.60]
Tax	−0.20	−0.21
	[−0.46; 0.03]	[−0.44; 0.02]
Expr. Risk	0.08	0.04
	[−0.32; 0.50]	[−0.34; 0.42]
FDI stock	0.08	0.06
	[−0.20; 0.32]	[−0.16; 0.33]
Num. obs.	6158	158

Note: Dependent variable: Indicator for the existence of tax haven affiliates. Model 1 and Model 4 repeat Model 4 from 6.1, but Model 1 omits Fixed Assets HHI, and Model 2 omits Revenue HHI.

Table 6.6: Specification with Various Subsamples Excluded

	Model 1	Model 2	Model 3
HHI Revenue	−0.32	−0.29	−0.32
	[−0.44; −0.17]	[−0.43; −0.16]	[−0.45; −0.19]
HHI Assets	−0.22	−0.23	−0.23
	[−0.35; −0.08]	[−0.36; −0.09]	[−0.35; −0.09]
Revenue	0.41	0.40	0.41
	[0.29; 0.54]	[0.28; 0.53]	[0.28; 0.51]
Assets	0.43	0.40	0.43
	[0.30; 0.56]	[0.26; 0.54]	[0.31; 0.56]
Vert. Int.	−0.67	−0.64	−0.67
	[−1.08; −0.28]	[−1.16; −0.26]	[−1.01; −0.30]
ROE	0.23	0.25	0.23
	[0.00; 0.48]	[0.01; 0.54]	[0.00; 0.46]
GDP	0.26	0.25	0.18
	[−0.06; 0.62]	[−0.14; 0.60]	[−0.24; 0.53]
Tax	−0.14	−0.17	−0.17
	[−0.36; 0.15]	[−0.44; 0.09]	[−0.44; 0.11]
Expr. Risk	0.01	0.07	−0.05
	[−0.41; 0.41]	[−0.41; 0.46]	[−0.46; 0.40]
FDI stock	0.18	0.24	0.24
	[−0.07; 0.50]	[−0.03; 0.56]	[−0.06; 0.52]
Num. obs.	6039	4767	6034

Note: All the specifications repeated in Model 4 from Table 6.1. Model 1 excludes USA and Canada, Model 2 excludes Japan, USA, and China. Model 3 excludes Dominican Republic, Guatemala, and Kuwait. Random intercepts for countries and industries are included. None of the convergence diagnostics (Gelman-Rubin diagnostics, effective number of observations, visual inspection of chains and densities) indicate non-convergence.

countries with the largest number of companies in my sample (China, Japan, and the US) are excluded. Model 3 shows the specification where three countries with the highest tax haven utilization (Kuwait, Guatemala, and Dominican Republic) are excluded.

In all of those specifications, the coefficients on the proxies of vulnerability do not lose their precision, but increase in magnitude. I have also estimated same specifications with fixed effects (Table 8.12), with the ten richest companies excluded (Table 8.13) and with the most influential observations (according to Cook's distance) excluded (Table 8.14). In all of those specifications, the estimates of the main coefficient remain at least as large and as precise as in the specification with the full sample. In Table 8.14, once the most influential observations are removed, the point estimates become 2-3 times larger.

6.6.3 Sensitivity to Unobserved Confounding

Every statistical analysis of a social phenomena, including the one presented earlier, can suffer from misspecification. In my analysis, I considered the robustness of my results to different controls, including country-level and sector-level intercepts (modeled as either random effects or fixed effects), but the danger of unobserved covariates influencing both the main explanatory variable and the outcome cannot be avoided.

One of the ways to mitigate this concern is to investigate the *sensitivity* of the result to unobserved confounding. In this section, I considered such an analysis, following the procedure outlined by Cinelli and Hazlett (2018), which allows making conclusions about how large the potential omitted variable bias must be to nullify the results obtained in a regression.

Cinelli and Hazlett (2018) offer the following decomposition of omitted variable bias:

$$|\hat{bias}| = se(\hat{\alpha}) \sqrt{\frac{R^2_{Y\sim Z|X,D} R^2_{D\sim Z|X}}{1 - R^2_{D\sim Z|X}} (df)} \tag{6.9}$$

Here, $se(\hat{\alpha_{res}})$ is the standard error of the main coefficient of interest ($\hat{\alpha}$), Y

is the outcome of interest, D is the main explanatory variable, X is a vector of covariates, Z is the omitted variable, and df is degrees of freedom of the regression.

Intuitively, the absolute value of the bias is proportional to the connection of the outcome to the omitted variable (measured by the partial R^2) multiplied by the connection of the main explanatory variable to the omitted variable (also measured by corresponding partial R^2).

To use this formula, one needs a way to calibrate the expectations of the potential partial R^2's, involving the unobserved parameter. One way to do this is to assume (conservatively) that the connection of the unobserved variable to the outcome is unlikely to exceed the maximum observed connection of the *observed* variables to the outcome. In other words, we assume that the strongest possible predictor of the outcome is already in the regression.

In the case of my analysis, the strongest possible predictor of having an affiliate in a tax haven is the log of the firm's assets (the richer the firm, the more likely it is to have an affiliate in tax haven). Applying this procedure yields the conclusion that the hypothetical bias *needed* to nullify my results is six to ten times larger than the estimate of the maximum bound of the potential bias. Thus, though my results can be vulnerable to misspecification and omitted variable, the procedure shows that the results are relatively stable (see SECTION for the detailed description of the steps of the procedure).

Another procedure for evaluating the sensitivity to unobserved confounding has been suggested by Oster (2017) and widely used across social sciences. The intuition behind it is relatively simple: If the main coefficient remains stable when the control variables are added, but R^2 goes up, then the main coefficient is declared relatively insensitive to unobserved confounding (under the assumption that the observed covariates constitute a representative sample for all the potential covariates). The procedure, outlined by Oster (2017) under a different set of assumptions than Cinelli and Hazlett (2018), calculates a value (δ) for how large the effect of unobserved confounder must be to nullify the effect of the main

explanatory variable. I found that the unobserved confounder should be at least 1.4 times stronger than any of my main variables to nullify my main coefficients (thus, $\delta = 1.4$). A "rule of thumb" suggested by Oster (2017) is that the values of δ smaller than 1 might indicate sensitivity to unobserved confounding.

6.7 Conclusion

Corporate tax compliance is one of the most important challenges to the fiscal capacity of states, especially in the poor and middle income parts of the world. Firms often establish affiliates in low-tax jurisdictions and use various accounting schemes to move their profits into those jurisdictions, thus robbing their host countries of tax revenue. As states are not able to achieve any of their goals (defense, contract enforcement, redistribution, public goods provision) without tax revenue, this problem is extremely consequential for the quality of governance.

In this paper, I aimed at proposing a theory of corporate income shifting. Inspired by Charles Tilly's view of the state as a quintessential protection racket, I hypothesized that the firms that are more vulnerable to value-reducing activity by the government will be *less* likely to engage in income shifting and more likely to demonstrate tax compliance. Using firm-level data that allow measuring connections to tax havens, I found that firms that have a higher concentration of assets, a higher concentration of revenue, and operate in more vertically integrated sectors are less likely to have an affiliate in a tax haven.

There are several important caveats regarding this analysis that I should make. My dependent variable is almost certainly measured with an error. Some firms hide their tax haven affiliate better than the others, some firms do not need to set up a tax haven affiliate because they are perfectly happy with the deductions they get from their host governments. Also not included in the analysis are within-country offshore zones. I attempted to mitigate those concerns by looking not only at the connection to tax havens but also at tax to revenue ratio as another measure of tax compliance and found results that are consistent with

the results of my main specification.

My argument has important policy implications. In conflicts between firms and states, the international community often sides with firms. Governments can be labeled "predatory," "grabbing" or violating "contract sanctity." For many years, the goal of the community of nations were encouraging international investments, especially in the form of FDI, protecting property rights, and encouraging "pro-business" climate. Certainly, there is nothing wrong in protecting the property rights or encouraging international investments. Nevertheless, the same policies, agreements, and moral climate that promote "pro-business" attitudes might end up hurting the tax capacity and economic development of the host nations. A more balanced approach that embraces the value of tax compliance at least as enthusiastically as it now embraces the value of broadly defined property rights is what is needed.

My argument has implications for the study of corporate behavior in risky environments. If firms chose to do business in places where political risk is high, then they might prefer to lower the concentration of fixed assets and revenue or, if this is not sufficient, build a goodwill with the host government by showing tax compliance.

My argument has implications for the study of quality of governance and economic development. It is commonly assumed that a type of business activity a country has a comparative advantage in might shape its economic and political trajectory. For example, oil rents are often associated with all kinds of bad outcomes (Ross, 2012). Because concentration of assets and revenue of firms that operate in a country might have an impact on its fiscal capacity, an early composition of investments might have long-term consequences. For example, inviting too many multinational corporations into a country at early stages of development might have a benefit of bringing more jobs and technologies but also can harm the nascent fiscal capacity. I leave more detailed explorations of this mechanism for future research.

CHAPTER 7

Conclusion

In this dissertation, I attempt to advance the study of political consequences of offshore financial system and understand causes behind differences in tax haven utilization among firms. I start with a theory of authoritarian survival that explains how tax havens can be used as commitment devices in a patron-client exchange between a ruler and an elite. I set up a simple model with two actors: the ruler and the elite. The ruler decides about the share of the spoils she wishes to share with the elite and, later, whether to expropriate the spoils back or not, while the elite decides whether to rebel or not after observing the share of the spoils, and, if given a chance, whether to move the money into an offshore jurisdiction. I show that, under certain assumptions, the option to move money to tax havens leads to the elite demanding less in compensation. I also show that once the relative riskiness of the elite's fortune in the offshore zones goes up, the share of the spoils shared with the elite should also go up to compensate for the increased risk.

I implement two empirical exercises to test this theory. First, I show that nondemocracies with larger amount of offshore wealth are less likely to experience a positive change in Polity score (relative democratization). I control for other common determinants of democratization and show that the result is not driven by reverse causality (capital outflow responding to authoritarianization or a coup risk). In a second empirical exercise, I test a different empirical implication: share of spoils shared with the elite should go up following the exogenous increase in the riskiness of holding assets in the foreign jurisdictions. I use the firm-level data from a sample of largest Russian firms to document that firms that had had connections to tax havens, paid lower amount of tax after 2014 (but not before)

– a finding consistent with the members of business elite being compensated for the increased risk in offshore jurisdictions.

I also explore the determinants of tax compliance. I argue that firms that are more vulnerable to political risk are less likely to avoid taxes for the fear of retaliation from the state. I quantify exposure to political risk as the concentration of fixed assets and revenue. I find that, conditional on the sector, country, and other determinants of taxation, the firms with higher concentration of fixed assets and revenue are less likely to have an affiliate in a tax haven and usually pay more in taxes.

My arguments have several political implications. First, if the tax haven economy influences authoritarian survival serving as commitment devices in the exchange between the ruler and the elites, then it gives the western governments an important leverage for influencing the "rogue" regimes. By credibly threatening to restrict access of the elites to the offshore financial infrastructure, the Western governments might be able to exhibit certain influence. However, if the regime is rich, it might offer a compensation for the elite.

My findings about the determinants of tax compliance, outlined in chapter 6 have several implications – both theoretical and practical. From the theoretical standpoint, my arguments challenge several premises of the "new institutional theory" that makes contract enforcement and protection of property right main drivers of economic development (Acemoglu and Robinson, 2005b; Besley and Persson, 2011). While I do not disagree with the argument that those protections are important, I argue that protection of property rights can conflict with building fiscal capacity. To the extent economic development depends on fiscal capacity, the constraints – either imposed by the domestic institutions or by international treaties – might end up harming fiscal capacity and the long-run economic development.

From the policy perspective, my arguments have several implications on how the community of nations sees property rights protection. The states today participate in the network of around 30,000 investment treaties which may bind

severely what they can do in their domestic economic policy[1]. At the same time, the protections of fiscal capacity of the states are lagging. While it is common for the investment treaties to include non-committal statements that participating parties condemn tax avoidance, the stronger language might be needed.[2].

Certainly, my arguments are not designed to be definitive statements. My analysis has several limitations (discussed in details in the earlier chapters). Most notably, my measures of tax compliance and offshore wealth might suffer from the measurement error. From the statistical perspective, these errors are unlikely to impact the direction of the effects I estimate, but they might lead to the attenuation of the effect. In the future research, when better data are available (for example, when country-by-country financial reporting by multinationals will be required by more countries), my analysis will have to be repeated to improve the precision of the estimates.

Future research should also explore potential sources of exogenous variation in the concentration of assets (exploiting the gravity equation, linguistic distances between countries and others) to produce estimates that would be less likely to be influenced by unobserved confounding.

Another important issue is the explanation of differences between the offshore wealth of different countries. Because the rise of tax haven (as I mention in chapter 2) coincided withe the creation of mass democracy in Europe, it is possible that the institutional choices made at that period had a strong impact on the current patterns of offshore finance.

In sum, this work is designed to draw the attention of political scientists to the problems of offshore finance and the impact of tax havens on politics. While I do offer some tentative conclusions, more research is needed in this area.

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[1]As of 2012, states won 34 percent of the investors-state disputes, firms won 31 percent of the time, and the rest of cases ended in a settlement which is likely to be a win for the participating firms (Wellhausen, 2014)

[2]For example, in Canada/Mongolia agreement from 24/02/2017, Article 16 states that the protections for the firms do not include cases, when "any new taxation measure... is aimed at ensuring the equitable and effective imposition or collection of taxes". This is a step in the right direction, but probably not only "taxation" measures would be exempt, but any regulatory measures that have a clear aim at fighting tax avoidance

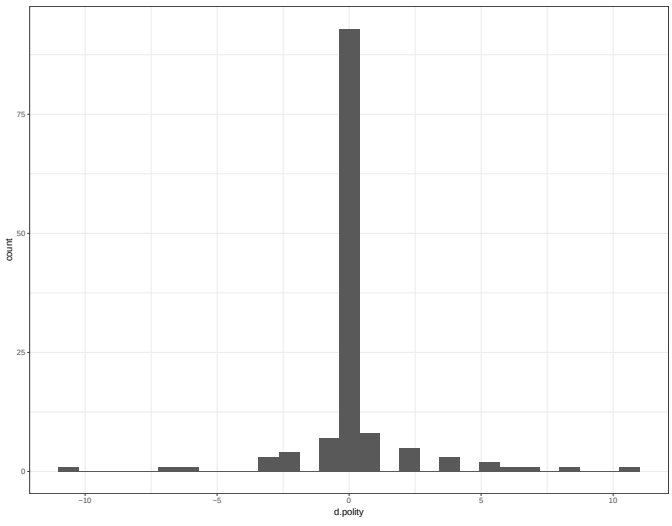
CHAPTER 8

Additional Material

8.1 Cross-Sectional Estimates: Additional Information about Data

Figure 8.1 shows the histogram of the differences of polity scores between years 2007 and 2016 for the countries that were classified as non-democracies in 2007. One can see that the most frequent outcome is the polity score remaining unchanged. Also, there is a nontrivial amount of cases that have at least marginally democratized (17 percent of the sample), and a nontrivial amount of cases that have at least marginally authoritarianized (13 percent of the sample).

Figure 8.1: Distribution of Differences in Polity Scores



Note: Histogram of the differences in Polity scores between year 2007 and year 2016 for those countries that had Polity score less than 7 in 2007.

Table 8.1: Propensity Score Results for Propensity Score Model in Chapter 5

	Model 1
Assets 2011	-0.03 (0.05)
Assets 2010	0.23 (0.07)***
Assets 2009	-0.12 (0.06)
Net Income 2011	-2.37 (0.74)**
Net Income 2010	3.92 (1.11)***
Net Income 2009	-1.51 (0.79)
Empl 2011	-28.10 (12.66)*
Empl 2010	32.97 (17.49)
Empl 2009	-0.30 (10.93)
Tax 2011	1.40 (0.59)*
Tax 2010	-0.75 (0.92)
Tax 2009	-3.00 (1.20)*
Fixed 2011	0.05 (0.06)
Fixed 2010	-0.22 (0.07)**
Fixed 2009	0.08 (0.06)
Industry FE	✓

Note: Logit model. Dependent variable is an indicator variable for a firm having an affiliate in a tax haven. $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

8.2 Characteristics of the Sample of Firms

Table 8.2: Descriptive Statistics for Firm-Level Financial Data

	Variable	Mean	SD
1	Assets, bn USD	17.33	92.06
2	Revenue, bn US	5.47	11.69
3	Tax Haven Use, share	0.29	0.45
4	Fixed Assets HHI	0.96	0.11
5	Revenue HHI	0.95	0.12

Note: The main descriptive variables for the 6158 observations in my sample.

Table 8.3: Number of Firms per Country - I

	Country	Number of Firms
1	JPN	754
2	USA	746
3	CHN	518
4	KOR	384
5	DEU	362
6	GBR	351
7	ITA	338
8	FRA	323
9	IND	230
10	CAN	205
11	ESP	190
12	RUS	190
13	COL	176
14	SWE	170
15	AUS	169
16	DNK	156
17	NOR	153
18	MYS	128
19	AUT	126
20	BEL	124
21	BRA	103
22	FIN	96
23	THA	90
24	ZAF	90
25	TUR	87

Table 8.4: Number of Firms per Country - II

	Country	Number of Firms
26	POL	57
27	ISR	47
28	PHL	41
29	IDN	40
30	GRC	39
31	MEX	38
32	CZE	33
33	PRT	30
34	CHL	29
35	IRN	29
36	SAU	28
37	VNM	27
38	HUN	25
39	NZL	24
40	UKR	24

Table 8.5: Number of Firms per Country - III

	Country	Number of Firms
41	PER	23
42	DZA	21
43	KAZ	18
44	PAK	17
45	ARG	15
46	LTU	13
47	VEN	12
48	ROM	11
49	SVK	8
50	SVN	8
51	BWA	7
52	HRV	7
53	URY	7
54	MAR	5
55	SRB	5
56	EGY	4
57	BGD	3
58	BIH	3
59	ECU	3
60	KWT	3
61	LVA	3
62	UZB	3
63	DOM	2
64	EST	2
65	GTM	2

Table 8.6: Number of Firms per Country - IV

	Country	Number of Firms
66	KEN	2
67	LKA	2
68	MKD	2
69	ALB	1
70	AZE	1
71	BGR	1
72	IRQ	1
73	MDA	1
74	PNG	1
75	PRY	1
76	SDN	1
77	SLV	1

Table 8.7: Number of Firms per Economic Sector

	Sector	Number of firms per sector
1	Manufacturing	2028
2	Finance	1297
3	Retail	1222
4	Prof. Services	433
5	Electricity	347
6	IT	291
7	Transport	288
8	Mining	236
9	Construction	230
10	Adm. Services	148
11	Real Estate	123
12	Health	62
13	Accomodation	53
14	Agriculture	52
15	Arts	47
16	Pub. Adm	47
17	Other Services	45
18	Water	33
19	Education	8

8.3 List of Tax Haves

1. Andorra
2. Anguilla
3. Antigua and Barbuda
4. Aruba
5. Bahamas
6. Bahrain
7. Barbados
8. Belize
9. Bermuda
10. Bolivia
11. Brunei Darussalam
12. Cape Verde
13. Cayman Islands
14. Comoros
15. Costa Rica
16. Curaao
17. Cyprus
18. Djibouti
19. Dominica
20. Falkland Islands
21. Fiji

22. Gambia
23. Gibraltar
24. Grenada
25. Guernsey
26. Guyana
27. Honduras
28. Hong Kong
29. Ireland
30. Isle Of Man
31. Jamaica
32. Jersey
33. Jordan
34. Kiribati
35. Lebanon
36. Liberia
37. Liechtenstein
38. Luxembourg
39. Macao
40. Maldives
41. Malta
42. Marshall Islands
43. Mauritius

44. Monaco

45. Netherlands

46. Oman

47. Palau

48. Panama

49. Pitcairn Islands

50. Qatar

51. Saint Helena

52. Saint Kitts and Nevis

53. Saint Lucia

54. Saint Vincent and the Grenadines

55. Samoa

56. San Marino

57. Sao Tome and Principe

58. Seychelles

59. Singapore

60. Sint Maarten

61. Solomon Islands

62. Swaziland

63. Switzerland

64. Taiwan

65. Tonga

66. Trinidad and Tobago

67. Turks and Caicos Islands

68. Tuvalu

69. United Arab Emirates

70. Vanuatu

71. Vatican City State

72. Virgin Islands

73. Yemen

8.4 Additional Tables and Figures for Chapter 6

Table 8.8: Model with Complete Pooling

	Model 1
HHI Revenue	−0.15
	[−0.19; −0.11]
HHI Assets	−0.11
	[−0.15; −0.06]
Revenue	0.10
	[0.07; 0.13]
Assets	0.12
	[0.09; 0.16]
Vert. Int	−0.20
	[−0.22; −0.17]
ROE	0.08
	[0.05; 0.10]
GDP	0.01
	[−0.03; 0.04]
Tax	−0.07
	[−0.10; −0.05]
FDI Stock	−0.03
	[−0.06; −0.01]
Expr. Risk	−0.07
	[−0.11; −0.03]
R^2	0.19
Adj. R^2	0.18
Num. obs.	6158

Note: A model without any unit-specific intercepts, estimated by OLS. All the variables are the same as in Model 4 in Table 6.1. The dependent variable is a firm-level indicator for having an affiliate in a tax haven.

Table 8.9: Tax To Revenue Ratio and Tax Havens: OLS Estimates

	Model 1	Model 2	Model 3
Haven	−0.08	−0.08	−0.06
	[−0.14; −0.02]	[−0.14; −0.02]	[−0.12; 0.00]
Assets	0.30	0.28	0.27
	[0.25; 0.34]	[0.23; 0.33]	[0.22; 0.32]
Revenue	−0.20	−0.19	−0.24*
	[−0.25; −0.16]	[−0.24; −0.15]	[−0.28; −0.19]
Country	✓		✓
Industry		✓	✓
R^2	0.03	0.06	0.09
Num. obs.	5201	5201	5201

Note: Dependent variable: (standardized) tax to revenue ratio. *Haven* is an indicator for having an affiliate in tax haven. All specifications contain global intercept (constant).

Table 8.10: Logistic Regressions with Fixed Effects

	Model 1	Model 2	Model 3
HHI Revenue	−0.34	−0.32	−0.34
	[−0.46; −0.21]	[−0.43; −0.22]	[−0.46; −0.23]
HHI Assets	−0.23	−0.24	−0.20
	[−0.35; −0.11]	[−0.34; −0.13]	[−0.31; −0.08]
Revenue	0.31	0.15	0.27
	[0.20; 0.41]	[0.06; 0.25]	[0.16; 0.37]
Assets	0.48	0.43	0.50
	[0.37; 0.59]	[0.33; 0.54]	[0.39; 0.61]
Vert. Int	−0.66		
	[−0.74; −0.57]		
ROE	0.27		
	[0.17; 0.37]		
GDP		−0.05	
		[−0.17; 0.07]	
Tax		−0.23	
		[−0.30; −0.15]	
FDI Stock		0.01	
		[−0.06; 0.08]	
Expr. Risk		−0.25	
		[−0.37; −0.13]	
Num. obs.	6172	6969	6985

Note: The models are analogous to models 1-3 from Table 6.2. All variables are the same as in Table 6.1. The model with the fixed effects for the interactions between industry fixed effects and country fixed effects is not estimated because the glm specification does not converge reliably due to the abundance of fixed effects to estimate.

Table 8.11: Determinants of Tax to Revenue Ratio: Estimates with Fixed Effects

	Model 1	Model 2	Model 3	Model 4
HHI Revenue	0.11		0.10	
	[0.08; 0.14]		[0.07; 0.12]	
HHI Assets		0.08		0.07
		[0.06; 0.11]		[0.05; 0.10]
Controls	✓	✓	✓	✓
Country	✓	✓		
Industry	✓	✓		
Country-Industry			✓	✓
R^2	0.08	0.08	0.27	0.26
Num. obs.	5197	5197	5197	5197

Note: Specifications analogous to 6.3 only with the country, industry, and country-industry fixed effects.

Table 8.12: Estimation with Subsamples: Fixed Effects Estimates

	Model 1	Model 2	Model 3
HHI Revenue	−0.09	−0.08	−0.10
	[−0.11; −0.07]	[−0.10; −0.05]	[−0.12; −0.08]
HHI Assets	−0.03	−0.04	−0.03*
	[−0.05; −0.01]	[−0.06; −0.02]	[−0.05; −0.00]
Revenue	0.07	0.08	0.07*
	[0.06; 0.09]	[0.06; 0.10]	[0.06; 0.09]
Assets	0.04	0.04	0.04
	[0.03; 0.06]	[0.02; 0.06]	[0.03; 0.06]
R^2	0.14	0.15	0.15
Num. obs.	6034	4762	5676

Note: Fixed effects analogs of the estimations in Table 6.6.

Table 8.13: Estimates without ten largest firms

	Model 1	Model 2	Model 3
HHI Revenue	−0.09	−0.33	−0.33
	[−0.11; −0.07]	[−0.45; −0.21]	[−0.45; −0.21]
HHI Assets	−0.03	−0.23	−0.23
	[−0.05; −0.01]	[−0.36; −0.11]	[−0.35; −0.10]
Revenue	0.07	0.31	0.32
	[0.06; 0.09]	[0.20; 0.41]	[0.21; 0.43]
Assets	0.04	0.48	0.48
	[0.03; 0.06]	[0.37; 0.60]	[0.36; 0.60]
Vert. Int.		−0.66*	
		[−0.74; −0.58]	
ROE		0.27	
		[0.17; 0.36]	
Country		✓	✓
Industry			✓

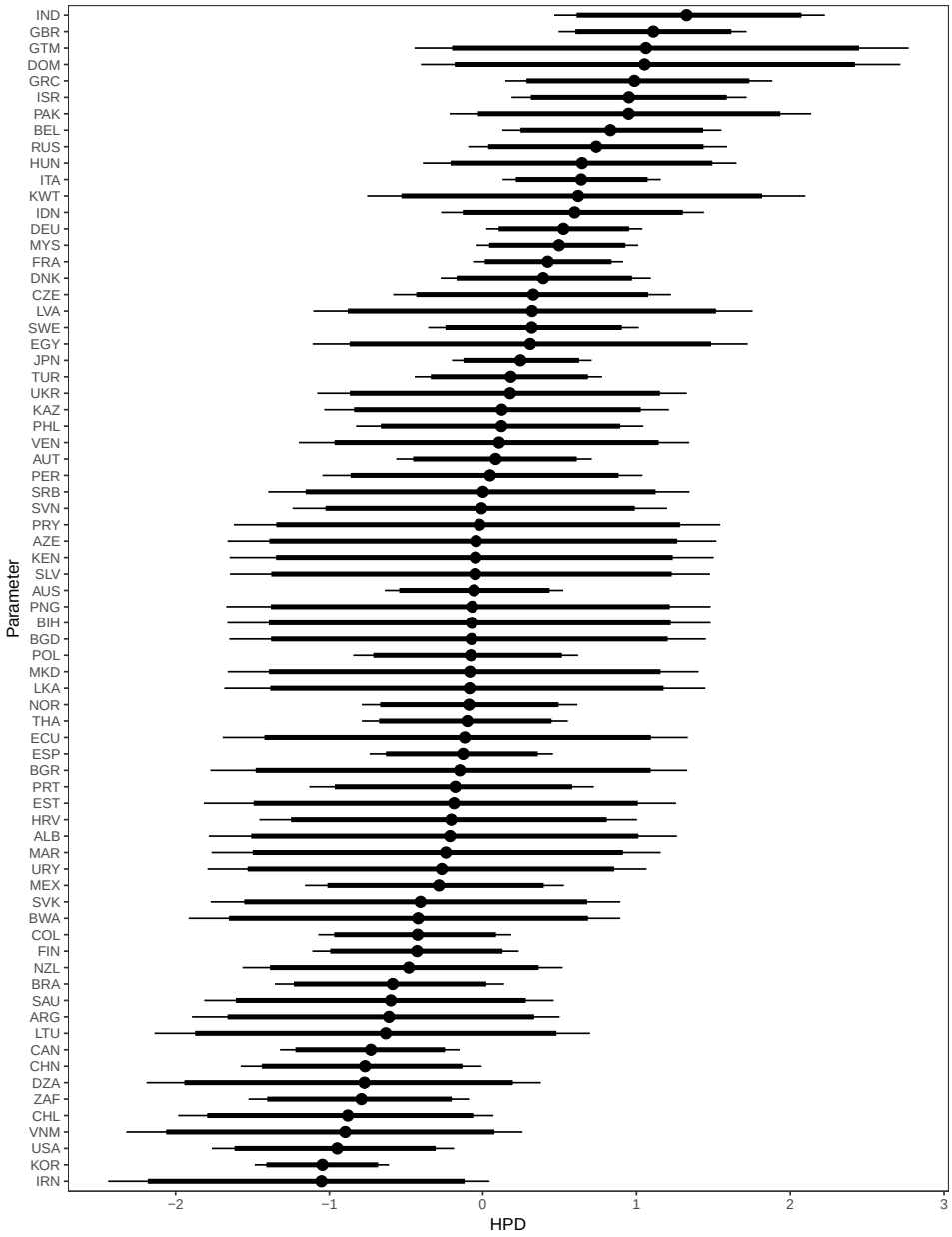
Note: Fixed effects analogs of the estimations in Table 6.6.

Table 8.14: Specifications with Outliers Removed

	Model 1	Model 2	Model 3
HHI Revenue	−0.72	−1.03	−0.81
	[−0.90; −0.53]	[−1.23; −0.84]	[−1.01; −0.60]
HHI Assets	−0.37	−0.23	−0.32
	[−0.56; −0.18]	[−0.42; −0.04]	[−0.52; −0.11]
Revenue	0.19	0.45	0.31*
	[0.07; 0.30]	[0.34; 0.57]	[0.18; 0.43]
Assets	0.50	0.18	0.60*
	[0.38; 0.62]	[0.07; 0.29]	[0.45; 0.74]
Vert. Int.	−0.78		
	[−0.87; −0.69]		
ROE	0.40	−0.09	
	[0.29; 0.50]	[−0.17; −0.01]	
Tax	−0.36		
	[−0.45; −0.26]		
Expr. Risk	−0.38		
	[−0.47; −0.28]		
FDI stock	0.02		
	[−0.06; 0.11]		
Country		✓	✓
Industry			✓
Num. obs.	5861	5861	5861

Note: OLS specifications once the observations with the largest Cook's distances (the most influential observations) has been removed from the sample. To identify the most influential observations, I have fitted Model 1 with the full sample, calculated Cook's distance for every observation, and removed the observations with Cook's distance larger than 4/N, whe N is the number of observations in the full sample. As a result, 4.8 % of the sample has been removed. All the measures are the same as in Table 6.1.

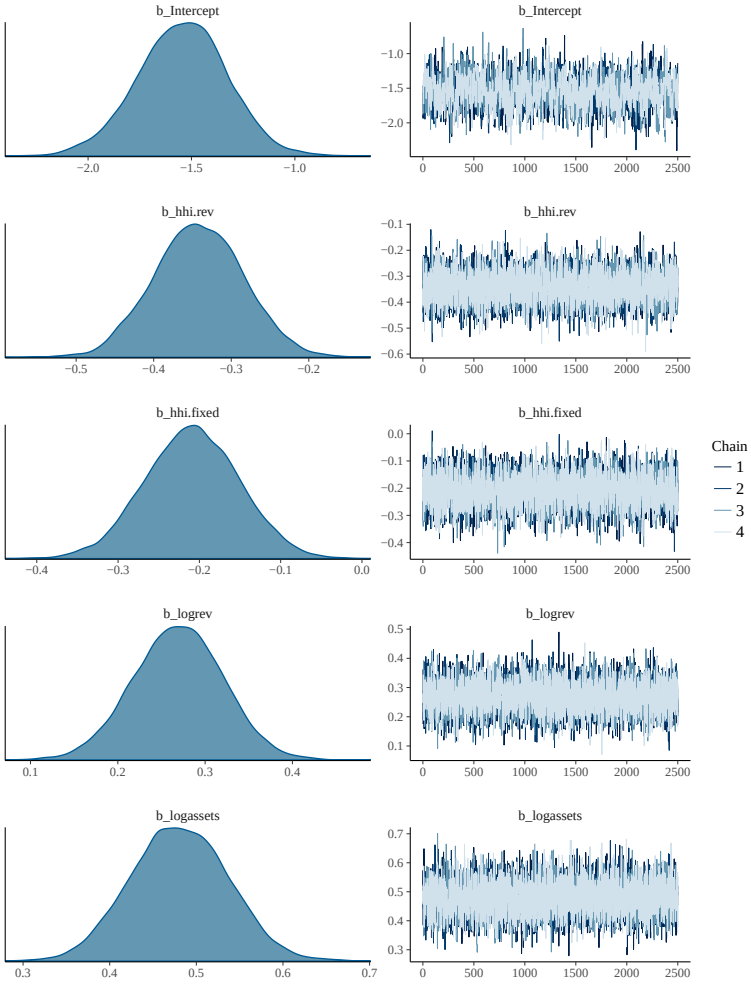
Figure 8.2: Estimates of Country-Level Random Effects for Tax Haven Utilizations



Note: Random effect estimates from Model 4

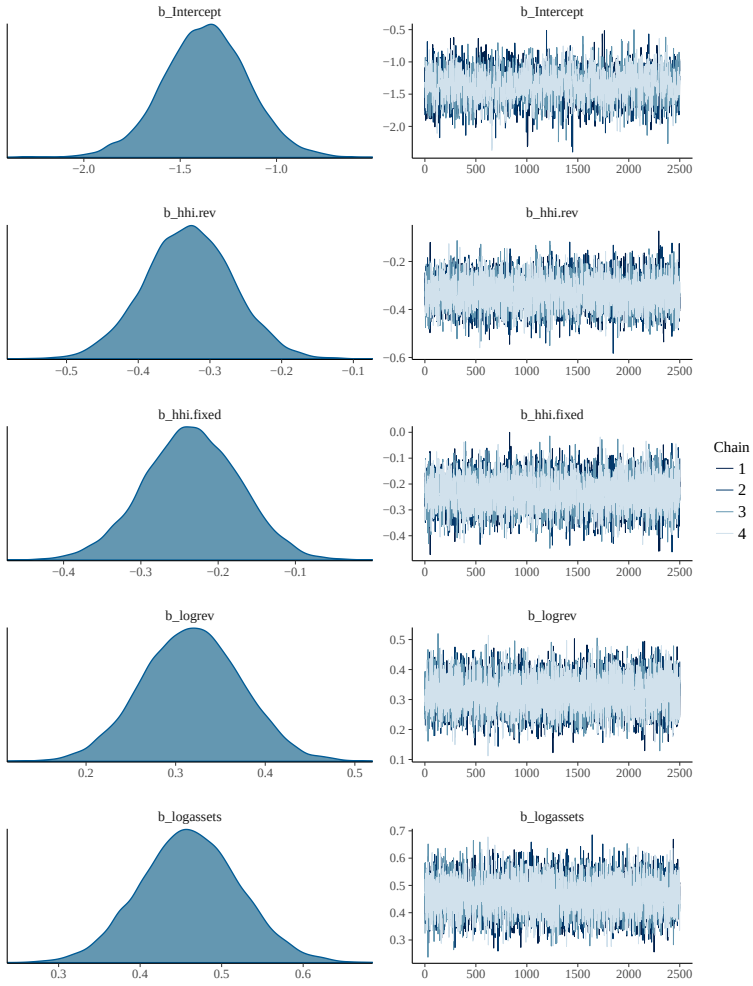
Density Plots and Trace Plots from Table 6.1

Figure 8.3: Density and MCMC Traces for Model 1



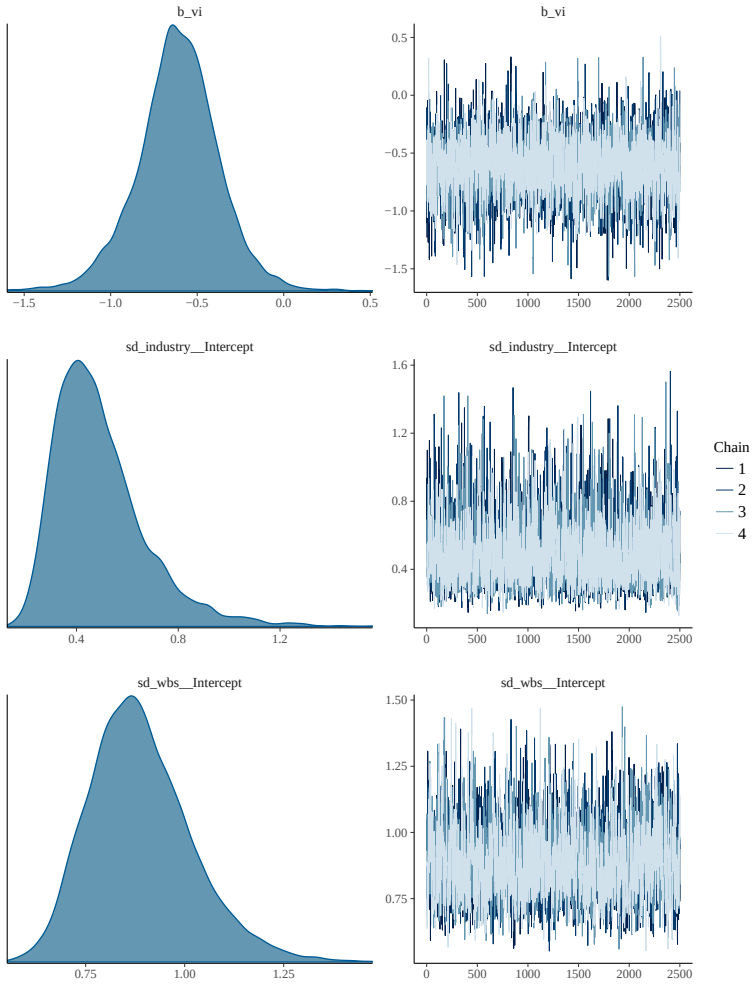
Note: Density plots and MCMC plot from the estimations of Model 1 from Table 6.1. *b_Intercept* is an intercept, *b_hhi.rev* is concentration of revenue, *b_hhi.fixed* is a concentration of fixed assets, *b_logrev* is concentration of log revenue, *b_logassets* is log assets. The source is Orbis and author's calculations.

Figure 8.4: Density and MCMC Traces for Model 2, Part 1



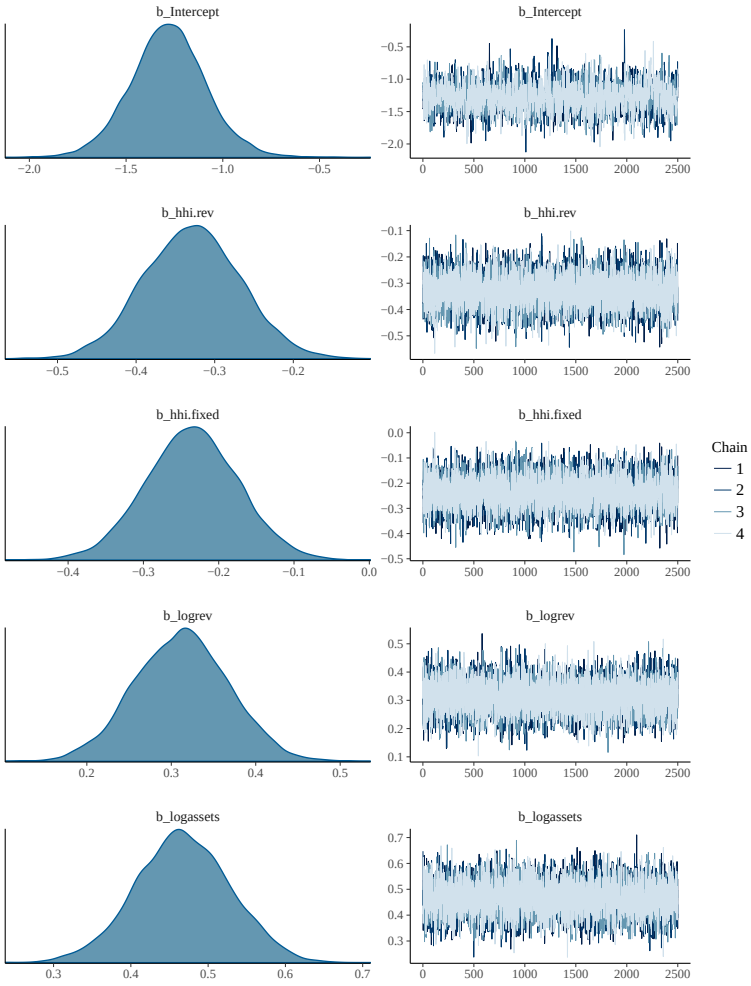
Note: Density plots and MCMC plot from the estimations of Model 2 from Table 6.1. *b_Intercept* is an intercept, *b_hhi.rev* is concentration of revenue, *b_hhi.fixed* is a concentration of fixed assets, *b_logrev* is concentration of log revenue, *b_logassets* is log assets. The source is Orbis and author's calculations

Figure 8.5: Density and MCMC Traces for Model 2, Part 2



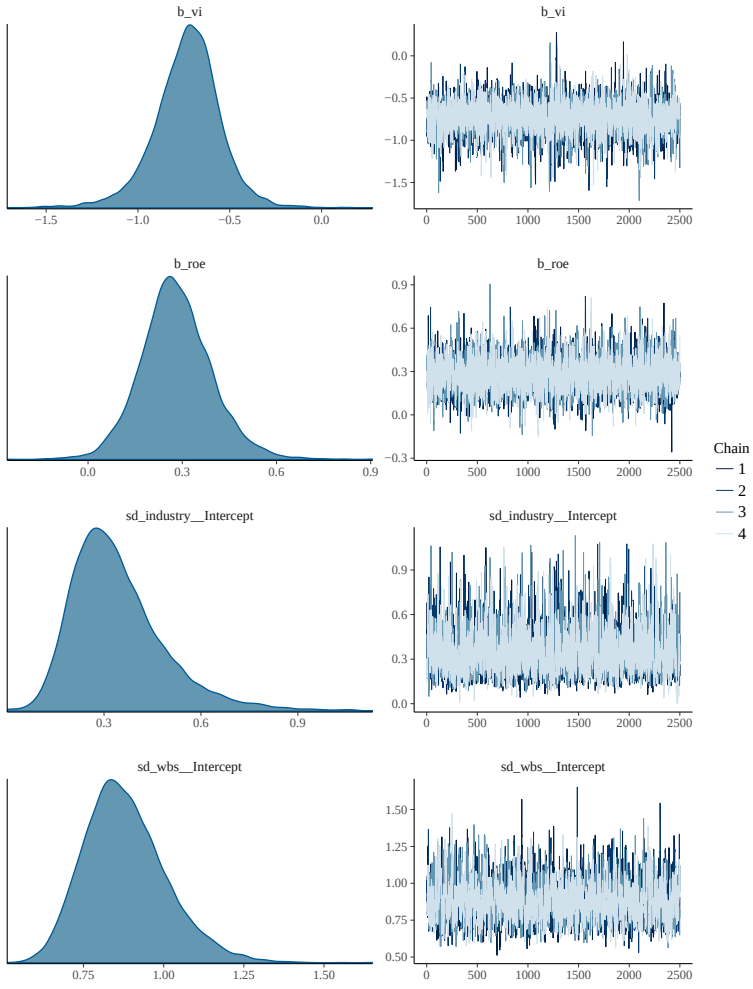
Note: Density plots and MCMC plot from the estimations of Model 2 from Table 6.1. *b_vi* is a coefficient ob vertical integration *sd_industry_intercept* is a standard deviation of industry-level random effects, and *sd_wbs_intercept* is standard deviation of country-level random effects

Figure 8.6: Density and MCMC Traces for Model 3, Part 1



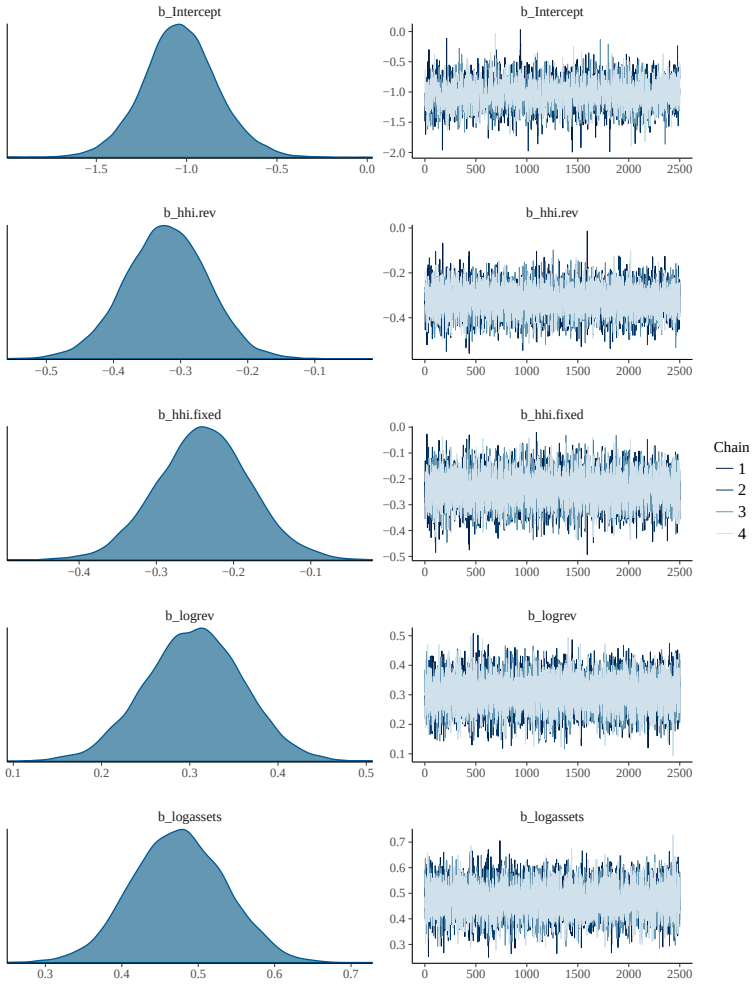
Note: Density plots and MCMC plot from the estimations of Model 3 from Table 6.1. *b_Intercept* is an intercept, *b_hhi.rev* is concentration of revenue, *b_hhi.fixed* is a concentration of fixed assets, *b_logrev* is concentration of log revenue, *b_logassets* is log assets. The source is Orbis and author's calculations

Figure 8.7: Density and MCMC Traces for Model 3, Part 2



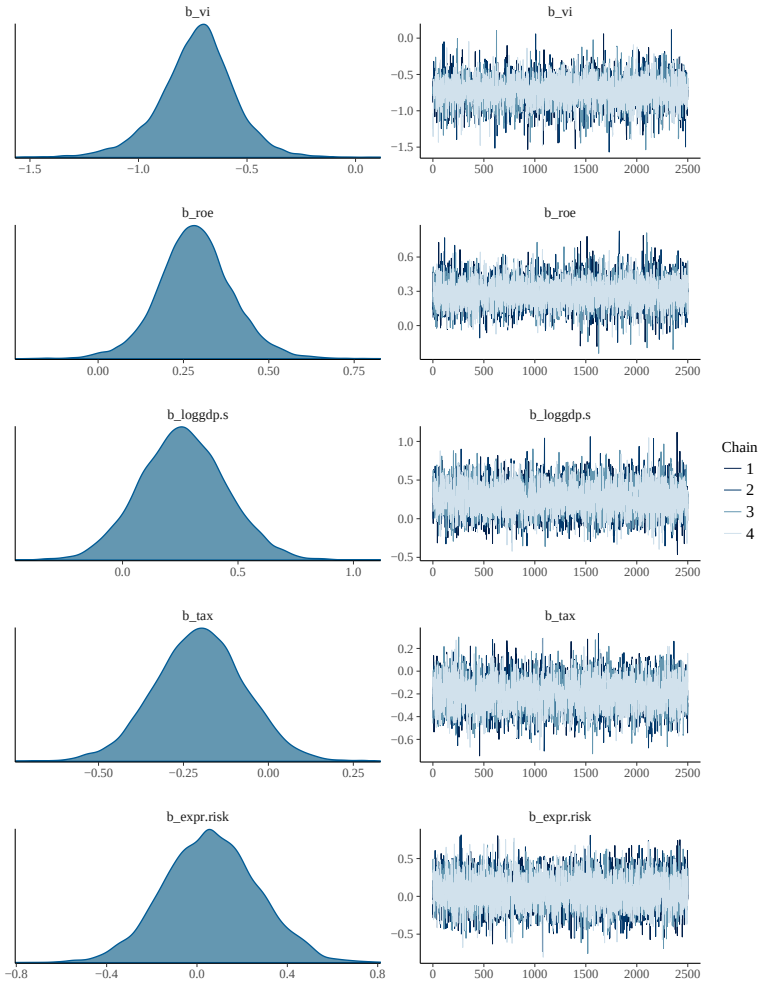
Note: Density plots and MCMC plot from the estimations of Model 3 from Table 6.1. *b_vi* is a coefficient on vertical integration, *b_roe* is a coefficient on sector-level return on equity, *sd_industry_intercept* is a standard deviation of industry-level random effects, and *sd_wbs_intercept* is standard deviation of country-level random effects

Figure 8.8: Density and MCMC Traces for Model 4, Part 1



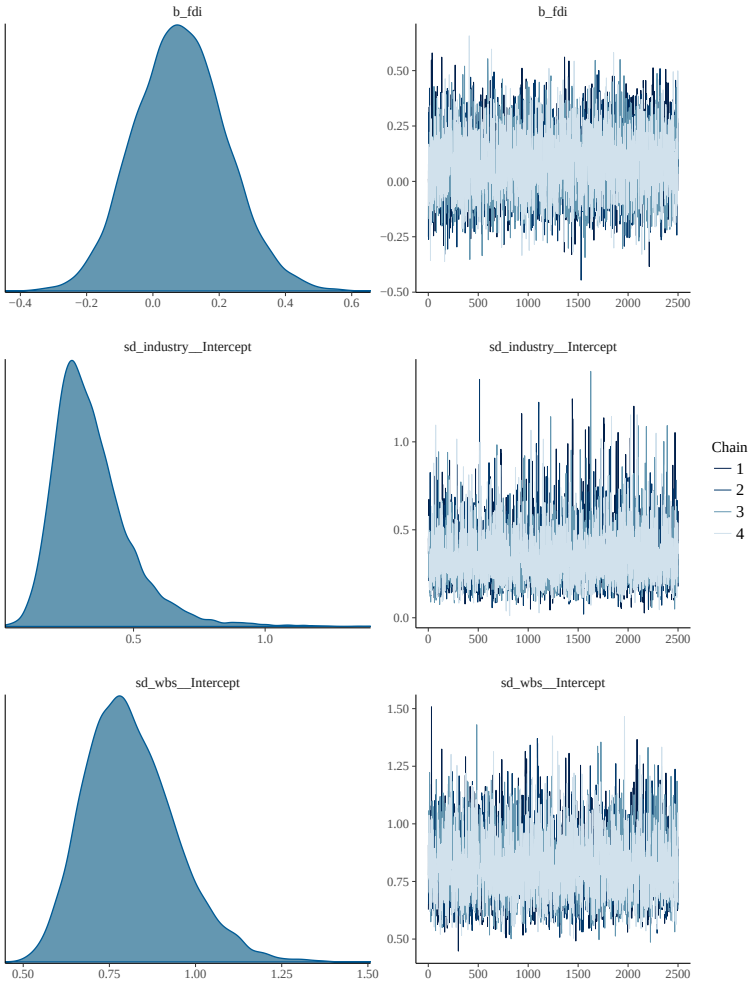
Note: Density plots and MCMC plot from the estimations of Model 4 from Table 6.1. *b_Intercept* is an intercept, *b_hhi.rev* is concentration of revenue, *b_hhi.fixed* is a concentration of fixed assets, *b_logrev* is concentration of log revenue, *b_logassets* is log assets.

Figure 8.9: Density and MCMC Traces for Model 4, Part 2



Note: Density plots and MCMC plot from the estimations of Model 3 from Table 6.1. *b_vi* is a coefficient on vertical integration, *b_roe* is a coefficient on sector-level return on equity, *b_loggdp.s* is a coefficient o log GDP per capita, *b_tax* is a coefficient on corporate tax rate, *b_expr.risk* is a coefficient on expropriation risk.

Figure 8.10: Density and MCMC Traces for Model 4, Part 3



Note: Density plots and MCMC plot from the estimations of Model 4 from Table 6.1. *b_fdi* is a coefficient on FDI stock, *sd_industry_intercept* is a standard deviation of industry-level random effects, and *sd_wbs_intercept* is standard deviation of country-level random effects.

8.5 Convergence Diagnostics

From the practical point of view, for models as simple as a multilevel specification used here (where the posterior distributions are expected to be symmetric and unimodal), one of the best ways to assess convergence is a visual inspection of the plots of posterior densities and MCMC traces. The plots presented do not exhibit any symptoms of non-convergence.

This section presents additional convergence diagnostics. I report $\hat{R}$, (also known as Gelman-Rubin diagnostic, or potential scale reduction factor). It compares the variance across chains. The "rule of thumb" is that $\hat{R} < 1.1$ indicates convergence. For every model, i report the maximum value of $\hat{R}$ across all the sampled parameters(including random intercepts).

Another widely used convergence diagnostic is effective sample size, the estimated number of independent draws from the posterior distribution. The "rule" of thumb is that the ratio of effective sample size to the number of observations less than 0.1 might indicate non-convergence. For every model from Table 6.1, I report the minimal $neff\_ratio$ across all sampled parameters (including random intercepts).

Table 8.15 presents the results. None of the diagnostic indicate non-convergence in any of the models.

Table 8.15: Convergence Diagnostic for Table 6.1

Model	$\hat{r}$	$neff\_ratio$
Model 1	1.003	0.13
Model 2	1.002	0.19
Model 3	1.002	0.15
Model 4	1.001	0.21

Note: Convergence diagnostics are presented for every model from Table 6.1. $\hat{R}$ is maximum value of Gelman-Rubin diagnostic across all sampled coefficients, $neff\_ratio$ is a minimum value of a ratio of effective sample size to the number of observations across all sampled coefficients.

8.6 Procedure for Sensitivity Analysis

This section outlines the procedure for the sensitivity analysis. I perform the following steps.

1. Standardize all the variables, including the outcome.

2. Estimate an OLS regression of indicator of having an affiliate in a tax haven on all the variables from Model 4 in Table 6.1, except for random intercepts. Save the residuals (r_y)

3. Estimate an OLS regression of indicator of log assets on all the variables from Model 4 in Table 6.1, except for random intercepts. Save the residuals (r_x)

4. Regress r_y on r_x. Save R^2. In this procedure, I get an R^2 of 0.007[1].

5. Use the this number as an estimate of both $R^2_{Y\sim Z|X,D}$ and $R^2_{D\sim Z|X}$. For $se(\hat{\alpha})$ use the largest of the standard errors on any of the vulnerability

[1]Please note that because I do not include fixed effects in to the regression to recover partial R^2, the actual value of partial R^2 is likely to be biased upwards. The resulting bound for bias would also be biased upwards because of this reason and because the omission of fixed effects drives up the degrees of freedom

proxies (concentration of assets, concentration of revenues, vertical integration)[2] I use the value 0.022 (the standard error of the coefficient on the concentration of revenue). The value of *df* is 6147.

6. After plugging in the numbers into the Cinelli & Hazlett formula, I get the maximum value of bias 0.011

7. To nullify the results the bias should be at least as large as the value of the coefficient of interest. In the OLS regression with standardized value of the outcome, the estimate of the coefficient on concentration of assets is -0.11, the estimate of the coefficient on the concentration of revenue is -0.15, the coefficient on vertical integration is -.20. Thus the values of the bias needed to nullify the results exceed the estimated bound of the potential bias at least ten times, or if the closest to zero estimate of the bound of confidence interval is considered, at least six times.

[2]Of course, a more accurate way it calculate the bounds for the bias separately for all the coefficient of interest. Here, for simplicity, I implement a more conservative procedure: calculate the maximum possible bound and use it for all the coefficients.

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