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Theft and Taxes

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We thank Mehmet Beceren, Kent McNellie, Bill Simpson, and James Zeitler for their valuable research assistance.

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Theft and Taxes

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Abstract

This paper analyzes the interaction between corporate taxes and corporate governance. We show that the design of the corporate tax system affects the amount of private benefits extracted by company insiders. A higher tax rate increases the amount of income insiders divert and thus worsens governance outcomes. In contrast, stronger tax enforcement reduces diversion and, in so doing, can raise the stock market value of a company, in spite of the increase in the tax burden. We also show that the corporate governance system affects the level of tax revenues and the sensitivity of tax revenues to tax changes. When the corporate governance system is ineffective, a decrease in the tax rate can increase tax revenues. This corporate governance view of taxes provides a novel justification for the existence of a separate corporate tax based on profits. Tests of the corporate governance implications using Russian data provide evidence consistent with model implications. We test the tax implications in a panel of countries. Consistent with the model, we find that corporate tax rate increases have smaller effects on revenues when corporate governance is weaker.

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1. Introduction

The state, thanks to its tax claim on cash flows, is *de facto* the largest minority shareholder in almost all corporations. Yet, the state's actions are not part of the standard analysis of corporate governance, which has typically emphasized legal protections for outside investors (as in La Porta et al. (1998) and Shleifer and Wolfenzon (2002)), the role of boards (e.g., Hermalin and Weisbach (1998)), and the presence of large shareholders (Morck, Shleifer and Vishny (1988)).[1] At the same time, the public finance literature on taxation typically ignores any effects of governance on the functioning of the corporate tax system (see Auerbach (2002) and Hassett and Hubbard (1997)).

In this paper, we provide a simple reason for why the analysis of corporate governance and taxation should be integrated. Most transactions aimed at diverting corporate value toward controlling shareholders also reduce corporate tax liabilities. Similarly, many procedures aimed at enforcing a corporate tax liability make it more difficult for controlling shareholders to divert corporate value to their own advantage. More generally, the level of diversion and the amount of taxes paid are determined in a game that involves three parties – the state, insiders, and outside shareholders. Our claim is that each bilateral interaction has important spillover effects on the third party. How the state designs and enforces taxes influences the relationship between insiders and outside shareholders and the nature of the relationship between insiders and outside shareholders (corporate governance) influences the corporate taxation system.

In a model that adopts this simple insight, we analyze how the corporate tax system affects the level of managerial diversion. A higher tax rate increases the return to stealing by controlling shareholders and worsens governance outcomes. By contrast, increased tax enforcement reduces the amount of private benefits these shareholders can enjoy. Most interestingly, an increase in tax enforcement can increase the amount outside shareholders will receive, even accounting for increased levels of taxation. Accordingly, for a given tax rate, an increase in tax enforcement can increase (rather than decrease) the stock market value of a company.

[1] This absence is even more remarkable, given that corporate taxes are an integral part of the literature on corporate financing and investment decisions (e.g. Graham (2003)).

Much as the structure of taxation affects corporate governance, the model introduced in the paper also demonstrates that corporate governance affects the working of the tax system. When it is difficult to divert income, we derive the standard result of a relatively direct relation between tax rates and tax revenues. By contrast, when the corporate governance system is ineffective (i.e., when it is easy to divert income) an increase in the tax rate can reduce tax revenues while a decrease can increase tax revenues, reflecting a hump-shaped relationship between corporate tax rates and corporate tax revenues implied by the model. This arises for the simple reason that when it is easy to divert income, managers will behave as residual claimants, accentuating their incentive to shelter income to avoid taxation. As a result, the revenue maximizing tax rate is higher in countries with a better corporate governance system.

This *corporate governance view of taxes* provides a novel justification for the existence of a corporate tax. A separate tax on corporate profits generates an incentive for the government to verify income, ameliorating the agency problem between insiders and outside shareholders. This rationale for the corporate tax may also help explain unique features of most corporate income taxes including the tax-deductibility of interest payments, the nature of the corporate tax base and the link between limited numbers of shareholders and exemption from the corporate tax.

We then test the corporate governance and tax policy predictions of our model. The prediction that is easiest to test (i.e., that an increase in tax rates reduces stock prices) is not unique to this approach as the same implication also follows from a traditional view of taxes. By contrast, the predictions that are unique to this approach (the effect of enforcement on stock prices and control premia) require us to measure variables that are difficult to quantify (tax enforcement) or even to observe in a systematic way (control premia). For this reason, we focus on Russia, an environment where both managerial diversion and tax evasion are more macroscopic. The drawback of this choice is that the illiquidity of the Moscow stock exchange limits the number of data points that can be employed.

We study the effect of an increase in tax enforcement following the election of Vladimir Putin on stock prices and the value of control (a proxy for the amount of managerial diversion). As predicted by the model, the stock market values of companies targeted by enforcement

actions increased and the voting premium for these stocks decreased after the increase in tax enforcement. We also document that increased tax enforcement leads to substantial organizational changes in the targeted companies - changes that make managerial diversion more difficult.

To test the tax implications of our model we assemble a panel of countries which differ in the quality of their corporate governance. We test whether the relation between tax rates and tax revenues depends upon the quality of corporate governance by investigating the revenue consequences of corporate tax rate changes from 1979 to 1997. Consistent with the model, we find that increases in corporate tax rates have a lower impact on tax revenues in countries characterized by weaker corporate governance. In particular, the empirical estimates suggest that corporate tax rate increases lead to corporate tax revenue increases only in countries with very strong corporate governance. As outside shareholder protections weaken, we find that rate increases are associated with lower revenue – consistent with the model's implication that rate increases encourage diversion that hide revenue from the tax authorities. Hoping to isolate the impact of the governance environment from other factors that vary across countries, we also include control variables associated with the institutional environment – such as rule of law and measures of tax compliance – and find that these factors do not alter this result. This result does not appear to be driven by the potential endogeneity of the tax rate, because it survives when we instrument for tax rate changes with the ideology of the party in power.

This corporate governance view of taxes has implications for the design of tax systems. It suggests that the fiscal effects of any corporate tax reform cannot be assessed without looking at the pre-existing corporate governance situation. This view also suggests a clear direction for reforms in emerging markets. By lowering the corporate tax rate, governments can improve governance outcomes, with particular gains where governance is weak to begin with. An increase in tax enforcement can provide payoffs to both governments and outside shareholders, as it generates greater revenue and higher outside share values.

Our paper explores only one dimension of the interaction between corporate governance and taxation. Other papers suggest additional costs and benefits of taxes on governance outcomes. Arlen and Weiss (1995) emphasize how taxes, by favoring income retention, can

exacerbate the agency problem between managers and shareholders. Roe (1991) claims that in the United States, taxes penalize ownership structures that facilitate monitoring. Morck (2003), in contrast, suggests a possible benefit of the double taxation of dividends in reducing the use of pyramidal ownership structures and Desai and Dharmapala (forthcoming) consider how ownership by managers influences tax sheltering decisions in the U.S. setting.

The rest of the paper proceeds as follows. Section 2 presents a model of the relationship between the tax system and corporate governance that generates several predictions on how corporate taxation affects corporate governance and how corporate governance affects corporate taxation. Section 3 analyzes the normative predictions of this approach and Section 4 elaborates on this new rationale for the existence of a separate corporate tax. Section 5 tests the corporate governance implications of tax enforcement changes using recent changes in Russia, while Section 6 tests the effects of corporate governance on the impact of corporate tax changes in a panel of countries. Section 7 concludes.

2. A Simple Model of Tax Evasion and Managerial Diversion

To examine the relationship between corporate governance and corporate taxes we begin with a relatively standard model of governance and then superimpose a standard corporate income tax on it and study the implications. Unlike Chen and Chu (2003) and Crocker and Slemrod (2003), our focus here is not on tax sheltering, but on diversion.

2.1. The optimal level of diversion

Let $d \in [0,1]$ be the proportion of income that insiders divert. If insiders own a fraction λ of the company, then, in the absence of any corporate income tax, the payoff to insiders is

$$\lambda(1-d)+d$$

Diverting, however, is costly because insiders can be caught and pay a penalty. We model this cost with the following quadratic function:

$$C(d)=\frac{\gamma}{2}d^2$$

where γ is a parameter that captures the quality of the corporate governance system with a higher γ indicating a better governance system. Hence, in the absence of taxes, the optimal amount of diversion is

(1) $$d^* = \min(\frac{1-\lambda}{\gamma}, 1).$$

2.2. The effect of a corporate income tax

We now superimpose a corporate tax in this simple model. Most corporate tax systems can be characterized by two parameters – the tax rate and the level of enforcement. On the one hand, the presence of a positive tax rate makes diversion more likely, as it increases the opportunity cost of diverting income (insiders will receive a reduced fraction of the money they do not divert, because the government is getting a fraction of it). On the other hand, the existence of a corporate tax introduces an additional monitor (the tax authority) that increases the probability that diversion will be detected and, hence, increases the expected cost of diversion.

In principle, the monitoring provided by the tax authority and the expected costs of being caught for tax avoidance may be very different from the one provided by the system of corporate governance. We will discuss these differences in section 4.2. To begin, however, we assume that the likelihood of being caught for tax evasion through diversion increases with the amount that is diverted. To capture this, we assume that the expected cost of evading taxes for managers has the same functional form as the corporate governance cost. In addition to being plausible, this assumption does not bias the model in favor of traditional governance mechanisms or the tax system:

$$C(d) = \frac{\alpha d^2}{2}$$

Notice that this is not the total cost imposed on the company but only the personal cost insiders face if they are caught diverting. The reason why we ignore any financial penalty for the firm is that it will be borne *pro rata* by insiders and outsiders and hence it will not generate any conflict of interest between the two. Since enforcement functions are critical to understanding the

behavioral response to changes in the tax rates (see, in particular, Slemrod and Yitzakhi (2002)), we explore the robustness of our results to a different specification of the enforcement cost in Appendix A.

In the presence of corporate taxation, the total payoff to insiders simplifies to

$$\lambda(1-d)(1-t)+d-\frac{\alpha+\gamma}{2}d^2.$$

Hence, the optimal amount of diversion is

(2) $$d^{**}=\min(\frac{1-\lambda(1-t)}{\alpha+\gamma},1).$$

Comparing the optimal amount of diversion with and without taxation yields the following:

Result 1: Ceteris paribus, countries with a higher tax rate will have higher levels of diversion. This effect is stronger where tax enforcement is weaker.

Proof: $\frac{\partial d}{\partial t}=\frac{\lambda}{\alpha+\gamma}>0; \frac{\partial^2 d}{\partial t\partial\alpha}=-\frac{\lambda}{(\alpha+\gamma)^2}<0.$

In our framework this is an obvious point, but it suggests an important channel through which the tax system can worsen governance outcomes. Higher tax rates lead to worse corporate governance outcomes because they increase the return from diverting.

Result 1 looks at the effect of a higher tax rate, keeping all other dimensions constant. But this is not the right comparative static if we want to study the effects of the introduction of a corporate income tax. A corporate income tax not only introduces a positive *t*, but also additional enforcement through the variable α. Hence, we have

Corollary 1: The introduction of a corporate tax improves corporate governance (i.e., reduces the amount of diversion) if and only if the level of tax enforcement exceeds a critical level defined as follows

$$\alpha > \frac{\lambda\gamma t}{(1-\lambda)}.$$

Proof: It follows by comparing (2) with (1).

The effect of the introduction of a corporate tax system on diversion is twofold. The fact that the government takes a fraction of profits increases the incentive to divert, while the additional monitoring provided by the tax authorities reduces it. The overall effect depends on the relative strength of the two forces.

Corollary 2: For a given monitoring ability of the tax authorities (α), the introduction of a corporate tax is more likely to reduce diversion (and improve corporate governance) when

i) The corporate governance system is weaker (lower γ);
ii) Ownership is less concentrated (lower λ);
iii) The tax rate is lower.

While obvious, this corollary has important implications. Countries with a poor record of tax enforcement cannot introduce steep corporate tax rates without causing a worsening of the amount of diversion, with the well-know effect on the functioning of capital markets (e.g., La Porta et al, (1997) and Dyck and Zingales (2004)).

Having analyzed how different characteristics of the tax system affect the optimal amount of diversion, we can derive how taxes influence the market value of a company.

Result 2: The market value of a company increases with tax enforcement and decreases with the tax rate.

Proof: The market value is driven by the value minority shareholders can capture, which in turn is given by $V^m = (1-d)(1-t)$. Since $\frac{\partial V^m}{\partial d^{**}} < 0$ and $\frac{\partial d^{**}}{\partial \alpha} = -\frac{1-\lambda(1-t)}{(\alpha+\gamma)^2} < 0$, then $\frac{dV^m}{d\alpha} > 0$. Since $\frac{\partial V^m}{\partial t} < 0$ and $\frac{\partial V^m}{\partial d} < 0$ and $\frac{\partial d^{**}}{\partial t} = \frac{\lambda}{(\alpha+\gamma)} > 0$, then $\frac{dV^m}{dt} < 0.$

An increase in the tax rate has two negative effects on minority shareholders. The direct effect is that the state takes a larger fraction of profits, reducing the value left to minority shareholders. This is the standard effect present in the traditional view of taxes. The indirect effect is that a

higher tax rate induces more diversion, reducing the value of claims held by minority shareholders. This is an additional cost we introduce by adopting a corporate governance view of taxes. Since both effects go in the same direction, the result is unambiguous.

The *corporate governance view of taxes* (CGVT) also allows us to study the effect of a change in enforcement on diversion and equity prices. In principle, the effect of enforcement is ambiguous: greater enforcement leads to more taxes paid but also less diversion. Which effect dominates? In the model presented here, the effect is unambiguously positive, because the state gets only a fraction of the income, while insiders, when they divert, get 100%.[2] More generally, the result holds as long as, on the margin, the fraction of pretax income appropriated by the state is less than the fraction appropriated by insiders.

For our empirical analysis, it is also useful to derive the following two corollaries:

Corollary 3: Following an increase in enforcement, companies that were previously diverting more will experience a larger increase in price.

Proof:

$$\frac{\frac{dV^m}{d\alpha}}{V^m} = \frac{(1-t)\frac{1-\lambda(1-t)}{(\alpha+\gamma)^2}}{(1-t)(1-\frac{1-\lambda(1-t)}{\alpha+\gamma})} > 0 .$$

Following Dyck and Zingales (2004), let us define the control premium (CP) as the difference between the per share payoff controlling shareholders receive and that outside shareholders receive, normalized by the total value of the company computed at the price of non-controlling shares:

$$CP = \frac{\lambda[\frac{V^i}{\lambda} - \frac{V^m}{1-\lambda}]}{\frac{V^m}{1-\lambda}} = (1-\lambda)\frac{V^i}{V^m} - \lambda .$$

[2] Another way to view this problem, elaborated in a previous version of this paper, is to consider sheltering and diversion decision separately, with income sheltered from tax authorities split between insiders and outside shareholders. This modification leads to similar results so long as the fraction of income diverted by insiders exceeds the tax rate. Only when the fraction of income appropriated by the tax authorities exceeds that diverted by insiders does this result get overturned.

Accordingly, we have

Corollary 4: The value of control decreases with tax enforcement.

Proof: $\frac{\partial CP}{\partial \alpha} = \frac{(1-\lambda)}{(V^m)^2}[\frac{dV^i}{d\alpha}V^m - V^i\frac{dV^m}{d\alpha}]$. By using the envelope theorem $\frac{dV^i}{d\alpha} = \frac{\partial V^i}{\partial d}\frac{\partial d}{\partial \alpha} = 0$.

Since by Result 2 $\frac{dV^m}{d\alpha} = \frac{\partial V^m}{\partial d}\frac{\partial d}{\partial \alpha} > 0$, the result follows.

Since tax enforcement reduces the amount of income diverted, this reduces the value of control and increase the value of minority shareholders. Hence, the control premium should decline. Below we focus on this empirical prediction associated with changes in enforcement because this prediction is unique to the governance view of taxes. We do not focus on the prediction of the relationship between tax rates and the value of claims held by minority shareholder since both the traditional view of taxes and the governance view of taxes generate the same implication.

2.3. The effect of the corporate governance environment on the tax system

While the previous section considered the effect of a tax system on corporate governance outcomes, we now turn to the effect of the corporate governance environment on the functioning of the tax system.

First, our simple model produces a hump-shaped relation between corporate tax revenues and corporate tax rates.

Result 3: If $0 < \frac{\alpha+\gamma+\lambda-1}{2\lambda} < 1$, then corporate tax revenues as a function of corporate tax rates are hump-shaped.

Proof: Corporate tax revenues (CTR) are given by $t(1-d) = t - t[\frac{1-\lambda(1-t)}{\alpha+\gamma}]$. Differentiating this with respect to *t* we obtain $\frac{\partial CTR}{\partial t} = 1 - \frac{1-\lambda+2\lambda t}{\alpha+\gamma}$, which reaches an interior optimum for $t \in [0,1]$ if $\frac{\alpha+\gamma+\lambda-1}{2\lambda} < 1$.

The intuition for this result is straightforward. An increase in corporate tax rates increases the amount of diversion, which in turn reduces taxable income. The net effect can be a decline in tax revenues. The intensity of this behavioral response is driven by the size of the expected cost of diversion ($\alpha + \gamma$). It is also driven by the extent of ownership concentration (λ), which makes insiders internalize the benefits of diversion more. If the expected cost of diversion or the level of insider ownership is not sufficiently high, then the behavioral response to increases in the tax rates is sufficiently strong that these increases in rates will not yield additional revenues.

The most interesting aspect of the corporate governance view of taxes, however, is not the existence of a range of parameter values where corporate tax revenues decline with tax rate increases, but a link between the shape of this relationship and two keys indicators of a corporate governance system: the quality of the corporate governance system, γ , and the level of ownership concentration, λ.

Corollary 5: The sensitivity of tax revenues to tax rate changes increases with the quality of the corporate governance system γ.

Proof: $\frac{d^2CTR}{dtd\gamma} = \frac{1-\lambda+2\lambda t}{(\alpha+\gamma)^2} > 0.$

Corollary 5 states that better corporate governance increases the sensitivity of tax revenues to tax changes. In fact, better corporate governance reduces both the equilibrium amount of diversion and the sensitivity of diversion to changes in the tax rate. If higher tax rates lead to less diversion because of the quality of the corporate governance system, then an increase in tax rates will lead to greater revenues.

A similar effect holds for ownership concentration.

Corollary 6: The sensitivity of tax revenues to tax rate changes increases with ownership for tax rates below 50%. For tax rates above that, it decreases with ownership.

Proof: $\frac{d^2CTR}{dtd\lambda} = -\frac{2t-1}{\alpha+\gamma} > 0 \text{ if } t < 0.5.$

2.4. Robustness and limitations of the model

The model presented above abstracts from a number of considerations. First, it assumes that outsiders have no negotiating power in setting the level of diversion. This is clearly an extreme assumption: outsiders may have some ability to restrain insiders even if they face significant costs of coordinating their actions. Introducing this possibility, however, does not substantially change the model. In fact, the power of outside shareholders can be subsumed in our framework through a company-specific γ. Where outsiders have more power, γ will be higher, and insiders will divert less.

Second, the state impacts the interaction between corporate insiders and outsiders only through taxes in our model. In reality, there are many other channels. The threat of nationalization (or renationalization, as in the Russian case), for instance, is another important channel. Many of these interventions, however, can be easily introduced in the model. The threat of nationalization, for instance, is analogous to a higher expected tax rate and, as such, will induce insiders to divert more.

Third, our model does not consider the full contracting space. It is essentially a game involving three parties – the state, the insiders, and the outside shareholders – where we emphasize how some bilateral interactions (corporate governance and corporate taxation) have spillovers on the third party. Yet, we do not consider the possibility of side deals. For example, we have not allowed insiders and outsider to coordinate their actions to reduce the corporate tax liability. Similarly, we have not allowed for insiders and the state to coordinate their actions at the expense of outside shareholders.

There is a simple rationale for not allowing insiders and outsiders to coordinate to evade taxes: there are significant transaction costs for outside shareholders to arrive at any decision, and even greater costs to coordinate with insiders. In fact, these added transaction costs are a primary difference between publicly traded companies and privately held ones. In privately held companies, it is much easier for shareholders to reach an agreement to minimize their collective tax liability through mechanisms such as charging fictitious expenses. Shareholders, then, redistribute their tax savings among themselves with side contracts. Of course, this possibility is considerably more complicated when there are widely-dispersed shareholders.

Collusion is considerably more likely between the state and insiders. The state, for example, can demand higher payments from insiders (e.g. bribes) in exchange for overlooking diversion from outside shareholders. While this might seem a remote possibility in the United States, it is not inconceivable in a variety of countries, including Russia. Such a strategy, however, has two limits. First, nothing guarantees that insiders, after bribing the tax authority to avoid taxes, will not be subject to additional requests for bribes. The advantage of taxes is that the state can more credibly commit not to harass a company repeatedly. Second, the state faces an agency problem in its collection of taxes. If it accepts bribes instead of official tax payments, it may find it difficult to limit the skimming of proceeds by its delegated agents. Hence, collusion between the state and insiders at the expenses of outsiders has its own disadvantages and our model is more relevant where these disadvantages are sizable.

Finally, the model assumes a very specific functional form for enforcement costs. A more standard specification in the literature on personal taxation (e.g. Slemrod and Yitzakhi (2002)) would have the expected cost of diversion be a function of the amount of taxes evaded, rather than the income that is diverted. This functional relation could arise because the level of enforcement depends upon the lost tax revenues or because the financial penalties imposed on insiders are proportional to the taxes evaded. In the appendix, we repeat our analysis with this alternative enforcement function. Our main results - that the introduction of the tax system can lower diversion, that diversion rises with the tax rate and declines with enforcement, and that the relationship between tax rates and revenues can be hump-shaped – continue to hold for a range of parameter values, and most notably when the exogenous parameter for tax enforcement is not too high. This finding implies that our model's results are more likely to apply to developing countries, where, *ceteris paribus*, tax enforcement is weaker.

3. Optimal Tax Rates

Within this corporate governance view of taxes, what is the optimal tax rate? To do this, we need to specify the governments' objective function. We consider three alternatives: First, we consider a benevolent social planner interested in tax revenues and governance; second, in addition we allow the social planner to consider costs of enforcement; third, we consider a social planner completely captured by insiders - as in Stigler (1971) and Rajan and Zingales (2003).

3.1. The benevolent social planner interested in tax revenues and governance

The optimal tax rate in this framework obviously depends upon the government's objective function. In general, we can assume that the government cares about both revenues and diversion. While diversion has no efficiency costs in this model (because it is mere redistribution from the shareholders to insiders), there are at least two reasons why the government may want to limit diversion. First, as shown both theoretically (e.g., Zingales 1995a) and empirically (Dyck and Zingales, 2004), higher diversion hampers the ability to raise external funds and, thus, the development of the equity market. A government that cares about this objective will put some negative weight on diversion. Second, in reality many of the tactics used to divert income generate large deadweight costs.

Hence, it is reasonable to assume that the government's objective function should weight both tax revenues and diversion. We model this as

$$t(1-d)-\psi d \ ,$$

where ψ is the weight attributed to the goal of reducing diversion relative to the goal of raising revenues.

Result 4: If $0<\frac{\alpha+\gamma+\lambda-1}{2\lambda}<1$, then the optimal tax rate is $t=\max(\frac{\alpha+\gamma+\lambda-1}{2\lambda}-\frac{\psi}{2},0)$, which is increasing in

i) the quality of the corporate governance system (γ),
ii) the quality of the additional monitoring provided by the tax authorities (α), and
iii) the level of insiders' ownership (λ) if $\alpha+\gamma<1$.

By contrast, the optimal tax rate is decreasing in

i) the social weight puts on diversion (ψ), and
ii) the level of insiders' ownership (λ) if $\alpha+\gamma>1$.

Proof: Differentiating with respect to *t* we obtain the optimal tax rate. From this, the comparative statics with respect to the various parameters follows directly.

Result 4 implies that countries should pay attention to their corporate governance environment and the prevailing level of insider ownership in setting tax rates. Concerns about diversion lead to lower tax rates even when governments place a high value on those revenues. Countries with better corporate governance can afford to have higher corporate tax rates, as the negative effect of corporate taxes on diversion is reduced. The same is true for insider ownership if $\alpha + \gamma < 1$. When $\alpha + \gamma < 1$, the expected cost of being caught alone cannot deter insiders from diverting. In this case, if insider ownership is zero, the optimal amount of diversion is 1. Hence, higher levels of insider ownership decrease the level of diversion and allow for a higher tax rate.

3.2. The benevolent social planner who in addition is concerned with costs of enforcement

Under many circumstances, it is reasonable to consider, as we have just done, that the government sets only the level of the corporate tax rate. Other times, however, the government might consider a more systemic tax reform, which involves a simultaneous decision on tax rates and the level of enforcement. Interestingly, this does not change the relation between the optimal tax rate and the quality of corporate governance and tax enforcement.

Suppose the government simultaneously sets the tax rate and the quality of the tax enforcement (or, analogously, the tax rate and the quality of the corporate governance system).[3] Of course, we have to introduce a cost of the government of improving tax (or corporate governance) enforcement. For simplicity, we assume this cost to be quadratic:

$$C(\alpha) = \frac{\mu}{2}\alpha^2,$$

where μ is a parameter affecting the cost of better enforcement. For example, in the La Porta et al (1999) framework, civil law countries have higher costs to introduce better enforcement, i.e., higher μ. Then, the government objective function becomes

$$Max_{t,\alpha} t(1-d^{**}) - \psi d^{**} - \frac{\mu}{2}\alpha^2,$$

[3] Since the quality of the corporate governance system (γ) and the intensity of the additional monitoring provided by the tax authorities (α) enter in the same way, the comparative statics with respect to one is identical to the comparative static with respect to the other. For space consideration, we report only the one with respect to α.

where d^{**} is the optimal level of diversion set by insiders as in equation (2).

Result 5: Both the optimal level of monitoring and the optimal tax rate decreases with the costs of better enforcement μ.

Proof: See Appendix B.

The first part of the result is obvious: in countries where increasing enforcement is more costly to the government budget, the government will do less of it. The second part is also quite intuitive: when it is more costly to increase enforcement, the negative effects of a higher tax rate will be stronger and the government will choose a lower tax rate.

Thus, when we endogenize the choice of the level of monitoring provided by the tax authority (or the level of corporate governance), we obtain the same prediction as before: a benevolent social planner will set a higher tax rate in countries with better tax enforcement (and/or better corporate governance).

3.3. A social planner completely captured by insiders

The results presented above are derived under the assumption that governments are run by benevolent dictators that maximize social welfare. Government actions may well be driven by political goals and shaped by influential constituencies. To explore the setting of the optimal tax rate when – as it is likely - corporate insiders have a disproportionate power in setting tax rates, we assume that they will set *t* to maximize the value of their stake, subject to satisfying a revenue constraint. Formally, they will maximize

$$\lambda(1-d^{**})(1-t)+d^{**}-\frac{\alpha+\gamma}{2}d^{**2}$$

with respect to *t,* subject to a minimum tax revenue constraint *(K)*:

$$t(1-d^{**}) \geq K,$$

where d^{**} is the optimal level of diversion set by insiders as in equation (2).

Since the corporate insiders objective function is decreasing in *t* and convex, it will be maximized at the minimum level of *t* that satisfies the tax revenue constraint. Hence, we can obtain the relation between optimal tax rates and corporate governance by using the implicit function theorem on the budget constraint. Hence, we have

Result 6: If $t < \frac{\alpha + \gamma + \lambda - 1}{2\lambda}$, then the optimal tax rate is decreasing in the level of corporate governance.

Proof: $\frac{dt}{d\gamma} = -\frac{t(1-\lambda(1-t))/(\alpha+\gamma)^2}{1-\frac{1-\lambda(1-t)}{\alpha+\gamma}-t\frac{\lambda}{\alpha+\gamma}}$, which is negative if the denominator is negative. This condition is satisfied for $t < \frac{\alpha + \gamma + \lambda - 1}{2\lambda}$.

When the goal is only to produce a minimum level of tax revenues, a decrease in the quality of the corporate governance has to be matched by an increase in the tax rate to meet the revenue target. Hence, the model predicts that when insiders dominate the state countries where corporate governance and tax enforcement are weak, as is the case with many civil law countries, tax rates will be higher.

4. A Rationale for Corporate Taxes?

A fundamental question we have not addressed thus far is whether corporate governance alone can justify the very existence of a separate tax on corporate income. To study whether this is possible, we dispense totally with concerns about tax revenue.

At the very least, the governance effects can help explain the *introduction* of corporate taxation in the United States. In 1909, when a corporate tax was first introduced in the United States, President Taft supported its introduction by saying:

> *Another merit of this tax [the federal corporate excise tax] is the federal supervision which must be exercised in order to make the law effective over the annual accounts and business transactions of all corporations. While the faculty of assuming a corporate form has been of the utmost utility in the business world, it is also true that substantially all of the abuses and all of the evils which have aroused the public to the necessity of reform*

> *were made possible by the use of this very faculty. If now, by a perfectly legitimate and effective system of taxation, we are incidentally able to possess the Government and the stockholders and the public of the knowledge of the real business transactions and the gains and profits of every corporation in the country, we have made a long step toward that supervisory control of corporations which may prevent a further abuse of power.*[4]

This was not just wishful thinking. The introduction of this tax increased the publicly available information on corporate profitability (at the time, corporate tax filings were public records) and increased the reliability of all the information provided as tax returns were audited. In fact, the tax generated a need for a standard definition of income and other accounting variables, prompting the development of uniform accounting standards, introduced in 1917. Hence, the introduction of a corporate income tax improved corporate governance.[5]

4.1. When do tax enforcers have a comparative advantage?

That corporate governance considerations might have driven the *introduction* of a corporate taxation system does not necessarily imply that governance considerations justify the *existence* of corporate taxation today. Under what conditions would tax enforcers, such as the IRS, be more effective at monitoring corporate insiders relative to other Government agencies specifically designed for this purpose, such as the Securities and Exchange Commission?

One circumstance that would lead to a comparative advantage, which applies mostly to developing countries, is economies of scope. Every country has a government agency specialized in collecting revenues. It is much easier, faster, and more effective to extend the tasks of these experts, than to create another *ad hoc* agency. For example, in Russia, when the local securities and exchange commission wanted to improve enforcement, they asked the tax police for assistance as they were the only ones with the appropriate expertise.[6] In the United States in

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[4] William H. Taft, President of the United States, June 16, 1909, "Defense of introduction of the first US federal corporate excise tax".

[5] David Hawkins (1963, p. 153), after analyzing the period had this to say, "The introduction of corporate income taxes not only spurred businessmen to keep better accounting records and take a more active interest in financial accounting, but also led directly to the adoption of certain valuation practices for corporate accounting. For instance, the acceptance of the "last in first out" method of valuing inventory for tax purposes resulted directly in its widespread adoption in industrial financial reports." All of this took place against the backdrop of an absence of national securities regulation and weak and unreliable enforcement of listing standards in the nation's stock exchanges.

6 "For a long time, FSC [Federal Securities Commission] has been planning to apply to the law enforcement structures for more efficient control over the stock market: this idea was in the plans of the first chair of FSC, Dmitri Vasilyev. This wish is quite

1909, this extension of the tax authorities scope to corporate returns was apparently well within their existing capabilities.[7]

This explanation may be less compelling for a country like the United States today, where an agency solely dedicated to the enforcement of security laws has been in place for the last seventy years. In such cases, the more compelling argument in favor of the comparative advantage of tax authorities is the distinctive revenue implications of actions by the IRS versus the SEC. The IRS enjoys more political clout (and a better budget) because it generates more revenues for the Government, while the SEC relies on annual appropriations unrelated to its enforcement actions.[8] Even if the SEC generates revenues through its enforcement actions, there remains a fundamental difference. By increasing enforcement, the IRS increases revenues not only from the company investigated, but also from all other companies, which are not investigated but improve their compliance out of fear. By contrast, by increasing enforcement, the SEC raises revenues only from the company investigated, while losing them from other companies, which would be more compliant and hence pay fewer fines.

Finally, the existence of two independent sources of enforcement increases the probability that diversion is caught. Revealed preference suggests that even in the United States this additional monitoring has some bite. For example, Erickson, Hanlon, and Maydew (2004) show that managers were willing to pay taxes on false earnings in order to ensure that the IRS did not detect their fraudulent activities.

4.2. Optimal tax rates with endogenous enforcement

That tax enforcement agencies might have a comparative advantage in monitoring corporate insiders only implies that a corporate tax system might have a positive spillover on corporate governance. Is it possible to justify the existence of a corporate tax *solely* on corporate

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understandable: until recently, FSC could do nothing but lodged complains to the prosecutor's office and imposed symbolic fines on violators". *Banking and Exchanges Weekly*, Oct 25, 2000.

[7] The Commissioner for Internal Revenue (1910), for example, testified in his annual report to congress in 1910 that "the tax has been collected with as little difficulty and friction as has been occasioned by the collection of any internal revenue tax." Consistent with this he reported that the tax which brought in $27 million in its first year required only a small appropriation in that year and only $125,000 in incremental cost for the upcoming year.

[8] The lack of relation between SEC-related revenues and budget was seen dramatically in 1995 where despite being a strong revenue generator - collecting $588 million in fees, and driving defendants to make payments of $730 million to the treasury, with costs of just $266 million – the SEC was under severe pressure to have its budget frozen or reduced. See Roger Lowenstein, "House Aims to Fix Securities Laws, But, Indeed, Is the System Broke?" *Wall Street Journal,* August 10, 1995, p. C1.

governance considerations? On the one hand, this seems like the ultimate Pigouvian tax. While shareholders face a free rider problem in monitoring, the tax authority does not. In fact, by aggressively prosecuting a company the government sets an example that induces other firms to behave. Because of the spillover effect enforcement has on the behavior of all the other companies, the tax authority has an incentive to certify income and enforce its rights even in individual cases where the cost of doing so is higher than the payoff it can derive. Hence, the corporate income tax can be constructed as a certification tax.

On the other hand, we have seen that the existence of a corporate tax may exacerbate diversion, rather than reducing it. So, if we want to justify the existence of a corporate tax solely on corporate governance considerations we need to show that in order to minimize diversion it is optimal to have a positive tax rate, in spite of the negative direct effect tax rates have on diversion.

To prove this result we drop any revenue consideration from the Government objective function and formally introduce a link, as per our discussion above, between quality of enforcement and revenue considerations. One functional form that captures the possibility that tax enforcers need some revenue to take action and that the extent of enforcement increases with revenue from enforcement is $\alpha(t) = \delta\sqrt{t}$. Under this assumption, the total payoff to insiders becomes

$$\lambda(1-d)(1-t) + d - \frac{(\gamma + \delta\sqrt{t})d^2}{2}$$

Hence, the optimal amount of diversion is

(2) $$d^{**} = \min\left(\frac{1-\lambda(1-t)}{\delta\sqrt{t}+\gamma}, 1\right).$$

The optimal tax rate is the t that minimizes diversion, i.e. d^{**} .

Result 7: If $\delta < \frac{\lambda\gamma}{\frac{1}{2}-\lambda}$, then there exists an optimal tax rate, $\hat{t}$ which is greater than zero and less than 1.

Proof: $\frac{dd^{**}}{dt} = \frac{\lambda(\delta\sqrt{t}+\gamma) - [1-\lambda(1-t)]\frac{\delta}{2}t^{-\frac{1}{2}}}{(\delta\sqrt{t}+\gamma)^2}$. The denominator is positive, so the sign depends upon the numerator which can be expressed as a quadratic function. Sufficient conditions for an interior optima that minimizes diversion where $t \in [0,1]$ are that this be negative as t $t \to 0$ and positive for t=1. The expression is negative as t $t \to 0$ and the condition for this to be positive when t=1, is $2\lambda\gamma + \delta(2\lambda - 1) > 0$, which is satisfied if $\delta < \frac{\lambda\gamma}{\frac{1}{2}-\lambda}$.

Result 7 states that there exists a range of parameter values such that the optimal tax rate is positive even in the absence of any revenue goals. For example, if the level of insiders' ownership is 55%, the expected governance cost of stealing (γ) is 40 cents per dollar, and δ is 0.5, then the optimal tax rate is 17%. This example is only meant to illustrate that the existence result obtained in Result 7 is relevant for plausible values. We make no claim, however, that the level of the corporate tax rate justifiable using a governance perspective is close to the prevailing level today.

A necessary condition for Result 7 is that tax enforcement be a concave function of the tax rate. If it were a linear or convex function with a positive intercept, the optimal tax rate would be either zero or very close to one. How realistic is the assumption of concavity? A concave function implies that there is very little enforcement when there is no revenue potential (i.e., a tax rate of zero); that at low tax rates tax enforcement responds very much to increase in tax rates, and that this responsiveness decreases at high tax rates. Such a function could be the result of two opposite forces. On the one hand, government agencies may work better (be more funded and have better incentives) when there is an explicit revenue objective. On the other hand, enforcement requires a certain degree of political consensus, which can easily break down at higher tax rates. As discussed in Andreoni et al. (1998), several studies point out that

compliance can be limited by a notion of fairness, particularly at high tax rates. But our specification requires a bit more: that the aggressiveness of tax enforcement slows down at higher tax rates.

Given the concavity assumption for enforcement reflected in $\alpha(t) = \delta\sqrt{t}$, we can derive the following comparative static:

<u>*Corollary 7:*</u> The optimal tax rate decreases with

i) corporate governance (γ);
ii) insider ownership (λ);
and increases with

i) the sensitivity of enforcement to tax revenues (δ).

<u>*Proof:*</u> Since we are minimizing d^{**}, for each parameter the sign of the change in the optimal tax with respect to the parameter is the negative of the sign of the first order condition with respect to the parameter (e.g. sign($\frac{\partial \hat{t}}{\partial \gamma}$)=- sign($\frac{\partial FOC}{\partial \gamma}$)). Since $\frac{\partial FOC}{\partial \gamma} = \lambda$,

$\frac{\partial FOC}{\partial \lambda} = \delta\sqrt{t} + \gamma + (1-t)\frac{\delta}{2}t^{-\frac{1}{2}} > 0$, and $\frac{\partial FOC}{\partial \delta} = \lambda\sqrt{t} - \frac{1}{2}(1-\lambda(1-t)t^{-\frac{1}{2}}$, which is always increasing in t and less than equal to zero for any $\lambda \leq 1.$, the corollary holds.

This corollary indicates how the optimal tax rate (from a purely corporate governance point of view) changes with other environmental conditions. It shows that the optimal tax rate is a substitute for other corporate governance mechanisms: higher corporate governance (γ) and higher insider ownership (λ) decrease the level of the optimal tax rate. This result is not obvious, since there are two conflicting forces. On the one hand, the benefit of monitoring by the tax authorities is lower when other devices reduce diversion. On the other hand, when other corporate governance mechanisms function better, the direct effect of taxes on diversion is reduced and hence the indirect effect (through its incentives on higher monitoring) becomes more important. Corollary 7 shows that the first effect dominates the second.

4.3. Is this rationale consistent with standard features of the corporate tax code?

The above discussion suggests that corporate governance considerations *alone* can justify the existence of a separate tax on corporate income. Here, we note that the CGVT also helps explain several otherwise unusual ways in which corporate taxation systems are generally designed. From the perspective of the CGVT, these features reflect differences in the need for outside monitoring.

First, our approach provides a rationale for making interest expenses deductible, and thus not subject to double taxation. The income paid in interest is certified by the fact it is paid out in cash to a third party. Hence, it does not require external certification and, consequently, should not be subject to a "certification tax."[9] Second, the CGVT provides a new rationale for why legal entities such as the limited liability corporation and the subchapter S corporation are not subject to double taxation of earnings: they are less prone to managerial agency problems that are addressed in part by tax enforcement. In fact, these entities are exempted from entity level taxation only if they meet conditions (such as a limited number of investors), which ensures that the free-rider problem in monitoring is reduced. Finally, the CGVT provides a rationale for why corporate taxes are based on income rather than cash flow, sales, assets or other bases (as Meade (1978) and many others have proposed). If an important reason for the corporate tax is its ability to certify the value of minority shareholders' claims, it makes sense to use the value of their claim, i.e. profits, as a base.

5. Tests - Corporate Governance Implications

Testing the corporate governance implications of the CGVT is not straightforward. The prediction that is easiest to test (i.e., that an increase in tax rates reduces stock prices) is not unique to this approach as the same implication also follows from a traditional view of taxes. By contrast, the predictions that are unique to this approach (the effect of enforcement on stock prices and control premia) require us to measure variables that are difficult to quantify (tax enforcement) or even to observe in a systematic way (control premia). Dyck and Zingales (2004) exploit cross-country variation in tax enforcement and control premia to show that --

[9] Of course, the same argument would imply the exemptions of dividends. In fact, in many countries dividends are partially or totally exempted from corporate taxes.

consistent with Corollary 4 -- higher levels of tax enforcement lead to lower control premia, even controlling for national differences in legal protections for investors.

In this context, however, we want to provide more disaggregated, within country, evidence. For this reason, we focus on Russia, a country where both tax avoidance and managerial diversion are extreme. The substantial increase in tax enforcement following Putin's election in 2000, which occurred without an immediate change in tax rates, provides a natural experiment to test these predictions.

5.1. A case study

To understand how tax evasion and diversion can interact, we begin with a case study of Sibneft, the 5th largest Russian integrated oil company and one of the first to be indicted for tax evasion.

Under President Yeltsin, high tax rates and low levels of tax enforcement encouraged Russian firms to shelter income aggressively. Multiple taxes from different levels of government meant that tax obligations could exceed profits.[10] Company executives were not shy about how this tax burden affected their behavior. As Yukos Oil CEO Khodorkovsky argued, "As long as the tax regime is unjust, I will try to find a way around it."[11]

A popular scheme to evade taxes and expropriate minority shareholders was to sell oil at below-market prices to outside trading companies. To get a sense of the magnitude of the manipulation in transfer pricing, analyst reports indicate that Sibneft's production subsidiary was selling oil at just $2.20/ barrel, considerably below the average export price (net of export costs and excise taxes) of $13.50, and the average domestic price (net of taxes) of $7.20/ barrel.[12] Unsurprisingly, company financial reports revealed an effective corporate tax rate of just 2.6%, far below the statutory rate of 30%.[13]

[10] In the oil industry, taxes included not only the traditional value-added and corporate profit taxes, but also excise taxes, export duties and specific geology and royalty taxes on net income at production subsidiaries.
[11] Quoted in Simon Pirani, "Oligarch? No, I'm just an oil magnate," *Observer*, Sunday June 4, 2000.
[12] "Oil Production Subsidiaries," *Troika Dialog Research Report*, February 2000.
[13] Sibneft acknowledges in public filings, for example, that for "tax and cash flow optimization purposes, the Company uses third party intermediaries in its refining and distribution process." *Sibneft Bond Offering Prospectus*, March 1, 2002, pg. F-8 "These arrangements have primarily comprised of using certain trading companies in certain Russian regions and, taken together, have reduced the amount of taxable income Sibneft reports" *Sibneft Bond Offering Prospectus*, December 3, 2002, pp. 16-17.

The use of 'third party intermediaries' to shelter income also provided controlling shareholders with sizable opportunities for self-enrichment at the expense of outside shareholders. To shelter income from tax authorities, most if not all the profits have to be shifted to an intermediary located in an offshore or onshore tax haven. In the case of Sibneft, the primary intermediary was the export trading company Runicom, which accounted for the vast majority of Sibneft's foreign sales through 2000.[14] Shifting profits to Runicom benefits Runicom shareholders at the expense of the shareholders of Sibneft and its separately listed production and refining subsidiaries. Since the controlling management of Sibneft can choose the intermediary to trade with, there are obvious opportunities for them to take advantage of the situation and channel the profits toward a company they personally own. This opportunity is enhanced by the opacity in the ownership structure of Russian companies, which makes it difficult to establish whether this is indeed the case. In this particular case, for example, Runicom was associated with Roman Abramovich, who was reported to control Sibneft.[15] Runicom was also a significant Sibneft shareholder[16], but not *vice versa*, as would have made sense if the goal was to equitably share the benefits of tax sheltering.

The 2000 election of Putin brought a sudden regime change. One important dimension of this change is an increase in tax enforcement with no change (at least for the first two years) in tax rates.[17] Putin signaled his intentions to crack down on tax evasion by releasing a memorandum with a list of the worst corporate tax offenders (July 28, 2000), where Sibneft was singled out as paying the lowest tax rate in the oil industry. While later (2004), some of these crackdowns appeared politically motivated (as the incrimination of Khodorkovsky), at that time they seemed targeted to raise tax revenues that the Government desperately needed.

The following month, the tax police raided the offices of Sibneft and of its export trading arm, leading to criminal charges against the company. In November, the tax police

[14] For example, company financials identify 38 (40) percent of all sales in 1999 (2000) being conducted through Runicom. Prior to 1998, the primary company was Runicom SA registered in the tax haven of Switzerland and in 1999 and 2000, Runicom ltd, registered in the tax haven of Gibraltar.

announced proposals aimed at closing channels for tax avoidance by oil companies, including a threat to reduce oil company revenues by auctioning space on government-owned pipelines (rather than allocating them at a price that covered costs). Finally, on January 25, 2001, Putin met with the oligarchs to discuss ending tax avoidance schemes and the passage of new tax laws designed to shut off such schemes. Sibneft remained a target of government action, with the filing of additional criminal and civil actions in the spring and summer of 2001.[18]

Not surprisingly, this increase in enforcement targeted at the oil industry in general, and Sibneft in particular, coincided with a dramatic increase in tax payments by Sibneft. Production-based taxes increased ten fold and the reported effective corporate tax rate for Sibneft as a whole jumped from 2.6% to 10.4%. More interestingly, following the pressure from government officials, Sibneft announced that it would no longer be trading with Runicom but would trade with a newly created subsidiary, SibOil, whose results would be reported in the holdings consolidated income statements.[19] Furthermore, in July of 2001 the company announced that it would acquire two previously undisclosed intermediaries located in Russian domestic tax havens, Vester and Olivesta, that reported profits of $300 million in 2000, for a mere $1,800 in Sibneft stock.[20] Shortly thereafter, Sibneft announced the closing of yet more subsidiaries and a commitment to market oil through fully owned subsidiaries not located in these tax havens.[21]

Most importantly – from our point of view — these enforcement actions coincided with an improved return for outside shareholders. Reported company income soared and, for the first time, Sibneft paid dividends: $53 million in November 2000 and close to $1 billion in 2001, an amount equal to 67 percent of the total market capitalization of Sibneft before the increase in

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[15] The controlling stake of top management exceeded 80 percent, with a personal stake rumored to exceed 40 percent, (e.g. Valeria Korchagina ,"Sibneft's Owners Nation's Worst-Kept Secret," *The Moscow Times,* , 11 April 2000,.

[16] Runicom bought a 12.22% stake in Sibneft in 1996, and held 27 % of Sibneft's shares at the end of 2000, as reported in Andrew Higgins,"EBRD Slams Russian Courts In Loan Dispute With Oil Firm --- Lender Says Case Will Test Putin's Pledge to Strengthen Legal System --- The Rule of Law vs. the Rule of `Oligarchs'",*Wall Street Journal Europe* , 11 February 2000, , p. 2.

[17] While tougher enforcement was the primary fiscal measure initially introduced by Putin, there were other contemporaneous decisions that could possibly affect outcomes. For this reason, in the subsequent analysis we focus on cross-sectional variation to identify the effect of enforcement.

[18] We focus on these enforcement actions that appeared to be targeted on increasing government revenue rather than some other events that involved tax police that commentary at the time suggested was more politically than economically motivated.

[19] Lukoil, Tyumen Oil Co and Yukos made similar announcements in December of plans to increase transparency by shifting exports from trading companies controlled by controlling shareholders to major trading companies. See, for example, *NEFTE Compass*, December 21, 2000" Umbrella – Yukos Blends Offshore Trading Arms into One"

[20] "CorporateGovernance Actions," Troika Dialog, *Weekly Bulletin #113*, July 13, 2001, pg. 6.

enforcement. Consequently, Sibneft's share price rose well in excess of industry trends. Although such returns cannot be interpreted as causal, since many other factors may be driving returns aside from changes in tax policy, they do suggest that tax changes have not impeded returns for minority investors.

By narrowing the time period, and focusing specifically on a few notable tax enforcement events, we can control for some of these other factors. Table 1 reports Sibneft excess returns in the days surrounding the most crucial enforcement events. In all cases but one, Sibneft stock outperformed the Russian Index and, in spite of the very high volatility of Russian excess returns, in a few instances these excess returns are more than two standard deviations away from zero. The more astute local observers were quick to draw a causal link between increased tax enforcement and greater shareholder returns. As the *Financial Times* reported, companies like Sibneft "have begun closing offshore subsidiaries and consolidating their operations within Russia. To comply with the law, they have to declare higher profits and pay higher taxes. They must also show the true extent of their financial operations to outside shareholders, who are just as keen to have a share of the proceeds as the tax inspector."[22]

5.2. Cross- industry test

Given the many changes that were taking place in Russia at the same time, this evidence alone is unconvincing. To attempt to separate out the effect of tax enforcement changes from other changes we focus on two subtler predictions that relate directly to tax enforcement: we look at differences in tax enforcement across industries and across companies in the most targeted industry - the Oil and Gas sector.

As Figure 1 shows, in the 18 months surrounding this regime change the Oil and Gas industry, which bore the brunt of the enforcement, witness a dramatic increase in stock prices. Over such a long window, however, there are too many possible factors driving the changes. For this reason, we focus on voting premia. The price differential between voting and nonvoting shares is related to the value of control through the probability a vote will be pivotal (see

[21] For example, Sibneft later purchased Terra in a deal reported to have roughly the same effect of increasing reported income by $300 million. See "Terra Firma – Sibneft Brings its Profits Back Home," NEFTE Compass, October 11, 2001.
[22] Andrew Jack, *Financial Times*, September 17, 2001.

Zingales (1994, 1995b)). If this probability, which is a function of the existing ownership structure, remains relatively constant over time, changes in the voting premia are a good estimate of the changes in the value of control.[23] Hence, Corollary 4 implies that, during this period, voting premia should drop more in the oil and gas industry than in the other industries. The advantage of this test is that it perfectly controls for any variation in the fundamental value of these companies.

To conduct this test, we collect from the Datastream sample of Russian securities a sample of all the companies having two classes of stocks with differential voting rights (124 firms). To obtain meaningful voting premia, we restrict our attention to companies having some trading in both classes in event windows prior to and following what we view to be the most important indicators of increased tax enforcement (59 firms).

Consistent with Corollary 4, Panel A of Table 2 shows a decline in voting premium during the period of increased tax enforcement, from 57 percent to 46 percent. The composition of the sample, however, changes. Thus, a more appropriate comparison, limited to companies that were traded both at the beginning and at the end of the sample period, is provided in Panel B, column 1. It shows an average decline in the voting premium of 7.8 percentage points, which is significant at the 5 percent level.

Why did it decline? If, as we think, this decline is associated with increased tax enforcement, then it should be more pronounced for the companies most affected by this enforcement. Since Putin initially focused on the extractive industries (because this is where the money is), we examine how much of this decline is concentrated in these industries. As panel B shows, the decline (13.7 percent) is entirely concentrated in these extractive industries. The mean decline for the other companies (2.6 percent) is not statistically different from zero. This decline, thus, cannot be explained by a general improvement in the Russian corporate governance situation, which would have affected all companies similarly. Only something that differentially affected extractive industries, such as tax enforcement, could have caused it.

[23] Goetzman et al. (2002) claim that in Russia this voting premium is too high to be justifiable solely on the value of control. They attribute it more broadly to the risk that nonvoting stock could be discriminated against in future corporate transactions (a corporate governance discount). Even if we accept this interpretation, changes in the voting premium over short time periods are a pretty reliable indicator of changes in the degree majority shareholders take advantage of their position at the expense of outside ones.

5.3. Within -industry comparisons

The impact of an increase in enforcement is unlikely to be the same for all the companies: those that were avoiding taxes more aggressively, should be affected more. In general, it is very difficult to get a reliable indicator of tax avoidance, but in the oil industry such an indicator exists: revenue per barrel of oil. Since a barrel of oil has a price which is the same everywhere, lower revenues per barrel indicate more tax avoidance.

Table 3 presents evidence on the enormous variation in revenue per barrel of oil, as reported by investment analysts based on filings of firms during 1999. Komineft, a subsidiary of KomiTEK, sold its oil at an average price of $7.6 a barrel, while Tomskneft (a subsidiary of Yukos) at only $1.1 a barrel! These reports of aggressive tax avoidance correlate strongly with government evaluations of levels of tax avoidance across the integrated oil companies in Russia.

If Corollaries 3 and 4 are correct, companies that were selling their oil at lower prices (i.e., were engaging in massive diversion) should experience a greater price appreciation and greater reduction in voting premia during this period of increased tax enforcement. Unfortunately, the intersection between the companies in Table 3, those with dual class stocks, and those for which we have data, leads to an almost empty set. Thus, we cannot really test the value-of-control implications. But we can do some mini-event studies around the four major enforcement actions, which took place between July 2000 and January 2001.[24] For announcement returns, we use excess returns (defined as the cumulative excess return) over a ten day window (t-1, to t+9) surrounding the announced enforcement action. The sample is based on all integrated Russian oil companies with traded stock over these intervals that also have measures of tax avoidance. While this results in relatively few observations, these companies account for the majority of all oil production in Russia. In our excess return calculations, we use the RTS index (the ruble index when security quoted in rubles and the dollar index when the share price quoted in dollars). The announcement returns over the four events are regressed on the average selling price per barrel of oil, which is our indicator of tax avoidance. As Table 4

[24] To emphasize, we are focusing on those enforcement actions focused on the industry as a whole, rather than more recent enforcement actions targeted at a specific company, such as Yukos, where political factors are important in singling out this firm for action.

shows, companies that were avoiding taxes the most (and hence had lower revenues per barrel) experience the higher market returns around the announcement of higher tax enforcement.[25]

These results, although limited by the underlying availability of data, are consistent with the corporate governance view of taxes. Private benefits of control, as measured using dual class voting shares, not only decline when tax enforcement increases, but they decline by a greater amount in extractive industries relative to other Russian industries. Similarly, the oil companies that were more aggressive in avoiding taxes experience greater returns when tax enforcement increases.

6. Tests - Corporate Tax Implications

The CGVT also has implications for the responsiveness of tax revenues to changes in the corporate tax rate. To test these implications, we need changes in tax rates in countries with both strong and weak corporate governance so we move to a cross- country setting.

6.1. The data

We construct a panel data set that combines information on corporate tax revenues, top corporate marginal rates, ownership concentration, and a measure of corporate governance. For corporate tax rate information, we utilize the data recently assembled by the Office of Tax Policy Research (OTPR) at the University of Michigan.[26] From the IMF, we obtain data on corporate tax revenues, total tax revenues (available from the *Government Finance Statistics* yearbook) and nominal GDP (from the *International Finance Statistics* yearbook*)*.[27] The data on tax rates are available for a large cross section of countries only after 1979. Thus, our sample starts in 1979 and ends in 1997, the last year for which this information was available. From the original

[25] Results are stronger if we restrict ourselves solely to the sample with average 99 selling price, but this reduces our sample to just 9 observations.

[26] This data is available at www.otpr.org.

[27] Specifically, data on corporate tax revenues are provided as variable g8h1aa in the GFS database and total tax revenues as variable g8h1y in the GFS database. Several countries that have variables from the Dyck and Zingales (2004) and LLSV (1998) databases do not provide corporate tax revenues collection statistics further narrowing the relevant sample. These countries include Chile, Hong Kong, Mexico, New Zealand, Nigeria, Philippines, Singapore, Taiwan, and Venezuela. For countries with data on tax rates but no data on corporate tax revenues we conducted additional data searches of country sources (including the finance ministry, tax authorities, IMF Article IV statistical appendices and other sources) and these searches produced additional data for Hong Kong and Taiwan. The electronic version of the GFS variables available at time of writing was not yet updated past 1997.

set of countries in our sample, we exclude major oil-producing countries given the distinctive dynamics of corporate tax revenues in these settings.[28]

As a measure of corporate governance, we use the control premium in negotiated control block sales, as computed by Dyck and Zingales (2004). Consistent with the spirit of our model, the Dyck and Zingales measure captures the amount of private benefits extracted by insiders. When we examine ownership concentration we use the average percentage of common shares owned by the three largest shareholders in the 10 largest nonfinancial, privately owned, domestic firms as computed by La Porta et al. (1998).

To explore whether we have identified the governance impact on the relationship between tax rates and revenues rather than some other institutional factor that might covary with governance across countries and also drive tax revenues, we employ a variety of institutional measures as control variables: "rule of law" (an index from 0 to 10 that measures the strength of a country's law and order tradition as developed by International Country Risk, a country risk rating agency); tax compliance (an index from 0 to 6 developed by the World Competitiveness Report, which assesses the level of tax compliance), anti-directors' rights index (and index from 0 to 6 developed by La Porta et. al. (1998), a corruption index (developed by the Worldbank (2005), using data for 1998) and log of GDP per capita.[29]

The top panel of Table 5 summarizes the data from the entire panel. The average ratio of corporate tax revenues to total tax revenues is 11.8.% and the average top marginal rate over the sample is 36.4%. The governance variables vary considerably by country: the measure of private benefits averages 12.4% with a standard deviation of 14.6%. The bottom panel summarizes the data collapsed by country. In addition to the raw data, we also report country-specific curve slopes. As described below, these slopes have been obtained by regressing the logarithm of corporate tax revenues on the logarithm of the GDP and the level of the corporate tax rate.

[28] The countries excluded are the major oil exporting countries defined as (a) OPEC members, (b) affiliated non-members Oman and Angola and (c) non-OPEC members in the list of the top 10 oil exporting countries. This last requirement, which excludes Norway, Mexico and Russia, actually only eliminates Norway, as corporate tax revenues for Mexico and Russia are not in our ownership or private benefit samples. In these oil-rich countries, corporate tax revenues are typically not income taxes and corporate tax revenues fluctuate with the world price of oil conflating the analysis.

[29] These measures of the rule of law and tax evasion are taken from La Porta et al. (1998, 1999).

The panel structure of the sample is useful because we can use within-country variability over time to estimate the slope of the relation between corporate tax revenues and corporate tax rates and the cross-country variation to identify how corporate governance influence the slope of this relation. Since the slope of the curve is estimated using within-country variation, it is important to have a sense of the magnitude and the direction of these variations. Figure 2 plots the changes in corporate tax rates during our sample period. In this period, most of the changes, but not all, are tax rate reductions. Furthermore, most, if not all, of these reductions have been accompanied by a broadening of the tax base. Unfortunately, in the regressions we will be unable to control for base broadening. Thus, our sample is biased toward finding a negative-sloped curve. Our interest, however, is not on the average slope of this curve, but on how this slope changes with the quality of the corporate governance system. Since the coupling of base broadening and tax rate reductions appears to be widespread and not unique to countries with high ownership concentration or large private benefits, our cross-country results should not be affected by the inability to measure base broadening in a systematic way.[30]

6.2. Results

In our base specification we regress a measure of tax revenues on the corporate tax rate employing a number of other variables to capture factors that might influence revenues. Specifically, our primary specification is as follows:

$$Log\left(Corporate\ Tax\ Revenues_{it}\right) = \alpha_i + \beta_i\left(Log\ GDP_{it}\right) + \eta\tau_{it} + \varepsilon_{it}$$

where i indexes countries, t is a time subscript and τ is the top marginal corporate tax rate; η provides the average slope of the corporate tax revenues curve and α_i are country-fixed effects that should absorb any country-specific institutional characteristic. This specification also includes the log GDP to capture the fact that tax revenues are influenced by the profits of the corporate sector, which are highly correlated with the business cycle. To allow for differences in

[30] For surveys of the nature of tax reform during this period, see Cummins, Hassett and Hubbard (1996) for the OECD and Thirsk (1997) for developing countries. There is no evidence, from such sources, that the likelihood of base broadenings being coupled with tax rate changes is correlated with income or ownerships concentration or corporate governance. In fact, from a political economy point of view, we believe the link is more likely to bias against finding results consistent with the corporate governance view of taxes. In countries with higher ownership concentration, owners should be more effective in lobbying against a base broadening that accompanies a tax rate reduction.

the size of the business sector, we let the coefficient of log GDP differ across countries. Finally, all the reported standard errors are clustered at the country level.

To study the effect of corporate governance on the relation between tax rates and revenues, we interact the corporate tax rate with a measure of corporate governance, (the Dyck and Zingales (2004) estimates of control premia in different countries). Since this is a measure of how much controlling shareholders appropriate for themselves, it is directly related to γ.

Column 1 of Table 6A reports our results. In this specification, the coefficient on the tax rate can be interpreted as the effect of tax rates on revenues in the absence of any private benefits of control. On average a tax increase raises corporate tax revenues, but by a minimal amount: a 10 percentage point increase in the tax rates (from 15% to 25%, for example) increases corporate revenues by 1%. The average effect, however, is not statistically different from zero. As we warned, this average effect is likely to be downward biased, because in this period most of the changes have been tax reductions associated with base broadening. Since Corollary 5 predicts a positive relationship between the sensitivity of tax revenues to changes in the tax rate and quality of corporate governance, we expect the coefficient of the interaction between tax rates and corporate measure of private benefits to be negative (because higher private benefits are an indicator of worse corporate governance). As expected, the interaction term is negative and statistically significant, i.e., countries with worse corporate governance have a lower sensitivity of tax revenues to tax increases. The threshold level of the control premium for a revenue-neutral relationship between corporate tax rates and corporate tax revenues is approximately 20%. Stated differently, corporate tax rate increases in countries where the private benefits of control are above 20% generate a sufficient behavioral response to negate, and overcome, any additional revenue generated by the higher rate.

To test the robustness of this result, in columns 2 through 5 we split the sample by the measure of governance. In columns 2 and 3, we divide the sample on the basis of the median level of control premium and in columns 4 and 5 we divide the sample based on a control premia of 10%, to highlight the differences in countries with more extreme governance difficulties. As predicted by the model, in countries where the control premium is below the median the coefficient of the tax rate is positive, while in countries where the control premium is above the

median, the coefficient of the tax rate is less and in fact negative. This effect is more pronounced the more severe are the governance difficulties, as seen in comparing column 3 and 5.

One potential concern regards our dependent variable. By letting the data dictate the relation between tax revenues and GDP, the basic specification adopts the most flexible form. Nevertheless, in columns 6 and 7 we re-estimate it by using alternative normalizations. In column 6 we use the ratio of corporate tax revenues to GDP, and in column 7 the ratio of corporate tax revenues to total tax revenues. These alternative specifications produce qualitatively similar results.

Another concern is that the coefficient of the interaction between corporate governance and tax rates might reflect other attributes of the institutional environment that would dictate the responsiveness of tax revenues to rate changes. In a country where there is no enforcement of taxes, for instance, changes in the tax rates might have very little effect on tax revenues, reducing the slope of the tax revenue curve. If countries with low tax enforcement are also countries with worse corporate governance, the results might reflect this spurious effect.

To examine this possibility, in Table 6B we re-estimate the basic specification with different proxies for the institutional environment interacted with the tax rate. In column 1, we use the law and order tradition of a country. Countries with a stronger law and order tradition have a more sloped curve, but this effect is not statistically significant. More importantly, the effect of corporate governance, while slightly reduced in magnitude remains statistically significant. Similarly, in column 2 we insert the interaction between the tax rate and our measure of tax compliance. This interaction is insignificant and, by contrast, our main effect remains highly statistically significant. In column 3, we insert an interaction between the tax rate and a measure of corruption, using the Worldbank indicator of corruption.[31] In column 4 we insert an interaction between the tax rate and the La Porta et al. (1998) index of shareholder protections. Including these controls, our main result remains statistically significant, with a slightly lower coefficient in the case of corruption (4.0) and a higher point estimate when we include shareholder rights (9.04). Finally, in column 5, we incorporate an interaction with log GNP per

[31] The corruption measure, described in Kaufman et. al (2005) has a maximum range from -2.5 to 2.5, with higher values corresponding to better governance outcomes. It is based on enterprise, citizen and expert survey respondents in industrial and developing countries.

capita as the broadest measure of institutional weakness. Again, the result on the interaction of corporate governance and tax rates remains highly significant. We also explored alternative specifications (not reported) that attempt to capture the secular decline in corporate tax rates over the last couple of decades. We first introduced year dummies, and then examined country-specific time trends. In both cases, our main results remain statistically significant and quantitatively similar with the coefficient on governance having values of 4.83 and 5.40 respectively.[32]

In the empirical work thus far we have treated the changes in tax rates as exogenous. This runs counter to the approach we took in the theoretical section, where we consider governments optimally choosing the level of their tax rates. To address this problem we instrument the tax rate with the ideological orientation of the chief executive. Ideology may push governments to suboptimal tax rates. Hence, ideology provides the exogenous variation that allows us to identify the true sensitivity of tax revenues to tax rates. We draw our data on the ideological orientation of the chief executive from the Database of Political Institutions (Beck et. al. (2001)). They classify this orientation in four categories: left, right, center, and other. In our sample we have 32% of country-years with left-wing chief executives, 43% of country-years with right-wing governments and 25% of country-years with other types of executives. As instruments for the tax rate we use two dummies: a dummy for left-wing chief executives and a dummy for right-wing chief executives. The F-test of the joint significance of the coefficients is significant at the 1% level. Column 5 of Table 6B reports the results of this instrumental variable regression. Our main result does not change: the interaction of private benefits with tax rates comes in negative and highly significant.

Finally, the predictions on the effects of ownership on the tax revenue sensitivity to tax rate changes are more nuanced (Corollary 6). The sign of the coefficient depends upon the level of the tax rate. Furthermore, at an aggregate level, ownership concentration is highly correlated

[32] We have omitted reporting these results for space considerations, but they are available from the authors upon request.

with private benefits, so when we put them both in the regression (not reported) it is impossible to distinguish the effect of one from the effect of the other.[33]

The preceding analysis constrains the tax revenue curve to be identical across all the countries (with the exception of the effect of corporate governance). In order to confirm the strength of our findings, we estimate country-specific slopes by employing the same specification country-by-country. Such a procedure, of course, comes at considerable cost since we estimate many more parameters with the same number of observations. Table 7 analyzes the relation between country-specific tax revenue slopes and governance levels weighting each observation by the precision of each estimate (the inverse of the variance of the estimated slope). As predicted by the model, the value of control premia is negatively related to the sensitivity of tax revenues to tax rates and this finding is robust to the inclusion of ownership concentration as another variable. Column 1 presents our results using the logarithm of corporate tax revenues as a dependent variable, while columns 2 and 3 show results using the ration of corporate tax revenues to GDP and corporate tax revenues to total tax revenues.

7. Conclusion

This paper begins with the simple observation that tax authorities and outside shareholders have a common goal: reducing managerial diversion. By focusing on this natural alignment of interests, we provide a new way of looking at corporate taxation. This approach delivers three main insights.

First, the characteristics of the corporate tax system affect the amount of diversion that takes place in a country and the valuation of firms: higher tax rates worsen corporate governance, while a strong enforcement of tax claims can strengthen it. We provide evidence consistent with these predictions: increased tax enforcement in Russia enhanced the value of targeted companies and reduced their control premia. As predicted by the model, the magnitude of these changes in value and control premia is a function of prior levels of diversion.

[33] We use as our measure of ownership concentration the average percentage of common shared owned by the three largest shareholders in the 10 largest non-financial, privately owned domestic firms in a country as computed by La Porta et al. (1998).

Second, as corporate taxation influences corporate governance, the quality of corporate governance plays an important role in determining the sensitivity of tax revenues changes to tax rate changes. Consistent with this prediction, we find that the relationship between tax rates and revenues depends upon the underlying governance environment, with a greater responsiveness to rate changes in good governance environments, and a lower (in fact, negative) relationship in bad governance countries.

Third, this approach is also able to provide a new rationale for the existence of a separate tax rate on corporate income. The function of this tax is to certify the income to minority shareholders and to provide the incentives for the enforcement of this certification. This rationale is consistent with the supporting arguments used when the corporate tax was first introduced in the United States in 1909 and is able to explain a number of the features of the current tax system. This certification role of corporate taxes has not necessarily disappeared with the development of other mechanisms to monitor corporate insiders (external auditors, SEC, etc) as shown by the fact that managers were willing to pay taxes on false earnings in order to reduce the probability of being monitored by the IRS (Erickson, Hanlon and Maydew, 2004).

Appendix A

In this appendix we analyze the robustness of our main results to the specification of the tax enforcement function. In the public finance literature on personal tax avoidance, an alternative specification sometimes employed is to specify a probability of detection and assume that the financial penalty if detected is proportional to the avoided taxes.[34] This leads to the adoption of functional forms where the expected cost of tax avoidance is an increasing function of the taxes that are avoided (*td*), rather than the income that is diverted (*d*). The major difference of this specification is that when there is no tax, there is no enforcement and that the extent of enforcement is an increasing function of the tax rate. While these features are appealing for low tax rates, they become unrealistic for very high tax rates, when the political support for enforcement breaks down and the probability of enforcement (and with it the expected cost) might decrease (but certainly not increase) in the tax rate.

Nevertheless, in this appendix we show that if we adopt this alternative formulation, our main results continue to hold for a wide range of parameter values.[35] Our results are weakened only at very high tax rates and/or when enforcement is very high.

In this alternative view the costs increase with the extent of avoided taxes:

$$C_2(d) = \frac{\alpha t^2 d^2}{2}.$$

The total payoff to insiders, then, becomes

$$\lambda(1-d)(1-t) + d - \frac{\alpha t^2 + \gamma}{2} d^2,$$

And the optimal amount of diversion

(2') $$d^{**} = \min\left(\frac{1-\lambda(1-t)}{\alpha t^2 + \gamma}, 1\right).$$

[34] This setup doesn't translate directly to our setting as our enforcement function is a reduced form that integrates the probability of detection and penalties associated with detection.

[35] For expositional ease we often present sufficient conditions as necessary conditions are more difficult to specify.

Result 1 becomes:

Result 1': In countries with a low level of enforcement, higher tax rate will cause higher levels of diversion. This effect is stronger where tax enforcement is weaker.

Proof: $\frac{\partial d}{\partial t} = \frac{\gamma\lambda - \alpha(\lambda t^2 + 2t(1-\lambda))}{\alpha + \gamma} > 0$ if $\alpha < \frac{\gamma\lambda}{2-\lambda}$.

$$\frac{\partial^2 d}{\partial t \partial \alpha} = \frac{-(\lambda t^2 + 2t(1-\lambda))(\alpha t^2 + \gamma)^2 - [\gamma\lambda - \alpha(\lambda t^2 + 2t(1-\lambda))](2\alpha t^4 + 2\gamma t^2)}{(\alpha t^2 + \gamma)^4} < 0 \text{ if } \alpha < \frac{\gamma\lambda}{2-\lambda}.$$

Result 2': The market value of a company increases with tax enforcement. The market value of a company decreases with the tax rate if $t < \frac{-\alpha(1-\lambda) + \sqrt{\alpha^2(1-\lambda)^2 + \alpha\lambda^2\gamma}}{\alpha\lambda}$.

Proof: The market value is driven by the value minority shareholders can capture, which in turn is given by $V^m = (1-d)(1-t)$. Since $\frac{\partial V^m}{\partial d^{**}} < 0$ and $\frac{\partial d^{**}}{\partial \alpha} = -\frac{1-\lambda(1-t)}{(\alpha t^2 + \gamma)^2} t^2 < 0$, then $\frac{dV^m}{d\alpha} > 0$.

Since $\frac{\partial V^m}{\partial t} < 0$ and $\frac{\partial V^m}{\partial d} < 0$, $\frac{\partial d^{**}}{\partial t} = \frac{\lambda(\alpha t^2 + \gamma) - 2\alpha t(1-\lambda(1-t))}{(\alpha t^2 + \gamma)^2} > 0$ if

$0 < t < \frac{-\alpha(1-\lambda) + \sqrt{\alpha^2(1-\lambda)^2 + \alpha\lambda^2\gamma}}{\alpha\lambda}$. It then follows that a sufficient condition for $\frac{dV^m}{dt} < 0$ is that $0 < t < \frac{-\alpha(1-\lambda) + \sqrt{\alpha^2(1-\lambda)^2 + \alpha\lambda^2\gamma}}{\alpha\lambda}$.

Corollary 3': Following an increase in enforcement, companies that were previously diverting more will experience a larger increase in price.

Proof:

$$\frac{\frac{dV^m}{d\alpha}}{V^m} = \frac{(1-t)\frac{1-\lambda(1-t)}{(\alpha t^2+\gamma)^2}2t}{(1-t)(1-\frac{1-\lambda(1-t)}{\alpha+\gamma})} > 0.$$

Corollary 4': The value of control decreases with tax enforcement.

Proof: $\frac{\partial CP}{\partial \alpha} = \frac{(1-\lambda)}{(V^m)^2}[\frac{dV^i}{d\alpha}V^m - V^i\frac{dV^m}{d\alpha}]$. By using the envelope theorem $\frac{dV^i}{d\alpha} = \frac{\partial V^i}{\partial d}\frac{\partial d}{\partial \alpha} = 0$.

Since by Result 2' $\frac{dV^m}{d\alpha} = \frac{\partial V^m}{\partial d}\frac{\partial d}{\partial \alpha} > 0$, the result follows.

Result 3': If $\lambda > \max[\gamma - 1, 1-\gamma]$ and $\alpha < \frac{1}{2}[-1-2\gamma+\lambda+\sqrt{1+8\gamma-2\lambda+\lambda^2}]$ then corporate tax revenues as a function of corporate tax rates are hump-shaped. That is, it can be shown that under these conditions $\frac{\partial CTR}{\partial t}\big|_{t=0} > 0$ and $\frac{\partial CTR}{\partial t}\big|_{t=1} < 0$ and therefore, CTR must be a decreasing function over some interval of *t* for $0 \le t \le 1$.

Proof: Corporate tax revenues (CTR) are given by $t(1-d) = t - t[\frac{1-\lambda(1-t)}{\alpha t^2+\gamma}]$. Differentiating this with respect to *t* we obtain $\frac{\partial CTR}{\partial t} = 1 - \frac{1-\lambda(1-t)}{\alpha t^2+\gamma} - t\frac{\lambda(\alpha t^2+\gamma)-(1-\lambda(1-t))}{(\alpha t^2+\gamma)^2}$. Sufficient conditions to demonstrate that the function is hump shaped are that this is an increasing function at t=0 and a decreasing function at t=1.

When t=0, $\frac{\partial CTR}{\partial t}\big|_{t=0} = \frac{\gamma+\lambda-1}{\gamma} > 0$ because $\lambda + \gamma \ge 1$.

When t=1, $\frac{\partial CTR}{\partial t}\big|_{t=1} = \frac{\alpha^2+\gamma(\gamma-1-\lambda)+\alpha(1+2\gamma-\lambda)}{(\alpha+\gamma)^2}$. Since the denominator is positive, we focus on the numerator which is a quadratic function of α with two roots,

$\frac{1}{2}[-1-2\gamma+\lambda\pm\sqrt{1+8\gamma-2\lambda+\lambda^2}]$, so when $\alpha_L<\alpha<\alpha_U \Rightarrow \frac{\partial CTR}{\partial t}\big|_{t=1}<0$, note that $\alpha_L<0$, so we just have to check $\alpha_U=\frac{1}{2}[-1-2\gamma+\lambda+\sqrt{1+8\gamma-2\lambda+\lambda^2}]$, and when $\lambda>\gamma-1\Rightarrow\alpha_U>0$, so there is an interval of α such that $\frac{\partial CTR}{\partial t}\big|_{t=1}<0$.

Corollary 5': The sensitivity of tax revenues to tax rate changes increases with the quality of the corporate governance system γ if $t<0.5$.

Proof: $\frac{d^2CTR}{dtd\gamma}=1-(1-\lambda(1-t))>0$ if $t<0.5$.

Appendix B

Proof of Result 5:

Substituting in the optimal level of diversion under a corporate income tax yields the two following FOCs:

$$\alpha+\gamma+\lambda-\psi\lambda-1-2t\lambda=0$$
$$\left[1-\lambda\left(1-t\right)\right]\left[t+\psi\right]-\mu\alpha\left(\alpha+\gamma\right)^2=0$$

To check the SOCs, note that the matrix is negative semi-definite

$$\begin{pmatrix} -2\lambda & 1 \\ 1-\lambda+2t\lambda+\psi\lambda & -\mu\left(\alpha+\gamma\right)^2-\mu\alpha\left(2\alpha+2\gamma\right) \end{pmatrix}$$

Applying Cramer's Rule, the relationship between optimal tax rates, levels of enforcement and costs of enforcement are given by the signs:

$$sign\ \frac{\mathrm{dt}}{\mathrm{d}\mu}=\begin{vmatrix} 0 & 1 \\ \alpha\left(\alpha+\gamma\right)^2 & -\mu\left(\alpha+\gamma\right)^2-\mu\alpha\left(2\alpha+2\gamma\right) \end{vmatrix}<0$$

$$sign\ \frac{\mathrm{d}\alpha}{\mathrm{d}\mu} = \begin{vmatrix} -2\lambda & 0 \\ 1-\lambda+2\mathrm{t}\lambda+\psi\lambda & \alpha(\alpha+\gamma)^2 \end{vmatrix} < 0\,.$$

Proof of Corollary 7: Differentiating t^* with respect to γ we have

$\frac{dt^*}{d\gamma} = \frac{\lambda^2\delta[\delta^2(1-\lambda)^2+\lambda^2\delta(\gamma+\alpha_0)]^{-\frac{1}{2}}}{\delta\lambda} > 0$; differentiating t^* with respect to α_0 we have

$\frac{dt^*}{d\alpha_0} = \frac{\lambda^2\delta[\delta^2(1-\lambda)^2+\lambda^2\delta(\gamma+\alpha_0)]^{-\frac{1}{2}}}{\delta\lambda} > 0$; differentiating t^* with respect to λ we have

$\frac{dt^*}{d\lambda} = \frac{1}{\lambda^2}+\frac{1}{2}[\frac{1}{\lambda^2}-\frac{2}{\lambda}+1+\frac{1}{\delta}(\gamma+\alpha_0)]^{-1/2}(-\frac{2}{\lambda^3}+\frac{2}{\lambda^2}) > 0,$ differentiating t^* with respect to δ we have $\frac{dt^*}{d\delta} = \frac{1}{2}[\frac{1}{\lambda^2}-\frac{2}{\lambda}+1+\frac{1}{\delta}(\gamma+\alpha_0)]^{-1/2}(-\frac{1}{\delta^2}(\gamma+\alpha_0)) < 0.$

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Figure 1: Returns for the Russian Oil and Gas Industry, the Russian Market Excluding Oil & Gas, and the World Oil Index

This figure graphs three indexes for the period December 1999- March 2002. The first is the Russian oil and gas industry index, the second an index of the major world integrated oil companies, and the third an index of the Russian market that excludes the oil and gas industry. The indexes are taken from Datastream International and are set to be equal to 100 on April 3, 2001.

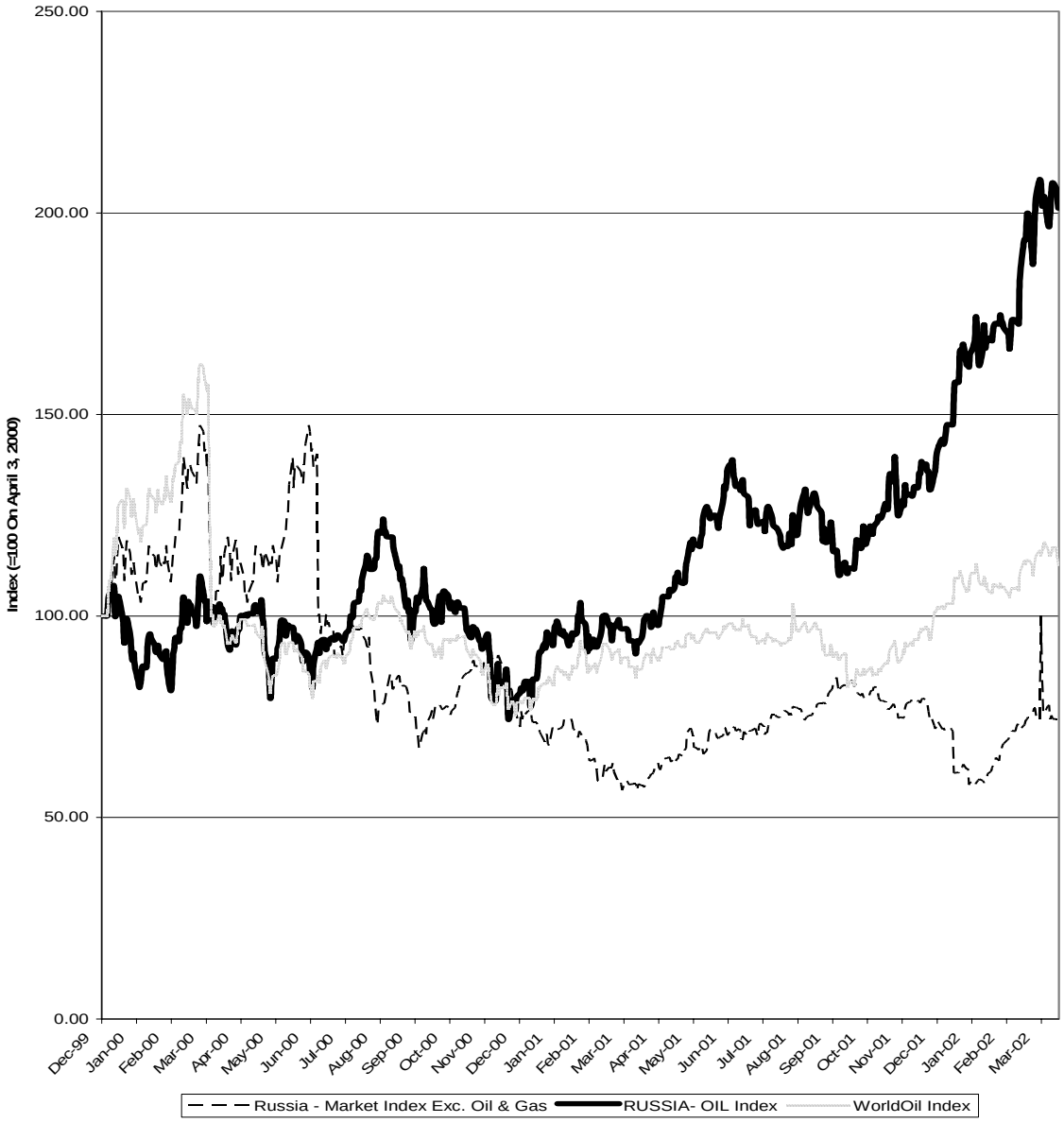


Figure 2: The Evolution of Top Marginal Corporate Tax Rates, 1979-1997

This figure shows the time series variation of the marginal tax rates for each country in the sample for the period 1979-1997. The tax rates are from the Office of Tax Policy Research database, University of Michigan.

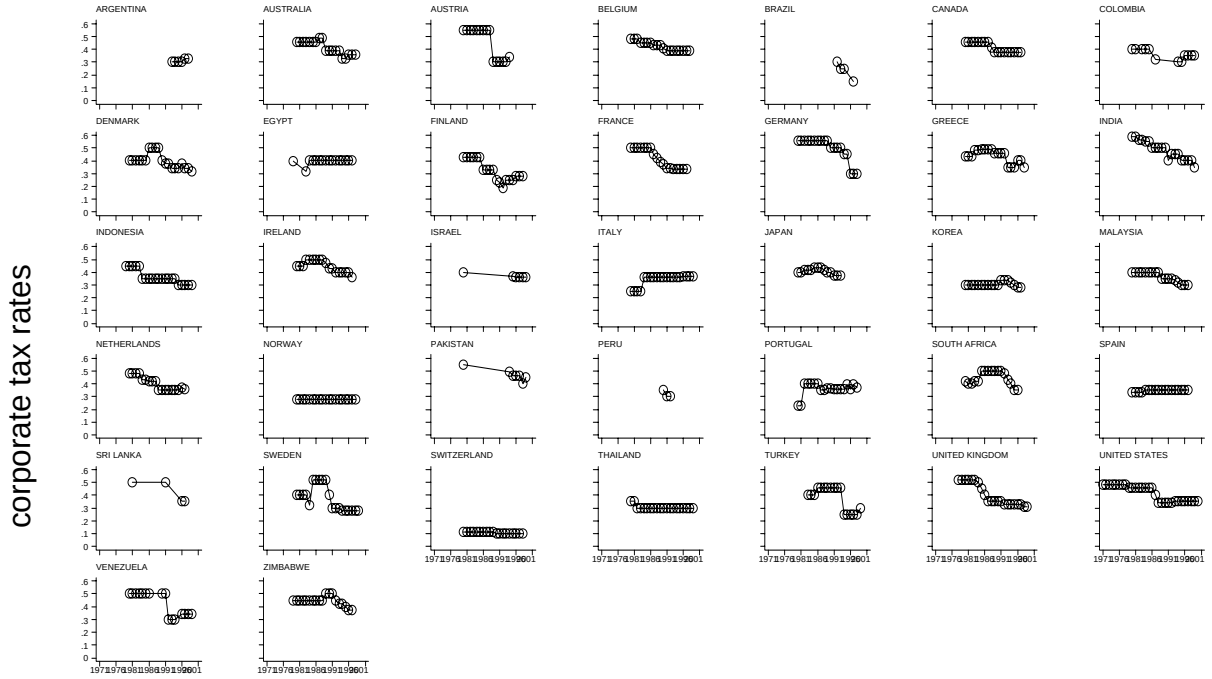


Table 1: Major Russian Tax Enforcement Actions and Excess Returns for Sibneft

This table presents the cumulative excess returns for Sibneft around days of major tax enforcement actions. The returns are defined as the ten day (t-1 to t+9) cumulative excess returns using the RTS index as the market return. As a point of reference, the standard deviation for excess returns from Jan 1, 2000 to December 31, 2001 is 0.074.

Event date	Event description	Ten day cumulative excess return for Sibneft
12-Jul-00	Public raid by tax police of four companies controlled by oligarchs and announcement of criminal investigations. Coincides with public statements that challenge oligarchs and demand increased tax payments.	-0.054
28-Jul-00	Putin meeting with oligarchs. Leaked finance ministry memorandum showing low tax payments by energy firms. Memorandum provides first mention of Sibneft as a low tax payer.	0.114
10-Aug-00	Tax Police remove documents from Sibneft. Swiss police raid offices of Runicom, export trading arm of Sibneft.	0.092
25-Nov-00	Government announces further crackdown on tax avoidance in oil sector, including proposal to auction space on Transneft pipeline. In days publishes perceived lost revenue of more than $9 billion annually.	0.035
25-Jan-01	Putin meets with large oil company executives, revealing deep knowledge of types of oil tax avoidance, and suggesting that this behavior must be curtailed	0.017

Table 2: Changes in Russian Voting Premia during Increased Enforcement Period

Panel A reports the average level (over four months) of control premia for the unbalanced sample prior to the period of increased enforcement and after the enforcement period. The sample includes all Russian equities in Datastream with two classes of stock (124 companies) where we can find a price associated with positive volume in both voting and non-voting shares within five days (59 companies). The voting premia, expressed as a percentage of the equity value of the company, is defined as the difference in price between the voting and non-voting shares multiplied by the number of voting shares divided by the total equity value of the company. Panel B reports the change in the voting premia for firms in extractive industries (oil and minerals) that were the focus of enforcement actions, and for all other firms. The first part of the panel presents results using t-tests, while the second part uses the Wilcoxon-Mann-Whitney, which does not assume a normally distributed dependent variable. Panel B restricts attention to a constant sample of 15 companies that have more liquid securities (had trading volume both prior and after enforcement, using the average of the immediate month preceding and following the enforcement action).

Panel A - Summary Statistics of the Voting Premia Prior to and After Tax Enforcement Actions

Dependent Variable:	Mean	Median	Standard Deviation	Number of companies
Average level of the voting premia prior to enforcement actions (average over March - June, 2000)	0.57	0.6	0.19	45
Average level of the voting premia after enforcement actions (averaged over February - May 2001)	0.46	0.47	0.23	44

Panel B - How Changes in Voting Premia Differ Across Industries (Balanced Panel)

T-test results

Dependent Variable:	Mean	Median	Standard Error	Number of companies
All other firms	-0.026	-0.028	0.029	8
Extractive industries	-0.137	-0.162	0.044	7
Combined	-0.078	-0.07	0.029	15
Difference	0.111		0.051	
Probability difference is equal to zero =	0.0503			

Wilcoxon-Mann-Whitney rank sum test results

Probability difference is equal to zero =	0.0372

Table 3: Russian Oil Companies and Tax Optimization

This table presents the selling price of oil from production subsidiaries and/or of major Russian integrated oil companies. The data are taken from various oil industry reports produced by Troika Dialog Research. We use these oil prices as indicators of tax avoidance, with a low oil price suggestive of more aggressive tax avoidance.

		Investment Bank produced indicators of tax optimization 1999		
Holding Company	Primary Production subsidiaries (a)	Average 1999 crude net selling price ($/bbl) (a,b)	August 1999 internal net selling price ($/bbl) (b,c)	1999 production bpd (a,d)
(1)	(2)	(3)	(4)	(5)
Sibneft				326,500
	Noyabrskneftegaz	2.2	2.2	325,562
Slavneft (e)				238,600
	Megionneftegaz	3.5	2.1	237,350
TNK				513,600
	Tyummeneftegaz	2.5	na	36,981
	Nizhnevartovskneftegaz	2.5	2.2	363,125
Yukos				894,300
	Tomskneft	1.1	~1.0	205,421
	Samaraneftegaz	1.8	~1.0	153,418
	Yuganskneftegaz	1.8	~1.0	522,788
LUKoil	various subsidiaries	na	2.8	1,443,700
	Permneft	na	2.0	na
Rosneft (e)				251,000
	Krasnodarneftegaz	na	na	21,940
	Purneftegaz	3.9	3.0	163,743
	Sakhalinmorneftegaz	11.0	6.8	28,995
	Stavropolneftegaz	na	4.2	na
Onaco (e)				159,100
	Orenburgneft	8.6	3.0	148,900
Sidanco				250,300
	Chernogorneft	5.8	3.9	126,136
	Saratovneftegaz	6.7	3.8	27,265
	Udmurtneft	6.7	3.8	106,708
	Varioganneftegaz	4.3	3.8	49,690
Surgutneftegaz	Surgutneftegaz	na	7.0	751,500
Bashneft	Bashneft	na	2.6	245,200
Tatneft (e)	Tatneft	na	na	481,300
KomiTEK	Komineft	7.6	na	72,378
Others				1,916,000

(a) "Oil Production Subsidiaries," *Troika Dialog Research* , February 2000.
(b) Average export price, net of export costs and excise in 1999 was $13.50. Average domestic price net of taxes was $7.20
(c) Estimated from graph, "Oil Sector Report," *Troika Dialog Research,* March 2000, p. 29.
(d) "Oil Sector Report," *Troika Dialog Research,* March 2000.
(e) Owned and/or controlled by government.

Table 4: Tax Enforcement Actions and Short-Window Excess Returns Within the Oil Industry

This table examines whether the market response to announced enforcement actions depends upon how aggressive firms have been in avoiding tax payments. We focus on the four notable enforcement actions taken July 2000-January 2001 introduced in Table 1 (excluding the Sibneft-specific enforcement action). The table reports the results of a regression of short window excess returns (defined as the cumulative excess return in the ten day window (t-1, to t+9) surrounding the announced enforcement action) on indicators of tax avoidance. In our excess return calculations we use the RTS index, using the rouble index when the security is quoted in roubles and the $ index when the share price quoted in dollars. For indicators of tax avoidance, we use the selling price for oil by company in 1999 reported by investment analysts. The regression uses the August 1999 $ value if the average $1999 selling price is missing. Data are from the RTS daily archive, using the last price reported. Companies are excluded if there is no trading volume and no reported change in last price over the relevant event window. Residuals are clustered by firm. Standard errors are in parentheses.

Dependent Variable:	**10 day excess returns around enforcement actions**
Tax avoidance indicator (average $/barrel selling price for 1999 if available August 1999 otherwise)	-0.0235
	(0.011)
Event dummies for four events noted in panel A	Y
Number of firms	6
R-squared	0.3745
Number of observations	18

Table 5: Descriptive Statistics for Tests of Corporate Tax Implications

The top panel provides descriptive statistics for variables in the unbalanced panel used in Table 6, while the bottom panel provides statistics for variables by country used in Table 7. "Log Corporate Tax Revenues" is the natural log of corporate tax revenues as measured in local currency and as provided in the Government Finance Statistics (GFS) electronic database. "Corporate Tax Revenues/Total Tax Revenues" is the ratio of corporate tax revenues to total tax revenues as provided in GFS. "Corporate Tax Revenues/GDP" is the ratio of corporate tax revenues to GDP as provided in GFS and IFS. "Marginal Tax Rates" are the top corporate statutory rates as provided in the OTPR database. The "Measure of Private Benefits" is the control premium in negotiated control block sales, as computed by Dyck and Zingales (2004). "Rule of Law" is a measure of the law and order tradition as computed by the International Country Risk Guide and reported in La Porta et al. (1998). "Anti-director rights" is a measure of shareholder rights computed and reported in La Porta et al. (1998). "Tax Evasion" is a measure of tax compliance reported in the Global Competitiveness Report for 1995 as reported in La Porta et al. (1999). "Corruption" is the 1998 value from the World Bank governance indicators database described in Kaufman et al. (2005), with higher values corresponding to better outcomes. Log GNP per capita is the average of 1970-1995, from the World Bank.

	No of Obs.	Mean	Median	Std. Dev.	Min	Max
Panel Variables						
Log Corporate Tax Revenues	486	3.763	2.974	2.948	-5.298	14.409
Corporate Tax Revenues/Total Tax Revenues	481	0.118	0.087	0.094	0.009	0.436
Corporate Tax Revenues/GDP	477	0.026	0.021	0.017	0.003	0.112
Marginal Tax Rates	462	0.364	0.360	0.097	0.098	0.560
Measure of Private Benefits	486	0.124	0.072	0.146	-0.043	0.650
Rule of Law	462	8.070	8.680	2.170	2.100	10.000
Anti-Director rights	398	3.008	3.000	1.148	1.000	5.000
Corruption index	456	1.358	1.557	1.040	-0.609	2.583
Tax Evasion	462	3.389	3.410	0.899	1.770	4.670
Cross-Sectional Variables						
Country-Specific Slopes Using Log Corporate Tax Revenues	32	0.9731	-0.1183	5.6650	-7.2815	23.2709
Country-Specific Slopes Using Corporate Tax Revenue to Total Revenue Shares	32	0.0510	-0.0025	0.4961	-1.0454	1.7917
Country-Specific Slopes Using Corporate Tax Revenue to GDP Shares	32	0.0244	0.0003	0.1716	-0.3528	0.7774
Measure of Private Benefits	28	0.1504	0.0731	0.1809	-0.0430	0.6495

Table 6: Does Governance Influence the Relationship Between Tax Rates and Tax Revenues?

This table examines whether the quality of corporate governance influences the relationship between tax rates and tax revenues. We use three different proxies for tax revenues as dependent variables: the log of corporate tax revenues (columns 1-5 Panel A, 1-6 Panel B), the ratio of corporate tax revenues to GDP (column 6 Panel A), and the ratio of corporate tax revenues to total tax revenues (column 7 Panel A). "Marginal Tax Rates" are the top corporate statutory rate as provided in the OTPR database The "Marginal Tax Rate Interacted with Measure of Private Benefits" is the product of the tax rate and the control premium in negotiated control block sales, as computed by Dyck and Zingales (2004). The variables included in the robustness tests in Panel B are a product of the marginal tax rate interacted with: a measure of the law and order tradition as computed by the International Country Risk Guide and reported in La Porta et al. (1998) (column 1), a measure of tax compliance computed by the Global Competitiveness Report for 1995 as reported in La Porta et al. (1999) (column 2), a corruption index for 1998 from the Worldbank Governance database, described in Kaufman (2005) (column 3), the anti-director rights index of La Porta et al. (1998) (column 4), and log GNP per capita (average 1970-1995) from the World Bank as reported in La Porta et al. (1999) (column 5). In column 6 Panel B, we instrument for marginal tax rates and for the interaction of tax rates with private benefits with ideological orientation of the chief executive from the Database of Political Institutions (Beck et. al. (2001)), and the ideological orientation interacted with private benefits. All specifications employ country fixed effects and the interactions of those country fixed effects with log GDP. Standard errors are presented in parentheses and correct for clustering of residuals at the country level.

Panel A - Main Results

Dependent Variable:	**Log of Corporate Tax Revenues**					**Corporate Tax Revenues/ GDP**	**Corporate Tax Revenues/ Total Tax Revenues**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All Countries	Low Private Benefit Countries (<7.5%)	High Private Benefit Countries (>7.5%)	Lower Private Benefit Countries (<10.0%)	Higher Private Benefit Countries (>10.0%)	All Countries	All Countries
Marginal Tax Rates	1.2627	1.2438	-0.4072	1.0444	-0.9598	0.0137	0.0182
	(0.5756)	(0.5249)	(0.5539)	(0.4798)	(0.5281)	(0.0098)	(0.0569)
Marginal Tax Rates Interacted with Measure of Private Benefits	-6.0502					-0.0698	-0.2866
	(2.2017)					(0.0386)	(0.2492)
Country Fixed Effects?	Y	Y	Y	Y	Y	Y	Y
Log GDP Interactions with Fixed Effects?	Y	Y	Y	Y	Y	Y	Y
Number of Countries	31	16	15	18	13	31	31
No Obs.	458	270	188	309	149	458	453
R-Squared	0.9588	0.8810	0.9796	0.8687	0.9861	0.5599	0.6929

Panel B - Robustness

Dependent Variable:	**Log of Corporate Tax Revenues**					**IV**
	(1)	(2)	(3)	(4)	(5)	(6)
	All countries	All countries	All countries	All countries	All countries	All countries
Marginal Tax Rates	-1.0706	3.968	-0.1378	1.3285	-4.9446	6.8097
	(1.1913)	(1.47)	(0.8162)	(1.9587)	(3.7902)	(1.4333)
Marginal Tax Rates Interacted with Measure of Private Benefits	-5.4275	-9.036	-4.3908	-6.0930	-4.7807	-36.5611
	(1.9341)	(2.48)	(2.0688)	(1.7814)	(1.9633)	(13.9816)
Marginal Tax Rates Interacted with Rule of Law	0.2586					
	(0.1339)					
Marginal Tax Rates Interacted with Tax Evasion		-0.0184			-0.0184	
		(0.5607)			(0.5607)	
Marginal Tax Rates Interacted with Corruption index			0.7229			
			(0.3095)			
Marginal Tax Rates Interacted with Anti director rights				-0.7257		
				(0.36)		
Marginal Tax Rates Interacted with Log GNP per capita					0.6669	
					(0.4165)	
Country Fixed Effects?	Y	Y	Y	Y	Y	Y
Log GDP Interactions with Fixed Effects?	Y	Y	Y	Y	Y	Y
Number of Countries	31	31	31	31	31	29
No Obs.	458	458	431	378	458	422
R-Squared	0.9593	0.9590	0.9961	0.9963	0.9588	0.9926

Table 7: The Relationship Between Tax Rates and Tax Revenues Using Country-Specific Slopes

The dependent variable in column 1 is the country-specific slope generated by regressing the log of corporate tax revenues on log GDP and the corporate statutory rates. The dependent variable in column 2 is the country-specific slope generated by regressing the ratio of corporate tax revenues in GDP on log GDP and the corporate statutory rates. The dependent variable in column 3 is the country-specific slope generated by regressing the ratio of corporate tax revenues to total tax revenues on log GDP and the corporate statutory rates. The "Measure of Private Benefits" is the control premium in negotiated control block sales, as computed by Dyck and Zingales (2004). All estimates are weighted least squares regressions where observations are weighted by the inverse of the variance of the measured slopes from country-specific regressions.

Dependent Variable:	**Country Specific Slopes using Log of Corporate Tax Revenues**	**Country Specific Slopes using Corporate Tax Revenues/GDP**	**Country Specific Slopes using Corporate Tax Revenues/Total Tax Revenues**
	(1)	(2)	(3)
Constant	0.6958	0.0108	0.0139
	(0.4673)	(0.0065)	(0.0180)
Measure of Private Benefits	-3.4626	-0.0479	-0.1020
	(1.4096)	(0.0174)	(0.0488)
No Obs.	28	28	28
Weighted by the Inverse of the Variance of the Measured Slope?	Y	Y	Y
R-Squared	0.1332	0.1370	0.0507

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