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STATE OWNERSHIP AND INVESTOR PROTECTION:

DYNAMIC MODEL OF THE COST OF CAPITAL;

EMPIRICAL INVESTIGATION OF A WORLDWIDE PANEL OF FIRMS

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$$N_{it+1} = [\alpha_{it}(1-d_{it+1}) + d_{it+1} - p(k_{it}, d_{it+1}, \sigma_{it})][\Pi(K_{i,t+1}) - s(\sigma_{it}, k_{it})]. \quad (1) \ldots 19$$

$$d_{it+1}^{*} = \frac{1-\alpha_{it}}{k+\eta\sigma}. \quad (2) \ldots 19$$

$$V_{it} = E[M_{it+1}(1-\alpha_{it}-\sigma_{it})(1-d_{it+1})[\Pi(K_{it+1}) - s(\sigma_{it}, k_{it})]], \quad (3) \ldots 20$$

$$C_{it+1} = N_{it+1} + (1+R_{it+1})(W_{it} + V_{it} - K_{it+1} - C_{it}), \quad (4) \ldots 21$$

$$(1-\sigma)E[M_{+1}\Pi^{K}] = 1 \quad (5) \ldots 22$$

$$E[\pi^{K}] = \frac{\sigma}{1-\sigma} + \frac{1}{1-\sigma}R_{+1}^{F} + \delta - \frac{\mathrm{cov}(M_{+1}, \pi^{K})}{E(M_{+1})}. \quad (6) \ldots 23$$

$$c_1 E[m_{+1}\Pi^{K}] + c_2 E[M_{+1}\Pi^{K}] = 1, \quad (7) \ldots 24$$

$$E[\pi^{K}] = \frac{1+R_{+1}^{F}}{c_1+c_2} - 1 + \delta - \frac{c_1}{c_1+c_2}\frac{\mathrm{cov}(m_{+1}, \pi^{K})}{E[m_{+1}]} - \frac{c_2}{c_1+c_2}\frac{\mathrm{cov}(M_{+1}, \pi^{K})}{E[M_{+1}]} \quad (8) \ldots 24$$

$$c_1^{\alpha} E[m_{+1}(\Pi(K_{+1}) - s(\sigma,k))] + c_2^{\alpha} E[M_{+1}(\Pi(K_{+1}) - s(\sigma,k))] = 0, \quad (9) \ldots 25$$

$$E[m_{+1}(\Pi(K_{+1}) - s(\sigma,k))] = \frac{1-2d-\dfrac{\sigma}{k+\eta\sigma}}{1-d} E[M_{+1}(\Pi(K_{+1}) - s(\sigma,k))], \quad (10) \ldots 26$$

$$E[m_{+1}\Pi^{K}] = \frac{c_2^{\alpha}}{c_1 c_2^{\alpha} - c_2 c_1^{\alpha}}\left(1 - \frac{c_2}{c_1^{a} c_2^{\alpha}}(c_1^{a} + c_2^{\alpha})\frac{1}{1+R_{+1}^{F}}\frac{s(\sigma,k)}{K_{+1}}\right), \quad (11) \ldots 27$$

$$\pi_{it+1}^{K} \cong \frac{1+R_{t+1}^{F}}{1-\sigma_{it}} - (1-\delta) + \hat{\Lambda} + (\hat{\lambda} - \hat{\Lambda})\frac{\alpha_{it}}{1-\sigma_{it}} + u_{it}, \quad (12) \ldots 39$$

$$MPK_{it+1} = \beta_{0i} + \beta_1 OWN_{it} + \sum_{m=2}^{10}\beta_m YEAR_{mit} + \beta_{11} SIGMA_{it} + \beta_{12}(OWN * SIGMA)_{it} + u_{it} \quad (13) \ldots 39$$

$$\Delta OWN_{it} = \delta_1 \Delta MPK_{it-1} + \delta_2 \Delta \ln(TA)_{it} + \delta_3 \Delta TD\_TA_{it} + \zeta_{it} \quad (14) \ldots 41$$

$$\Delta MPK_{it+1} = \gamma_1 \Delta OWN_{it} + \gamma_3 \Delta SIGMA_{it} + \gamma_4 \Delta(OWN * SIGMA)_{it} + \gamma_2 \Delta TD\_TA_{it} + \xi_{it} \quad (15) \ldots 41$$

$$q_{it} = \frac{(1-2d_{+1})(1-d_{+1})}{1-\frac{1}{2}d_{+1}(3+\alpha)} > 1. \quad (16) \ldots 50$$

I. Introduction

The debate on the role of state ownership in firm performance has largely settled on the opinion that the state is inefficient owner because it does not maximize shareholders' wealth, destroys incentives by subsidization, slows down restructuring, imposes over-employment (among other reasons). Empirically much support has been found for the superior performance of privatized and private firms compared to state-owned enterprises. Recently, however, observers have argued that privatization has not fared very well in developing and transition economies.[1] The suggested explanation is that those countries have no institutional framework that facilitates the efficiency of private ownership, consequently in many cases privatization has resulted in asset-stripping, tunneling and has failed to attract foreign investments and managerial talent and to create functioning market economies in those countries.[2] The population has become unhappy with economic reforms and is likely to oppose further sales even though reforms have positive effects if undertaken with care.[3]

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[1] Nellis (2001) presents a detailed account of the privatization processes in three transition economies, Coffee 1999 describes the securities market failure in the Czech Republic and Poland, Economist July 19, 2001 "A Mess: How not to build a private sector" describes the sorry condition of privatized textile factories in Iran that has raised renationalization calls.

[2] Stiglitz (1999) voiced the opinion that privatizing in the absence of a sufficient, market-supporting "institutional infrastructure" was a serious mistake that could and did "lead more to asset stripping than wealth creation." Johnson et al (2000) for analysis of tunneling, the term refers to the transfer of assets and profits out of firms for the benefit of their controlling shareholders.

[3] "Most [people] are now hostile to privatisation. And everywhere fewer (though still most) now think that the state should leave the economy wholly to the private sector." "The Latinobarometro poll: Democracy clings on in a cold economic climate" The Economist Aug 15th, 2002; and see

Some empirical evidence based on more than 30 empirical studies on individual and groups of transition countries (quantitative synthesis in Djankov and Murrell (2002)) suggests that state ownership in partially privatized companies is more than or at least as effective in producing restructuring as other types of block and insider owners.[4]

This paper incorporates the effect of the state in a theoretical model for the cost of capital. The mathematical results show why it might be possible for some degree of state ownership to be efficient under poor investor protection and weak institutions. I introduce the source of inefficiency through the decision of the manager to divert resources from the firm due to poor legal preventive mechanisms. Further, I claim that under some degree of state ownership it is more costly for the manager to steal, because he might be compelled to share benefits with the politicians or it might be too costly to hide from them. Additionally the politicians impose a degree of over-employment on the firm to secure votes, which leads to a decrease in company profits. Consequently, state ownership acts as a monitoring mechanism that limits diversion but imposes a cost. When the manager makes the decision to finance investment with new equity, he has to signal to the market - characterized by poor investor protection - his commitment to limit diversion by retaining some share ownership for himself. In this way he cannot diversify his idiosyncratic risk and assigns a higher cost of capital than the optimal rate assigned by the market. Ultimately diversion and over-employment result in higher cost of capital and

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"The politics of privatization: Arequipa's anger, Peru's problem" The Economist Jun 20th 2002 on the popular revolt against the privatization of two electricity generators in Peru.

[4] See Anderson et al. (2000) for Mongolia, Frydman et al. (1999) for the Czech Republic, Hungary and Poland, Lee (1999) and Tian (2003) for China.

passing up profitable investment opportunities. Interestingly in some cases the cost of capital might be reduced when the state owns part of the company. This happens under very poor investor protection when the managers would otherwise choose very high levels of diversion, they limit stealing due to their own share ownership, as well as due to state ownership.

The empirical part of this work uses a worldwide panel dataset to document the effect of state and insider ownership on the firm's cost of capital. Several recent studies analyze the relationship between the level of investor protection a firm faces and its valuation through the level of managerial ownership and other factors.[5] They all use only cross-sectional data, since time series data for the level of investor protection or insider ownership is not available. Using panel data allows me to resolve some of the econometric problems with these studies. Further my treatment of state ownership is unique in the literature.

After controlling for unobserved firm specific effects and potential simultaneity of ownership and the cost of capital I find that concentrated insider ownership results in a higher cost of capital. This is consistent with previous evidence in Himmelberg et al. (2001) who use different econometric procedures. In my sample the presence of the state by itself also increases the cost of capital, again confirming that state ownership is inefficient. However, insider and state ownership combined result in lower cost of capital.

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[5] Durnev and Kim (2003), La Porta et al. (2002), Lins (2003)

The set of assumptions used to generate the trade-off between insider ownership and diversion can be seen to accommodate a number of real world privatization scenarios. The mass or voucher privatization schemes fit especially well, because the new owners acquired privatized companies for fictitious money (checks or vouchers) and did not have incentives to get their investment back by maintaining productivity but rather wanted to quickly liquidate any valuable assets left and stash the money in Swiss bank accounts. Even sales to foreign investors that seem a way to prevent asset stripping, because the new owners pay real cash for the companies, can very well fit under the model. In countries with poor investor protection any rational player (domestic or foreign) will take advantage of the system to maximize wealth.[6]

The present framework focuses on the cost of capital at the microeconomic level and does not attempt to measure the macroeconomic effects of poor investor protection. It is then possible to argue that piecemeal liquidation was the value-maximizing strategy no matter how the company was paid for and on the macro level the total welfare hasn't changed after privatization. However what we see rarely are swift and efficient asset sales, rather the privatized companies are used as a vehicle for resource diversion and are kept operational. In many instances wages are due for more than 6 months, and tax and social security payments are consistently defaulted on.[7] It seems the insider/managers

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[6] "...even western companies saw opportunities that tempted them to throw corporate governance and rights of minority shareholders to the winds." Economist "Grab and Smash" and "Capital Punishment" Survey: Finance in Central Europe 9/12/02

[7] Two privatized textile companies in Iran ended up in this position, see footnote 2. The largest steel plant in Bulgaria "Kremikowtzi" was sold to its new private owner for $1 (because of huge debts) and currently the factory pays generous wages but at the expense of social security

keep diverting until the limited investor protection mechanisms finally put them in jail or force them to run abroad.[8]

The rest of the paper is organized as follows: in chapter 2 I present a review of the literature, while chapter 3 develops a dynamic model of state ownership and investor protection. Chapter 4 describes real world implications of the model, chapter 5 describes my data, the empirical tests and results and chapter 6 concludes.

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contributions. It is able to get away with this because the current administration is willing to close its eyes (implicit subsidization).

[8] Or as Demsetz and Villalonga (2001) put it: "We have no doubt that management is self-serving to the degree that imperfect monitoring allows it to be."

II. Review of the literature

The main conclusions of the international corporate governance literature are: (1) ownership matters in non-US settings, and (2) the agency problems are not between the managers and the dispersed shareholders, rather between the majority and minority shareholders. The first conclusion can be drawn from the papers patterned after the corporate governance literature on the US, classified as first generation research in international corporate governance by Denis and McConnell (2003).[9] The early influential paper by Morck et al. (1988) that finds a significant relationship between ownership and Tobin's Q has been critiqued by Himmelberg et al. (1999) and Demsetz and Villalonga (2001) among others, because it fails to account for the endogeneity and simultaneity of ownership and performance. Once ownership and performance are modeled in a simultaneous equations framework (which is the only appropriate method if simultaneity is present) the significance of ownership disappears. The intuition behind this result is that in the US ownership structures are in equilibrium and no improvement is possible. In the international studies, however this relationship remains important and robust.

The second finding that shifts the focus of governance studies is related to the varying degree of investor protection around the world, treated systematically by La Porta, Lopes-de-Silanes, Shleifer and Vishny (1998) (LLSV). This paper started the

[9] Recent surveys of the corporate governance literature on the US are: Hermalin and Weisbach (2001) – boards, Core et al. (2001) – executive compensation, Holderness (2002) – insider and block ownership, Holmstrom and Kaplan (2001) – takeovers.

second generation international corporate governance research that uses the measures of legal protection developed by LLSV. Researches have recognized however that legal factors are not a perfect measure of the degree of investor protection shareholders face. Two recent papers by Durnev and Kim (2003) and Klapper and Love (2002) use measures of investor protection that are company specific and not country wide. This paper will treat investor protection in this latter sense and the only time I use country level variables is in the construction of sub-samples.[10]

The corporate governance literature is summarized in Table 1. My study combines elements of the investor protection and private benefits of control branches of the second generation of governance research. My theoretical model uses a partial equilibrium framework at the microeconomic level and clarifies the joint effect of state ownership and poor investor protection on the marginal product of capital and the expected discounted profit of the company. The empirical investigation in the second part of the paper represents a multi-country multi-company study of the effect of ownership concentration on the cost of capital.

The conceptual ideas and the empirical investigations in this paper draw on several large streams of literature. These include classical agency theory (Jensen and Meckling (1976), Burkart et al. (1998)), the effect of investor protection on valuation (LLSV (2002), Durnev and Kim (2003), Lins (2003)), the impact of financial market imperfections on investment (surveyed by Hubbard (1998)), law and finance (see LLSV

[10] My panel dataset allows me to use fixed effect models, where mean or time differencing eliminates any time invariant variables (the level of investor protection can be treated as an omitted variable).

(2000)), state versus private ownership (Megginson and Netter (2001), Djankov and Murrell (2002), Boubakri et al. (2002)), and the private benefits of control (Dyck and Zingales (2002)). I first examine the existing theoretical models that have been incorporated in the model developed here, and then discuss several empirical studies that directly relate to the motivation for this work.

The theoretical models on privatization have generally used several frameworks. Early work is based on the transactions costs between the state and the manager (Sappington and Stiglitz (1987)), or the information asymmetries between them (Shapiro and Willig (1990)), or the possibilities of bail-outs by the government (Kornai (1979)), more recent models focus on the lack of incentives for efficient monitoring of public enterprises which causes the transfer of income from public firms to favored interest groups (Shleifer and Vishny (1994)). My model incorporates the last approach, where the politician imposes excess employment to secure votes and monitors managerial performance. The monitoring hypothesis does not rely on perfect market incentives for the politician; it simply imposes higher costs of stealing for the manager.

	First generation	Second generation
Question	WHAT is the pattern of corporate governance outside the US?	WHY is international corporate governance different from the US?
Focus	Conflict between managers and shareholders	Conflict between majority and minority shareholders
Characteristics	Patterned after US corporate governance research; looks at separate countries	Multi-country studies, emphasis on legal and regulatory issues
Topics	Internal mechanisms • Board • Executive compensation • Ownership and control o Concentration – block premiums; private benefits of control o Insider; separation of control and CF rights (pyramids, cross-holdings, groups) o Foreign o State – privatization External mechanisms • Takeovers	Investor Protection • Country level o Availability of external finance o Efficient investment • Company level o Excess cash balances o Information symmetry o Valuation o Rates of return o Diversification Private benefits of control • Premiums on voting shares in block transactions • Tunneling • Family ownership • Monitoring by outside block owner Convergence • De jure vs. de facto convergence • Cross-listing as evidence
Results	• Large shareholders are more prevalent outside the US • Ownership is more important for performance than in the US	Better protection of investors' rights results in • Better access to financing • Higher valuation

Table 1. Map of the International Corporate Governance Literature

Source: Compiled by author based on the survey by Denis and McConnell (2003)

This paper focuses on the diversion – punishment element of the model in Shleifer and Wolfenson (2000). They derive the managerial going-public decision and the market equilibrium, then the authors relate the results to all "basic empirical regularities concerning the relationship between investor protection and corporate finance." Himmelberg et al (2001) use an intertemporal maximization model with investor protection but only link it to the choice of insider ownership and derive the result of too high cost of capital due to poor investor protection. They show empirically that insider ownership is significantly higher in countries with poorer investor protection. Further the authors test the equation for the cost of capital and find significant premia for the idiosyncratic risk that the insiders bear because they have retained some ownership. However, they do not account for the potential endogeneity of ownership. My model employs the same ideas but it introduces the role of state ownership, and I employ different econometric procedures in the empirical tests.

The present model can also be classified under the large monitoring literature, where the insider is controlled by an outside block owner. However, the state is a unique owner; its incentives and behavior are different from those of a corporate block owner that may have a monitoring role. A better analogy for my setup would be the role of strong unions or the effect of taxation in developed economies.

Several recent empirical studies address the role of different types of concentrated ownership. Most of them find a positive effect of concentrated ownership on valuation.

The work by LLSV (2002) looks at the effect of investor protection on valuation, whereas this paper focuses on the relationship between investor protection and state

ownership and their effect on the cost of capital. LLSV derive the theoretical predictions from a simple model that takes insider ownership as an exogenous variable, while I model it endogenously. LLSV examine only the largest 20 firms in 27 wealthy economies and find that better investor protection is associated with higher valuation of corporate assets, and also find evidence that higher manager/insider stakes are associated with higher valuations. In this study I derive a relationship for the cost of capital and my findings are consistent with LLSV. Additionally, I use a much wider sample of all publicly traded companies that attract investor interest from 37 economies (both developed and developing).

Claessens et al. (2002) report that for eight East Asian countries the cash flow rights held by the largest block-holder are positively related to value. Claessens and Djankov (1999) study Czech firms and find that firm profitability and labor productivity are positively related to ownership concentration. Gordon and Schmid (2000) report the same finding for German firms.

Durnev and Kim (2003) present the most comprehensive study to date explaining the effect of corporate governance on firm valuation and investment. They use two sources of survey-based corporate governance (I call it investor protection in this study) data that has recently become available and cover 859 companies from 27 countries. However, they again focus on valuation rather than cost of capital, do not address the role of the state as an owner, and are limited by the cross-section nature of the data.[11]

[11] Data on corporate governance practice compiled by Credit Lyonnais Securities Asia and Standard and Poor's disclosure data.

Dyck and Zingales (2002) examine control transactions in 39 countries and price the benefits of control. They find that high levels of investor protection and law enforcement are associated with lower levels of the private benefits of control. In the framework of my analysis, these results support my assertion that in strong institutional environments managers choose to retain lower ownership stakes. Boubakri et al (2001) test the performance of newly privatized firms in light of the effects of institutional development, and empirically confirm my conjecture that the performance of privatized firms is better in countries with more developed markets and mechanisms for protection of property rights. Boubakri et al. (2002) concentrate on privatized companies in developing countries only and look at the effect of ownership concentration on operating performance. They use an ad hoc empirical specification rather than testing a structural equation.

All multi-country studies (including the ones just cited) that examine performance have to use accounting based measures, since stock market data from countries other than a handful of developed countries is unreliable or unavailable. I avoid this problem by focusing on an estimated cost of capital measure.

Djankov and Murrell (2002) perform a meta-study on a comprehensive group of empirical papers on privatization in transition economies and are able to make summary conclusions with a great testing power based on many test statistics with lower power. Their findings suggest that state ownership in partially privatized companies is more effective in producing restructuring than other types of block and insider owners. Claessens et al. (1998) find similar results for East Asia. However Boubakri and Cosset

(1998) conclude that performance improvement is greatest when governments relinquish voting control, similarly D'Sousa et al. (2001) report that efficiency gains increase as government ownership declines. My model accommodates these conflicting findings depending on the input parameters that will differ for data samples from different types of companies and countries.

The empirical issues in the international corporate governance literature include but are not limited to: missing data, measurement error, omitted variables/unobserved effects, endogeneity and simultaneity bias, and poor variable measures. Table 2 systemizes these problems. Note that most of the issues can be resolved using panel data and simultaneous equations, as I do in this work.

Most of the studies in the international governance literature have used cross-sectional datasets which are not suitable to make inferences about the causality of the relationship between ownership and performance. Himmelberg et al. (2002) use panel data, but do not address causality. Lins (2003) specifies simultaneous equation models and does find reverse causality between non-management ownership and Tobin's Q values.

Issues	Country studies - panel datasets	Company studies - mostly cross sectional
Measurement error	-	-
Omitted variables	Difference or mean difference estimators	Cannot be addressed if no time dimension in data and no appropriate proxies
Endogeneity	Instrumental variables, lagged dependent variables	IV techniques, difficult to find good instruments
Simultaneity	Establish causality by simultaneous equations	Use simultaneous equations, panel techniques, measures of investor protection are time invariant
Problematic measures of performance variables	Growth, investment, savings rates	Accounting based measures, stock market data very scarce

Table 2. Econometric Issues and Ways to handle them in Second Generation Empirical International Corporate Governance Research

My empirical analysis uses a crude measure of insider ownership: the proportion of the shares held by owners of more than 5% of the company, but since this measure has a 10 year horizon that allows me to employ panel techniques. A much better measure of the insider ownership variable in my theoretical model is the entrenchment measure constructed by Faccio and Lang (2002) that incorporates the disparity between cash flow and voting rights of the manager.[12] However, currently these are static data and cover Western Europe only. I prefer to keep the scope of or analysis as wide as possible and retain its time dimension.

[12] "cash flow to control right ratio" also borrowed by Lins (2003) ("management group control rights leverage") and Durnev and Kim (2003)

Another fact that mitigates the crudeness of my ownership measure is the focus of my paper on international companies. The distinction between professional managers and outside large shareholders is largely irrelevant in the international setting, because "the management group (and its family members) is usually the largest block holder".[13] This is different than the US, where the fraction of stock owned by professional management is typically less than 10%.[14] In non-US firms the manager and the largest owner more often than not are merged into the same figure.

One can think of my empirical analysis as looking at the effect of two types of company blockholders: the insider and the state. Lins (2003) shows that the presence of an outside blockholder reduces the entrenchment of the management, and this relationship is stronger in countries with weaker investor protection. I conjecture that the state as an owner may have this positive effect as well.

[13] see Lins (2003)

[14] Demsetz and Villalunga (2001) report this for their random sample of 223 firms.

III. Model

The model in this paper follows the intertemporal utility maximization models that lead to Euler equations for investment and consumption.[15] I introduce the source of inefficiency through the higher discount rate assigned by the manager of the firm compared to the one assigned by the market following the "crime and punishment" approach in Himmelberg, Hubbard and Love (2001) (HHL).[16] The novelty in my specification is introducing the role of state ownership and its interaction with poor investor protection.

After simplifying the infinite dynamic maximization that results in Euler equations, the model can be viewed as consisting of two periods. At time 0 the players choose the optimal levels of their decision variables, and at time 1 production and profits are realized. The managers or insiders of the firm choose a level of diversion that is a portion d_{it+1} from the profits of the firm $\Pi(K_{it+1})$. It is important to point out that in this paper the use of the term insider/manager or manager for short does not refer to the "strong manager – weak dispersed owners" scenario of Berle and Means (1932). Rather by "manager" I mean the group of controlling shareholders and the executive team that acts in unison.[17] One can argue that there is a monitoring process going on within the controlling group, however for the purposes of this study I assume that this has been

[15] See Himmelberg, Hubbard and Love (2001), Girchlist and Himmelberg (1998), Hubbard, Kashyap and Whited (1995), Whited (1992), Calomiris and Hubbard (1995), Hubbard and Kashyap (1992), and Love (2000), refer to Hubbard (1998) for a survey.

[16] They use the ideas in Shleifer and Wolfenson (2000).

[17] This distinction has already been addresses in more detail on p 15.

resolved with a collusion outcome (see Burkart, Panunzi and Shleifer (2002) for a similar outcome in family owned firms) and I concentrate on the relationships between the controlling team and the outsiders. Furthermore, what I mean by diversion is not only the illegal activities that can be described as outright theft, but also some legal mechanisms of diversion that involve costs. Note that diversion is pervasive in developed economies as well; simply the insider/managers have to set up intermediary companies, or consult expensive corporate attorneys, or in other ways protect themselves from being punished or accept the cost of potentially being caught.

The profit function for the company is increasing in the amount of capital the manager will choose to invest at time 0, $\Pi^K \geq 0$.

A portion σ_{it} of this company's equity is owned by the state. The state ownership translates into the actions of a politician who has some discretion over the decisions of the manager. The politician wants to improve his chances for being reelected by imposing on the firm inefficient over-employment that reduces profits by $s(\sigma_{it}, k_{it}), s^{\sigma} \geq 0$, $s^{k} < 0$. The amount of profit reduction would also generally depend on the number of excess workers, on the wage differential they are getting and possibly on the subsidy the politician may be able to direct to the company to induce the manager to comply with the imposed over-employment.[18] However, for my analysis it suffices to introduce some sort of inefficiency of the state as an owner and I choose to call it over-employment.

[18] Shleifer and Vishny (1994) and Boycko, Shleifer and Vishny (1996) develop game theoretical models of the interaction between the manager and the politician when choosing optimal amounts

The manager/insider faces a punishment technology for diversion $p(k_{it}, d_{it+1}, \sigma_{it})$ that is increasing in the index of investor protection k, $p^k > 0$, in the amount of diversion d, $p^d > 0$, and in the amount of equity owned by the state σ, $p^\sigma > 0$. I assume that the manager will face higher monetary cost of stealing under state ownership because he might be forced to share some of the diverted funds with the politician or it may be costly to divert without the politician finding out. Note that this effect is separate from the investor protection index that also increases the cost of stealing. The second derivatives are important for later results: it is reasonable to assume that the marginal cost of stealing is greater at higher levels of stealing and under better investor protection, or $p^{dd} > 0$ and $p^{kd} > 0$; also I expect that diversion is costlier at higher levels of state ownership, or $p^{d\sigma} > 0$. I will use the following functional form of the punishment technology: $p(k_{it}, d_{it+1}, \sigma_{it}) = \frac{1}{2}(k + \eta\sigma)d^2$, where η is a measure of the effectiveness of the politician in monitoring the manager per unit of state ownership ("the scare factor").[19] Then the marginal cost of stealing will be $p^d = (k + \eta\sigma)d \geq 0$.

Another way to curb stealing is the option of the manager to retain some ownership α_{it} in the company for himself. He offers some equity to the public, but under imperfect investor protection outside investors anticipate some amount of stealing, thus

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of excess employment and subsidies. Here I simply introduce the resulting inefficiency after the bargaining game between the manager and the politician has been resolved.

[19] This term was coined by Neal Maroney when I presented this paper at University of New Orleans.

the manager retains some equity to signal that he will not expropriate them. The manager is left with the following net benefit from stealing:

$$N_{it+1} = [\alpha_{it}(1 - d_{it+1}) + d_{it+1} - p(k_{it}, d_{it+1}, \sigma_{it})][\Pi(K_{i,t+1}) - s(\sigma_{it}, k_{it})]. \quad (1)$$

Equation 1 says that the manager gets a proportion of profits (net of the cost of over-employment). That proportion is his own share of the company α times what is left after diversion $1-d$ plus the entire amount diverted less the cost of diversion.

To maximize his net benefit, the manager chooses to divert d^* such that $1-\alpha = p^d(k,d,\sigma)$, or under my assumption about the functional form of $p(k_{it}, d_{it+1}, \sigma_{it})$:

$$d_{it+1}^* = \frac{1-\alpha_{it}}{k+\eta\sigma}. \quad (2)$$

I split the maximization in this model into two parts: the static first stage where the manager chooses only the optimal amount of diversion, then given this result I introduce the dynamic setup of the inter-temporal utility of consumption of the manager. This approach simplifies work and is widely used in the literature.[20]

The manager chooses to steal until the marginal cost of stealing an additional dollar is exactly equal to the portion of that dollar $(1-\alpha_{it})$ that comes from outside shareholders and the state. This result is a version of the classical consumption of perks condition in Jensen and Meckling (1976) and is present in HHL and LLSV.

[20] For example in McGuire and Olson (1996)

After totally differentiating the first order condition with respect to α, σ and k I can sign the derivatives based on the assumptions about $p(k_{it}, d_{it+1}, \sigma_{it})$. I get: $\frac{dd^*}{dk} = -\frac{p^{dk}}{p^{dd}} < 0$; $\frac{dd^*}{d\alpha} = -\frac{1}{p^{dd}} < 0$; $\frac{dd^*}{d\sigma} = -\frac{p^{d\sigma}}{p^{dd}} < 0$ and conclude that the optimal amount of stealing is lower for greater insider ownership, greater state ownership and greater level of investor protection.

Differentiating once again involves some third derivatives and they are zero in the case of quadratic punishment technology: $\frac{d^2 d^*}{d\alpha dk} = \frac{p^{ddk} + p^{ddd}\frac{dd^*}{dk}}{\left(p^{dd}\right)^2} > 0$ and $\frac{d^2 d^*}{d\alpha d\sigma} = -\frac{0 - \left(p^{dd\sigma}\frac{d\sigma}{d\sigma} + p^{ddk}\frac{dk}{d\sigma} + p^{ddd}\frac{dd^*}{d\sigma}\right)}{\left(p^{dd}\right)^2} > 0$, then I can say that the optimal amount of diversion is decreasing at an increasing rate as insider ownership and the level of investor protection/state ownership increase. (These results are identical to LLSV(2002))

Before I turn to maximizing the manager's inter-temporal utility, let's assume the manager has some initial wealth W_{it} and consider the value of the equity the manager places on the market:

$$V_{it} = E[M_{it+1}(1-\alpha_{it}-\sigma_{it})(1-d_{it+1})[\Pi(K_{it+1}) - s(\sigma_{it}, k_{it})]], \qquad (3)$$

where M_{it+1} is the market discount factor and I assume that $E[M_{it+1}]=\frac{1}{1+R^F_{it+1}}$, where R^F_{it+1} is the risk free rate on the market at time 1. This assumption implies risk neutrality; however I do not preclude risk aversion of the minority shareholders, I simply suppress the risk premium to zero because it allows me to parameterize the first order conditions. Furthermore, zero risk premium is without loss of generality because my results are based on the difference between the risk premium assigned by the manager and that assigned by the market and not on the actual level of the risk premium.

Equation 3 says that the value of the stock put on the market is the expected discounted portion of net profits. That portion is what is left for minority shareholders $(1-\alpha-\sigma)$ times what is left after diversion $1-d$.

Now I specify how much the manager can consume at time 1 or

$$C_{it+1} = N_{it+1} + (1+R_{it+1})(W_{it} + V_{it} - K_{it+1} - C_{it}), \qquad (4)$$

where R_{it+1} is the opportunity cost of the manager.

Equation 4 states that at time 1 the manager will have his benefit of diversion plus his current wealth net of investment and current consumption compounded one period ahead.

The manager's maximization problem is:

$$\max_{K_{it+1},\alpha_{it},C_{it}} U(C_{it}) + \beta E[U(C_{it+1})], \text{ subject to (1)} - \text{(4)}$$

The above is the Bellman equation form of a standard dynamic maximization problem, where the manager interchanges consumption today for consumption tomorrow according to the factor β and where $U(C)$ is a standard concave utility function.

1. The Case of Perfect Investor Protection

In the case of perfect investor protection the manager does not find it worthwhile to steal, because the cost of stealing is infinite. On the other hand, outside investors also recognize that the manager would not divert and there is no need for him to signal his commitment by retaining ownership, he would prefer to diversify completely by selling all equity not owned by the state. (From now on I suppress the subscripts i and t, t+1 will be denoted by +1) Then $\alpha = 0$ and $d_{+1} = 0 \Rightarrow N_{+1} = 0$ and the maximization problem becomes:

$\max_{K_{+1},C} U(C) + \beta E[U(C_{+1})]$, where

$$C_{+1} = (1 + R_{+1})(W + E[M_{+1}(\Pi(K_{+1}) - s(\sigma,k))] - K_{+1} - C)$$

The first order condition, using $\Pi^K = \frac{\partial \Pi}{\partial K_{+1}}$, is:

$$(1-\sigma)E[M_{+1}\Pi^K] = 1 \qquad (5)$$

Equation 5 is saying that the expected discounted marginal value of capital of the firm is higher than one by exactly the stake of the state. I then conclude that state ownership by itself is inefficient.

Assuming $\Pi = \pi + (1-\delta)K$, where π is the current level of variable profit and δ is the rate of depreciation of capital, I can linearize equation 5 to become (see Appendix):

$$E[\pi^K] = \frac{\sigma}{1-\sigma} + \frac{1}{1-\sigma} R^F_{+1} + \delta - \frac{\mathrm{cov}(M_{+1}, \pi^K)}{E(M_{+1})}. \quad (6)$$

Note that for $\sigma = 0$ equation 6 says that the expected marginal profit of capital ($\pi^K = \frac{\partial \pi}{\partial K_{+1}}$) is equal to the firm's cost of capital or the sum of the risk free rate, the depreciation rate and the risk premium (a result analogous to HHL). The last right-hand side term includes the co-variance between the stochastic market discount factor and the marginal profit of capital of the firm. If the company's return moves together with the market return, then the covariance between the firm's return and the market discount factor will be negative (because the market return appears in the denominator of the discount factor). Thus for a positive beta the risk premium term on the right-hand side will be a positive number and will add to the cost of capital.

Now consider equation 6 when $\sigma \neq 0$, the coefficient on R^F_{+1} is greater than 1 and $\frac{\sigma}{1-\sigma} > 0$, this means that under state ownership even when investor protection is perfect, the cost of capital is higher than it would have been if the company were entirely private. In other words the presence of the state does not have any positive effect because investor protection is perfect anyway.

2. *The Case of Imperfect Investor Protection*

When investors are not perfectly protected, they expect that the insiders may expropriate them. To signal that he will limit diversion, the manager retains some equity ownership. Solving the manager's maximization problem given that: $d_{+1} > 0$, $p(k, d_{+1}, \sigma) > 0$, and $\alpha > 0$, the first order condition is:

$$c_1 E[m_{+1}\Pi^K] + c_2 E[M_{+1}\Pi^K] = 1, \tag{7}$$

where I have denoted $E[m_{+1}] = E\left[\beta \frac{U'(C_{+1})}{U'(C)}\right]$ to represent the discount factor of the manager, $c_1 = \alpha(1-d_{+1}) + d_{+1} - p(k, d_{+1}, \sigma)$, and $c_2 = (1-\alpha-\sigma)(1-d_{+1})$ (see Appendix for derivation).

The linearized form (analogous to the linearization of equation 5) of equation 7 is:

$$E[\pi^K] = \frac{1+R_{+1}^F}{c_1+c_2} - 1 + \delta - \frac{c_1}{c_1+c_2}\frac{\text{cov}(m_{+1}, \pi^K)}{E[m_{+1}]} - \frac{c_2}{c_1+c_2}\frac{\text{cov}(M_{+1}, \pi^K)}{E[M_{+1}]} \tag{8}$$

Note that if $m_{+1} = M_{+1}$, the two risk premium terms will be the same and the manager does not have to retain any equity ($\alpha = 0$), then for low levels of d_{+1}, $c_1 + c_2$ is approximately equal to $1-\sigma$ and equation 8 collapses to equation 6.

Here, though, I have two different risk premiums, one assigned by the market: $\frac{\text{cov}(M_{+1}, \pi^K)}{E[M_{+1}]}$ and one assigned by the manager: $\frac{\text{cov}(m_{+1}, \pi^K)}{E[m_{+1}]}$. Note that the manager's risk premium represents the covariance between the marginal profit of the firm and the

marginal utility of consumption of the manager. Since the marginal utility decreases for higher levels of consumption obtained at higher levels of profitability, the first covariance term is negative. Note that the market covariance term (last term on the right-hand side of equation 8) measures the systematic risk of the firm, whereas the first covariance term incorporates the co-movements of idiosyncratic profitability shocks and the manager's marginal utility and thus reflects idiosyncratic risk. For the sake of clarity, let's assume that the optimal level of diversion is small and so the punishment is also small, the coefficient on the idiosyncratic risk premium can be approximated as $\frac{\alpha}{1-\sigma}$ and the coefficient on the systematic risk premium as $\frac{1-\alpha-\sigma}{1-\sigma}$. I have:

$$E[\pi^K] = \frac{1+R^F_{+1}}{c_1+c_2} - 1 + \delta - \frac{\alpha}{1-\sigma}\frac{\mathrm{cov}(m_{+1},\pi^K)}{E[m_{+1}]} - \frac{1-\alpha-\sigma}{1-\sigma}\frac{\mathrm{cov}(M_{+1},\pi^K)}{E[M_{+1}]}$$

Now, the higher the managerial ownership of the remaining shares not owned by the state, the higher the weight of the idiosyncratic risk premium in the total cost of capital. The reason is that the manager is exposed to more of this type of risk by owning more stock. On the other hand, if the manager has retained little equity in the firm, the majority of the risk reflected in the total cost of capital of the firm will be attributed to the systematic risk premium assigned by the market.

In the case of imperfect investor protection, $\alpha \neq 0$, and it is a decision variable. The first order condition for α is thus:

$$c_1^{\alpha} E[m_{+1}(\Pi(K_{+1}) - s(\sigma,k))] + c_2^{\alpha} E[M_{+1}(\Pi(K_{+1}) - s(\sigma,k))] = 0, \qquad (9)$$

where $c_1^\alpha = \frac{\partial c_1}{\partial \alpha}$ and $c_2^\alpha = \frac{\partial c_2}{\partial \alpha}$. After substituting for c_1^α and c_2^α (see Appendix) I arrive at the following result:

$$E[m_{+1}(\Pi(K_{+1}) - s(\sigma,k))] = \frac{1-2d-\frac{\sigma}{k+\eta\sigma}}{1-d} E[M_{+1}(\Pi(K_{+1}) - s(\sigma,k))], \qquad \textbf{(10)}$$

To analyze the above equation, first consider the case of no state ownership, then the coefficient in front of the expected discounted profit by the market becomes $\frac{1-2d_{+1}}{1-d_{+1}} < 1$. This means that under imperfect investor protection without state ownership the expected future discounted profit for the manager is lower than the expected future discounted profit by the market (a result analogous to HHL).

When I introduce state ownership the coefficient seems to get even lower. However, for $\sigma > 0$, d is lower than under $\sigma = 0$ and thus the expected future discounted profit from the perspective of the manager may not be as low as under private ownership. This effect comes from the assumption that the punishment technology for stealing is increasing in state ownership.

Next I would like to arrive at a relationship similar to equation 10, but in terms of the cost of capital for the manager. If the manager assigns a higher cost of capital than the market, he will pass up some profitable investment opportunities.

Following HHL, I assume that the profit function is homogeneous of degree 1, in other words $K_{+1}\Pi^K(K_{+1}) = (1)\Pi(K_{+1})$. Then I use equations 7 and 9 arrive at the following expression for $E[m_{+1}\Pi^K]$:

$$E[m_{+1}\Pi^K] = \frac{c_2^\alpha}{c_1 c_2^\alpha - c_2 c_1^\alpha}\left(1 - \frac{c_2}{c_1^a c_2^\alpha}\left(c_1^a + c_2^\alpha\right)\frac{1}{1+R_{+1}^F}\frac{s(\sigma,k)}{K_{+1}}\right), \tag{11}$$

which is equivalent to:

$$E[m_{+1}\Pi^K] = F(\sigma,\alpha,\eta,k)\left(1 - B(\sigma,\alpha,\eta,k)\frac{1}{1+R_{+1}^F}\frac{s(\sigma,k)}{K_{+1}}\right), \text{ where}$$

$$F(\sigma,\alpha,\eta,k) = \frac{2d - 1 - \frac{d\sigma}{1-\alpha}}{\frac{1}{2}d(3+\alpha) - 1 + \sigma + \frac{1}{2}\sigma d^2 + \sigma d\left(2 - \frac{\alpha}{1-\alpha}\right)}, \text{ and}$$

$$B(\sigma,\alpha,\eta,k) = \frac{(1-\alpha-\sigma)^2}{1-\alpha}\frac{1}{2 - \frac{\sigma}{1-\alpha} - \frac{1}{d}}$$

To show the intuition behind equation 12 first consider the case of no state ownership as in HHL. I have the expression: $E[m_{+1}\Pi^K] = \frac{1-2d_{+1}}{1-\frac{1}{2}d_{+1}(3+\alpha)} > 1$.

When the company is private, but investor protection is not perfect, the cost of capital to the manager is above the market and he will under-invest. This result shows the source of inefficiency resulting from imperfect investor protection. Compare the above to equation 5, the result for perfect investor protection: $E[M_{+1}\Pi^K] = \frac{1}{1-\sigma} > 1$. Again the

cost of capital is inefficiently high, the crucial result here is that when I have imperfect investor protection and state ownership the cost of capital may not be as high. Specifically, the expression in equation 12 can be below or above $\frac{1-2d_{+1}}{1-\frac{1}{2}d_{+1}(3+\alpha)}$ depending on the level of σ. If state ownership is too much, the negative effect of over-employment will exceed the positive effect of the higher cost of stealing and ultimately the cost of capital should be higher than under $\sigma = 0$. On the other hand, if state ownership is below some indifference point, the cost of capital will still be higher than the market, but will be lower that the level under $\sigma = 0$. To confirm my intuition I need to show that the cost of capital is minimized for some level of σ that I call σ^{INDIFF}. Since the expression in equation 11 is very complex and does not provide a well behaved derivative, I use numerical simulations in MathCad and confirm the U-shape of the cost of capital with respect to σ. The first graph in Table 3 describes a situation where the politician is effective as a monitor, the manager is not very entrenched and the level of investor protection is low. Then the cost of capital decreases initially as the state retains a higher stake. In all other scenarios, the cost of capital is increasing in the relevant range of sigma. Note that in the last graph on the left-hand side, the cost of capital rises very steeply for levels of sigma greater than 0.40, because for low monitoring effectiveness and high entrenchment increasing state ownership has only a negative impact.

Figure 1 is a stylized representation of the first graph in Table 3. It shows that state ownership may have some positive effect up to some indifference level, after which the negative impact of over-employment is too great and the cost of capital increases as

the state owns more of the company. The cost of diversion is decreasing in σ, because the presence of the state limits misappropriation when η is high. On the other hand, the cost of over-employment is strictly increasing in σ. The joint effect results in an optimal level of σ where the cost of capital is minimized.

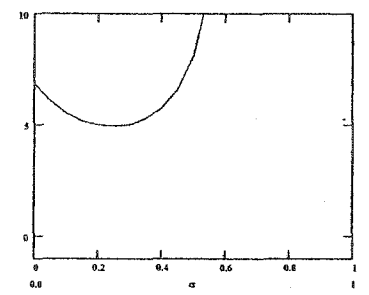
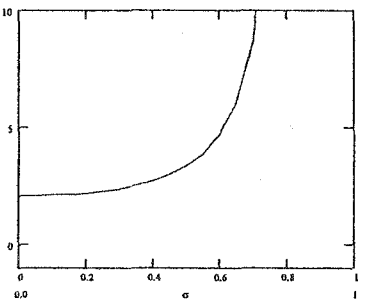
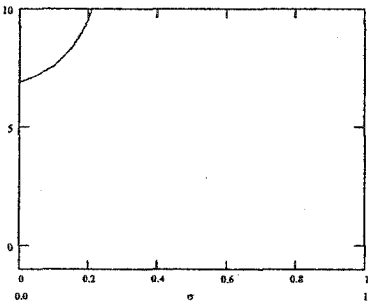
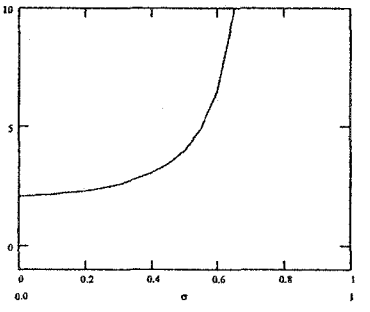
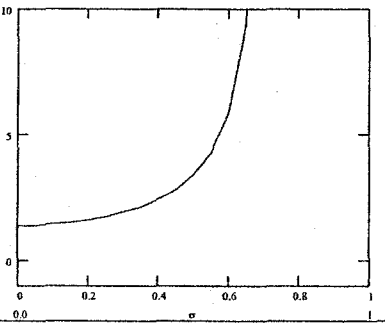
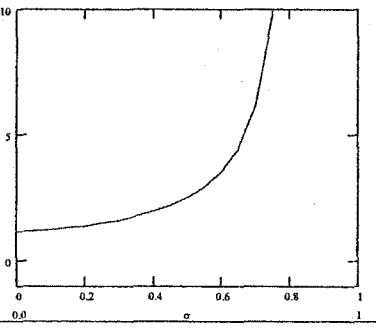
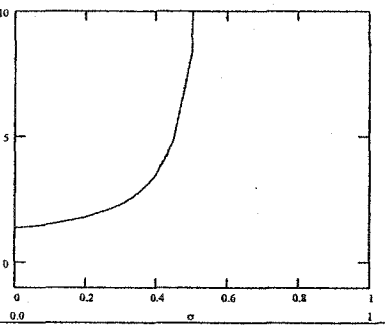
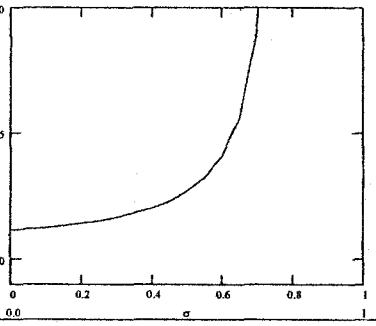
		$k=3$	$k=10$
$\alpha=0.10$	$\eta=8$		
	$\eta=2$		
$\alpha=0.70$	$\eta=8$		
	$\eta=2$		

Table 3. Marginal product of capital as a function of state ownership

The graphs are generated in Mathcad and represent the behavior of the function in equation (11) for different level of the parameters α - insider ownership, η - effectiveness of the state as a monitor and k - the level of investor protection. All graphs use the same values for the remaining parameters, since they do not alter the curve significantly: $R_F=0.05$ and $s(\sigma,k)/K_{+1}=0.5$

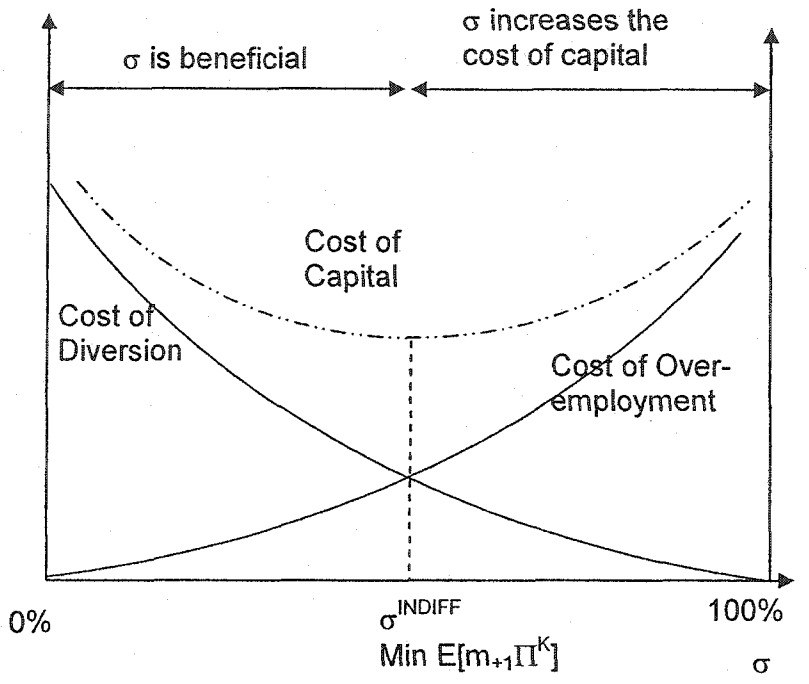


Figure 1: The indifference point for σ.

The cost of diversion is decreasing in σ, because the presence of the state limits misappropriation when η is high, on the other hand the cost of over-employment is strictly increasing in σ. The joint effect results in an optimal level of σ where the cost of capital is minimized. Up to some level of state ownership the positive effect of limiting diversion is higher than the negative effect of over-employment, after the indifference level the over-employment effect is too high and leads to increasing cost of capital.

IV. Discussion

In this section I discuss the applicability of the theoretical predictions above to the observed business environment in different parts of the world and the model's policy implications.

The investment climate in Russia was summarized in a report by the Moscow investment bank Troika Dialog as having the following features: consistent withholding of information, dilution of minority shareholdings, delaying dividends, diversion of cash flow (tunneling), and asset-stripping.[21] The failure of corporate governance in Russia can be very well formalized with this model. Since investor protection is very poor, managers choose high levels of diversion that lead to high inefficiency. Furthermore, the politicians in Moscow decided not to interfere too much with managers (low η), because the managers' clout in workers' unions was too great. Thus we observe high diversion, low excess employment and my model predicts that the cost of capital will be increasing in state ownership. In other words, gradual privatization would not have worked in Russia, because the state would not have been able to mitigate misappropriation. It is important to note, that in the case of Russia, the mere act of transferring property rights from the state to private owners was deemed of the greatest importance and the motivation was political reforms rather than economic efficiency.[22]

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[21] "Hot shares, bothered investors" Economist 07/22/1999

[22] See Black, Kraakman and Tarassova (2000) for a discussion of a staged, more controlled privatization. Although politicians have rationalized failed privatization in Russia as "economic sacrifice for a political victory", Nellis (2001) points out that "corrupt and non-productive"

The rest of Central and Eastern Europe is struggling with the same problems. It is important to point out again that it is not only the local managers that abuse their control positions, but foreign block investors are involved as well. To name just a few of the scandals: ING in Poland, Credit Suisse First Boston, PricewaterhouseCoopers and Deutsche Bank in Russia, Renault and Air Liquide in Romania.[23] Therefore, foreign direct investment cannot be in itself a panacea for the transition economies, the only feasible solution is establishing and enforcing clear business rules.

The case of China is unique, but it also provides a perfect example of market failure which was not cured by privatization. The state has kept stakes in all companies it has divested (a natural experiment for the role of partial state ownership), and since investor protection laws do not exist, my model would suggest that companies should perform better than if they were completely privatized. However I cannot test this formally since Worldscope data from China is incomplete and all Chinese companies are dropped from the sample when I impose my filters.[24]

Only a handful of the companies listed on the Chinese stock exchange are private, all the rest are partially or entirely state owned. Given that insider trading is pervasive, and rights of minority shareholders are completely ignored, it is surprising that equity

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privatization has contributed to the continuing importance of Communist party in Russia and Ukraine [as well as Bulgaria and Romania].

[23] The three scandals are covered by: Economist "Capital Punishment" Survey: Finance in Central Europe 9/12/2002; Economist "The Smell Test" 2/22/2001 and Economist "Rights Issue" 7/27/2000

[24] Tian (2003) finds a U-shaped relationship between firm valuation and state ownership in China.

ownership is so popular with ordinary Chinese.[25] One possible explanation is that the other opportunities for small investors are so much less profitable that even with such gross disregard for minority shareholders, the stock market is one of the most attractive investments.

In the rest of East and Central Asia privatization was heavily used and is well represented in the data sample. The economies of those countries (except Japan) are dominated by family-owned holding companies, characterized by extraordinary opaqueness, multiple layers of subsidiaries, cross-holdings and informal links.[26] An especially striking example fitting the theoretical setup developed here is the privatization of the Philippine National Bank.[27] The level of investor protection in these countries is higher than in China by virtue of the fact that they are democracies and have greater transparency and media coverage. Apart from knowing that they are being fleeced, minority shareholders cannot do much else and the players behind these schemes remain in business and most likely move into politics as well.[28] The parameters in my model will be: low η because of the collusion of politics and business, low k, but arguably higher than that in China or Russia (one positive effect of the financial crisis of 1997 may be the potential increased political accountability and the awareness of investors who now

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[25] Economist "Getting their skates on" 6/1/2000

[26] see Claessens et al. (2000)

[27] After acquiring control over PNB through special-purpose linked companies Lucio Tan (the wealthiest tycoon in the Philippines) lent $95 mil to his own companies; the loan was restructured within months and was never repaid. See Economist "Empires without umpires" Survey: Asian business 4/5/2001

[28] see "Asian eclipse" by Michael Backman

demand better corporate governance), very high α. This is represented by the last left-hand graph in table 3, and I expect that the cost of capital is only increasing in state ownership.

The developed countries, on the other hand, have much higher level of investor protection, managers optimally choose lower level of diversion and state ownership has little role in curbing inefficiency. However, things are hardly perfect in many of the developed countries. In Japan "an intricate network of cross-shareholdings and boards made up only of insiders conspire to protect company [executives]".[29] This may make k much lower than its level in the United States or United Kingdom and since the political process is more sophisticated (at least on paper), it is costlier for the insiders to ensure the compliance of the politicians or η is higher. This brings us to the first graph in Table 3 where some partial state ownership could have a positive role. Similarly, in Italy the examples of Telecom Italia and its controlling owner Olivetti, as well as ENEL and its share offering manager Madiobanca provide grounds for the scenario of comparatively low k and higher η than in emerging markets.[30] Since these parameters are unobservable, the effect of ownership on the cost of capital remains an empirical question that will be addressed in the second half of this work.[31]

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[29] Economist "Japan's corporate governance U-turn" 11/16/2000

[30] Economist "Caveat emptor" 10/7/1999

[31] I consider k unobservable, because the legal protection measures developed by LLSV are imperfect and do not reflect company level characteristics, as discussed earlier on p. 7.

Argentina was an important participant in the global privatization trend in the 90s, but its recent economic crisis adds to the conclusion that privatization by itself does not solve financial and economic problems. The sale of Argentinean airlines to Iberia has raised a lot of attention for its undesirable outcome.[32] Brazil was another example of a country with a substantial privatization scheme, however experts conclude that the results were disappointing as well.[33]

In general Latin America, like East Asia is a region where poor investor protection is especially serious since corruption is pervasive in all social and political spheres. Given low levels of k and η the current model predicts that residual state ownership cannot help in limiting the abuse of power on the part of controlling shareholders.

Poor and insufficient data from developing countries prevents me from testing my model in each geographic region separately.

I now turn to the empirical investigation of ownership and the cost of capital.

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[32] Argentinean airlines were sold debt free to Iberia (the Spanish carrier – as of 2002 one of only a few profitable airlines in the world) in the beginning of the 90s. Now the company is facing bankruptcy. Observers claim that the entire plane fleet was sold and then leased back at a much higher cost, expensive pilot training equipment was also sold and then Argentinean airlines had to pay to have its pilots train at Iberia's facilities.

[33] See Macedo (2000); Another recent development in Brazil concerns several large privatized companies. They were sold at a premium and the new owners reported the premium as a goodwill on the books and showed losses for several years. Now they are restructuring the existing holding companies to be able to take advantage of the tax credits and want the state to compensate them with new shares in the privatized companies, resulting in dilution of the stakes of the other shareholders.

V. Empirical part

I examine whether state ownership has positive efficiency effects under poor investor protection by comparing the sensitivity of the cost of capital to insider ownership of private companies and companies with state ownership. To do this I parameterize equation 8 and convert the variables to observables.

By testing equation 8 however, I essentially skip the intermediate result showing that insider ownership is negatively related to the level of investor protection. This result has already been confirmed empirically for the entire sample of Worldscope firms by HHL (2001), and for other samples by Durnev and Kim (2003), Lins (2003) and Klopper and Love (2002). I am a little reluctant to use the investor protection index constructed by LLSV (1998) because it only covers factors of the institutional environment and the legal system, some of which arguably have different effects in different countries (see Berglof and von Thadden (1999)). When I define k in the model I include not only country-level characteristics but also factors such as the type of the company's assets or the option of firms to opt-out or adopt additional provisions in their corporate charter. Although I model the level of investor protection as exogenous, I still recognize that in reality insider/managers base their decision whether to divert on the characteristics of the assets and on the point in time in the life cycle of a given investment.

For example, consider a manager who has a profitable investment opportunity available and is contemplating whether to set up a separate firm that is 100% owned by him and undertake the project that way or start the project with the current company, of

which he only owns α. If he sets up a separate company, he will get all expected cash flows, however the required initial investment may be higher than if the project is undertaken by the current firm, because it already has installed capacity and expertise. On the other hand the punishment for "stealing a profitable idea" is less severe because this type of diversion is less transparent and more difficult to implicate. Diverting out of the project cash flows after it has been implemented can take the form of tunneling. If, for example, the insider wants to buy materials at inflated prices from a connected party, but the company is large and visible and has long had established relations with an existing supplier, it may be difficult to conceal or justify the change.

Therefore, depending on the situation, managers will optimally choose to divert tangible resources after a project is implemented or alternatively "steal the idea" initially.

Since country level legal protection indices are unable to capture the above firm variation in effective investor protection, I will treat k as an omitted variable in my regressions. The fixed effect panel data technique is well suited to deal with firm-specific omitted variables.

There is a firm-level corporate governance index constructed by Credit Lyonnais Securities Asia, but it only covers emerging markets and does not have time variation. This index has been used in an empirical study by Klapper and Love (2002) and they find that the firm level governance measure is strongly positively correlated with the country level index of investor protection. The other similar measure is the transparency scores compiled by Standard and Poor's, but they too are static in nature. In my panel data set I

cannot use these data (except for forming sub-samples), because time invariant variables disappear from the specification once it is mean-differenced.

1. Regression equations and methodology

To rewrite equation 8:

$$E[\pi^K] = \frac{1+R^F_{+1}}{c_1+c_2} - 1 + \delta - \frac{c_1}{c_1+c_2}\frac{\mathrm{cov}(m_{+1},\pi^K)}{E[m_{+1}]} - \frac{c_2}{c_1+c_2}\frac{\mathrm{cov}(M_{+1},\pi^K)}{E[M_{+1}]}$$

in terms of observable variables I need to employ the approximating assumptions that $\frac{c_1}{c_1+c_2} \approx \frac{\alpha}{1-\sigma}$ and $\frac{c_2}{c_1+c_2} \approx \frac{1-\alpha-\sigma}{1-\sigma}$. Denote the risk premium terms as follows:

$-\frac{\mathrm{cov}(m_{+1},\pi^K)}{E[m_{+1}]} = \lambda$ and $-\frac{\mathrm{cov}(M_{+1},\pi^K)}{E[M_{+1}]} = \Lambda$. Now my testable specification is:

$E[\pi^K] = \frac{1+R^F_{+1}}{1-\sigma} + (1-\delta) + \frac{\alpha}{1-\sigma}\lambda + \frac{1-\alpha-\sigma}{1-\sigma}\Lambda$. To make λ and Λ be invariant parts of a coefficient in the regression, I specify their behavior as follows: $\lambda_{it} = \hat{\lambda} + \varepsilon^{\lambda}_{it}$ and $\Lambda_{it} = \hat{\Lambda} + \varepsilon^{\Lambda}_{it}$, then I arrive at the following regression equation:

$$\pi^K_{it+1} \cong \frac{1+R^F_{t+1}}{1-\sigma_{it}} - (1-\delta) + \hat{\Lambda} + (\hat{\lambda}-\hat{\Lambda})\frac{\alpha_{it}}{1-\sigma_{it}} + u_{it}, \qquad \textbf{(12)}$$

in terms of observables:

$$MPK_{it+1} = \beta_{0i} + \beta_1 OWN_{it} + \sum_{m=2}^{10}\beta_m YEAR_{mit} + \beta_{11} SIGMA_{it} + \beta_{12}(OWN * SIGMA)_{it} + u_{it} \qquad \textbf{(13)}$$

where $u_{it} = OWN_{it}\left(\varepsilon_{it}^{\lambda} - \varepsilon_{it}^{\Lambda}\right) + \varepsilon_{it}^{\Lambda} + \omega_{it}$, ω_{it} satisfies $E\left[\omega_{it} \middle| Information\_set_{it}\right] = 0$, the intercept captures all time invariant firm specific effects and the nine year dummies control for global economic factors across time with similar effect on individual companies.

Note that my error is correlated with the explanatory variable. First I observe that the error in λ could be higher when OWN is higher, because the manager will assign higher risk premium if a larger fraction of his wealth is tied up in the company. But it also could be that the insider's wealth is higher relative to the size of the firm (recall that the insiders in my sample are controlling families or colluding consortia that command large resources) and then higher OWN may not imply higher risk premium. There does not seem to be an expected systematic relationship between $1 - OWN$ and the error in the risk premium assigned by the market. If the insider group is so powerful that it influences the perceptions of the market then the departure of $(1 - OWN)\Lambda$ from its mean will tend to decrease as OWN increases. So for the first part of the analysis I assume that the combined error term is not systematically related to OWN or, alternatively, that the effects of OWN on the terms involving λ and Λ cancel out.

To address the endogeneity of OWN I need to set up an instrumental variable specification. First, since I have the omitted variable problem, I need to use a panel transformation that eliminates subject specific effects. I choose to first difference the data, since it is easier to implement in conjunction with a two-stage least squares regression. In the first difference transformation, OWN_{it} or OWN_{it-1} are not valid

instruments for ΔOWN_{it}. I could not use higher lags of OWN either, because I allow earlier values of ownership to determine the current cost of capital (this is the very feedback from the explanatory to the dependent variable that constitutes simultaneity)[34]. The only approach possible then is to use the simultaneous equations model (SEM) approach and use exclusion restrictions in the structural equations. Lins (2003) uses a SEM in his regressions of Tobin's Q on different ownership measures. Tobin's Q regressions face more severe measurement and endogeneity problems than the marginal product of capital relationship used here. However, I follow Lins (2003) because I do not want to restrict myself to contemporaneous correlation only (the assumption required to use lags as instruments).

In the second half of the analysis I estimate the following system:

$$\Delta OWN_{it} = \delta_1 \Delta MPK_{it-1} + \delta_2 \Delta \ln(TA)_{it} + \delta_3 \Delta TD\_TA_{it} + \zeta_{it} \quad (14)$$

$$\Delta MPK_{it+1} = \gamma_1 \Delta OWN_{it} + \gamma_3 \Delta SIGMA_{it} + \gamma_4 \Delta (OWN * SIGMA)_{it} + \gamma_2 \Delta TD\_TA_{it} + \xi_{it} \quad (15)$$

Size is included in the ownership equation, because for larger firms, insiders may employ different strategies to keep effective control of the company (pyramids, cross-holdings, etc.). Leverage is a control in the ownership regression because the presence of debt (which I assume away in the model) acts as additional monitoring mechanism that potentially affects the optimal level of insider ownership. Further, leverage is also a direct determinant of the cost of capital and has to be in the second-stage regression.

[34] HHL (2001) use three lags of the explanatory variables as instruments, but this is not appropriate if I allow for past as well as contemporaneous correlation between u_{it} and OWN_{it}.

2. *Description of the Data and Samples*

To estimate my model, I use company level financial data from Global Access WorldScope covering the period 1992-2001. The database includes 52 countries, with different numbers of companies for each country, but only 36 countries remain in the final sample after I impose my filters. I eliminate observations where my estimates of *MPK* are higher than 10 (the 95th percentile), as well as observations where capital and depreciation are negative. I also impose the filter that the firms remaining in the sample have at least 4 consecutive years of data (a filter used by HHL).[35]

The number of countries having companies with some state ownership is 33. There are 50 industries represented of which 33 have companies with state ownership. I eliminate the financial and service industries (or all 2-digit SIC codes 60 and above). Several interesting facts can be noted from tables 4 and 5. The mean net income in US$ is negative for the private companies in Argentina and the Philippines, for the state companies in Indonesia, Italy and Poland, and for all companies in Slovakia and Thailand. The most companies with state ownership can be found among Electric Utilities and Oil Refineries, which is expected. State companies are bigger in size and have higher leverage ratios. Overall *OWN* in entirely private companies is higher than the level of insider ownership in companies with state participation. This result is in line with the theoretical prediction of the model that state ownership acts as a monitoring mechanism and the manager does not have to retain as high ownership stake to signal

[35] I also need to impose this filter if I want to retain reasonable number of observations when I difference the data and use lags of the differences in the two-stage least squares equations.

commitment to limit diversion. But having higher insider ownership can be attributed to the different historical evolution of state-owned and private companies. If we think of private companies in our sample as the result of a gradual empire-building by the founding family, then it will be much more reluctant to dilute its ownership because of the strong subjective attachment it feels. In the case of privatized companies the new owners are not likely to keep insider stakes higher than what profit maximization suggests.

To avoid too much influence from the countries with the most companies (the UK and Japan), I use two approaches[36]. I create two sub samples: the largest 50 companies in each country (by total assets) and another consisting of 50 randomly selected companies from each country. I keep all companies with some state ownership in the random 50 samples to be able to detect any differential impact. The top 50 sample contains most of the state companies anyway, because they tend to be large. The state companies represent less than 10% in both sub-samples.

The data on state ownership is from the ownership section in Worldscope, from Privatization International 2000 and from the World Bank Privatization Database 1989-1999. I had to manually match the names of the companies in the different sources, since in many occasions databases use different translations. When there were inconsistencies between the sources I relied on the World Bank dataset. Initially I had 189 companies with some state ownership over the ten-year period of interest, however after the filter

[36] The number of companies from the US covered by Global Access Worldscope are only 276, the vendor has a separate database for US companies only.

described above, only 136 are left. I report all regression results for the sample of state owned companies, for a comparison sample of US firms only and for a sub-sample consisting only of countries with low investor protection measures (based on LLSV (1998)). I classify countries as being low k if they have anti-director rights score of 4 or less and rule of law score of 7 or less (they are: Argentina, Czech Republic, Hungary, Israel, Indonesia, Malaysia, Pakistan, Peru, Philippines, Poland, Russia, Slovakia, Sri Lanka, Thailand and Turkey, Venezuela and Zimbabwe). The low k sample consists of 542 companies, but the usable observations are only 2982 (because those are the countries that have the most missing or corrupted data).

The marginal product to capital (MPK) is estimated as the sales capital ratio for each firm times an industry specific parameter thetha (see Appendix 2 for derivation). The beginning of period capital stock is estimated as property, plant and equipment plus depreciation minus capital expenditure.

My measure for α - the proportion of the firm owned by the insider/manager is the Worldscope variable "Closely held shares" as a proportion of total shares outstanding. The definition of "Closely held shares" is the number of shares held by owners of at least 5% of the company. I recognize that this is imperfect measure; however, it is the best ownership variable available that provides time dimension.

When recording the values for $SIGMA$ I observe the following rules: whenever my privatization sources report a sale, the ownership change is recorded for the following year, sales of additional stakes are added to the previous privatized share. I do not record

full privatizations that have taken place before 1992, so some companies are not recognized as privatized, especially in the UK. Based on the variables α and σ, I construct $OWN_{it} = \frac{\alpha_{it}}{1-\sigma_{it}}$. For some of the partially privatized companies there were inconsistencies between α and σ. Specifically, Worldscope reports state ownership as part of the "Closely held shares" measure whenever $\sigma \geq 0.05$. Apparently, I need to disentangle the two. I apply the following rules:

If $\alpha > \sigma$ and $\alpha > 1-\sigma$, then $OWN = \frac{\alpha-\sigma}{1-\sigma}$;

If $\alpha > \sigma$ and $\alpha < 1-\sigma$, then $OWN = \frac{\alpha}{1-\sigma}$;

If $\alpha < \sigma$ and $\alpha > 1-\sigma$, then $OWN = 1-\sigma$;

If $\alpha < \sigma$ and $\alpha < 1-\sigma$, then $OWN = \frac{\alpha}{1-\sigma}$.

An example for the first case is $\alpha = 0.60$, $\sigma = 0.45$, if the state is not reported as part of "Closely held shares", then α is not consistent, because only 0.55 is left to be owned by private owners including insiders. Then the reported $\alpha = 0.60$ must include the state and the true value of insider ownership is 0.15.

In the third case, suppose $\alpha = 0.40$ and $\sigma = 0.70$, then α is apparently inconsistent and I assume measurement error in the Worldscope data and force α to be equal to the proportion of the shares left for private owners or 0.30. Of course this assumption may not be correct and I execute all my regressions with measures of OWN,

where the value is set to missing if such an inconsistency exists, and my results are unchanged.

3. Regression Results

The results for the first regression analysis are presented in Table 7. Panel A includes specification (1) of equation (13) and specification (2) including controls for leverage and size for each of the two sub-samples: top 50 and random 50. The coefficient on *OWN* is significant in all regressions, however the sign is negative, suggesting that the cost of capital decreases as insider ownership increases. *SIGMA* is not significant, which is not surprising given that state companies are only around 10% of the samples and the fact that I include an interaction variable. More importantly the interaction variable *OWN*SIGMA* is significant and positive suggesting that the effect of insider ownership on the cost of capital is less negative when there is some state ownership.

Panel B shows the same two specifications run on the sample of state firms (these firms have some state ownership, in many cases minority stakes, but I refer to them as "state" companies to be concise), low k countries and US firms. The ownership variable is insignificant for the state sub-sample suggesting that insider ownership does not affect the cost of capital. The insignificance may also be explained by the small size of the sample and the high variability of the *MPK* for the state firms.

For the low k countries sub-sample the coefficients are similarly insignificant. Note that more than half of the state companies are in the low k sample, although the

total number of firms is only one third of the number of firms in the full samples. It is possible that the same deficiencies plague this sample as the state sample.

In the US sample the *OWN* coefficient is significant only in the control variables regression and again has a negative sign.

Overall, table 7 suggests that ownership concentration results in a lower cost of capital and the presence of the state makes this effect weaker. In other words state ownership prevents the cost of capital from dropping as much as it would have, had the company been entirely private. Before I put too much faith in these results, I need to examine all potential econometric issues that may bias my coefficients.[37]

As discussed earlier on page 40 the potential endogeneity of ownership is not resolved by the fixed effects estimator. Panel data simply provides lags of endogenous variables that can be used as instruments. However, lags are not valid instruments when I allow current as well as past values of ownership to be related to the cost of capital error. Since it is not only endogeneity I have to address, but simultaneity as well, the only correct approach is a simultaneous equations model. The system is given on page 41.

Another source of bias not resolved by fixed effects is omitted effects that are variable over time (recall the time specific decision of the manager whether to divert

[37] HHL (2001) find positive relationship in their OLS regressions, I was able to replicate their results using the same methodology. However, I must stress that OLS estimates are biased under omitted subject specific variables. This is very likely a problem in my (as well as HHL) framework, because a firm's cost of capital depends on its riskiness perceived by the market, that riskiness depends on company characteristics imperfectly revealed in accounting information. The instrumental variable regressions in HHL confirm the positive relationship, but lags of the explanatory variables that they use are arguably invalid instruments when past correlation with the error term is permitted. Moreover, HHL do not address simultaneity.

discussed on page 37). This type of problem can only be solved with valid instrumental variables.

Table 8 provides the results from the two-stage least squares regression. The coefficients in the ownership equations are all insignificant, however once I control for the potential simultaneity, the three ownership variables all become significant and with the expected signs. The coefficients on ΔOWN and $\Delta SIGMA$ are positive and significant in the top 50, random 50 and low k regressions. The interaction variable is negative and significant in the three regressions. These results support the theoretical predictions of the model that higher insider concentration increases the risk premium perceived by the manager and makes the cost of capital inefficiently high. Further, state ownership alone has the same inefficiency effect as insider concentration, again in line with the model in the case of perfect investor protection (see the discussion on page 13). Furthermore, the negative coefficient on $\Delta OWN * SIGMA$ supports my conjecture that he presence of the state has a monitoring effect and limits the inefficiency of insider concentration.

I explain the lack of significance for the state sample with the large variability in the data for that sample. Consider the standard deviation of OWN for the state sample and the top 50 sample (0.25 vs. 0.23) (refer to Table 9). The measures are comparable but the former consists of 134 subjects only and the latter consists of 1054. This fact may create large standard errors and render the coefficients insignificant.

In the US sample (Table 8, Panel B), after controlling for potential endogeneity of ownership, I find no significant relationship. This is consistent with the findings of

Demsetz and Villalonga (2001) who get the same results for US firms in an earlier sample (1976 - 1980), and conjecture that ownership is an equilibrium outcome of a complex joint profit maximization of many stakeholders and therefore should not be related to firm value.

4. Ownership and Cost of Capital vs. Ownership and Tobin's Q

I believe it is important to relate my empirical analysis and results to the numerous studies that look at the effect of concentrated ownership (of different types of owners) on firm value, measured by various profitability measures and Tobin's Q. The difference here is that I focus on the cost of capital.

To show how Tobin's Q fits into the model, assume that the profit function is homogeneous of degree one, so that $K_{+1}\Pi^{K}(K_{+1}) = (1)\Pi(K_{+1})$, for simplicity assume state ownership is 0 and consider equation 12: $E[m_{+1}\Pi^{K}] = \frac{1-2d_{+1}}{1-\frac{1}{2}d_{+1}(3+\alpha)} > 1$. Note that Tobin's Q is the expected discounted after-diversion profit of the firm over the value of fixed capital, or $q_{it} = \frac{E[m_{+1}(1-d_{+1})\Pi_{+1}]}{K_{+1}}$. Combining the expressions I get:

$$q_{it} = \frac{(1-2d_{+1})(1-d_{+1})}{1-\frac{1}{2}d_{+1}(3+\alpha)} > 1.^{38} \qquad (16)$$

In equilibrium under perfect investor protection the cost of capital as well as the ratio of expected discounted profits to investment should be equal to one. When investor protection is less than perfect, both required returns and q ratios are predicted to be too high. Next notice that α enters the expression for q with a negative sign in the denominator, meaning that q ratios are increasing in the amount of insider ownership. However testing this relationship is difficult, because what I can estimate in practice are average q ratios but in equation 16 above I have defined the marginal q instead. Morck et al. (1988) confirm empirically the positive relationship between ownership and q ratios, though they do not account for the simultaneity of ownership.[39]

Theoretically (under the assumption of homogeneity of degree one of the profit function) the expressions for the expected discounted marginal product to capital and the

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[38] Note the difference from the analogous derivation in HHL (2001), their expression for Tobin's Q is: $\left(\frac{1-\frac{1}{2}s_{it}(3+\alpha_{it})}{1-s_{it}}\right)Q_{it} = 1$ and their definition of Tobin's Q is:

$$Q_{it} = \frac{E_t[M_{t+1}(1-s_{it})\Pi_{it+1}]}{K_{it+1}}$$

[39] Other studies that find positive or curvilinear relationship or identify breaks in the relationship between ownership and q ratios are: Cho (1998), McConnel and Servaes (1990) and Hermalin and Weisbach (1991); after including different controls the relationship disappears: most notably Loderer and Martin (1997), Himmelberg et al. (1998), Holderness et al. (1999) and Demsetz and Villalonga (2001). See Figure 1 in Demsetz and Villalonga (2001) for illustrative comparison between these studies.

marginal q ratio are similar, but empirically estimating q ratios is very problematic and therefore I focus on the cost of capital instead.

VI. Conclusion

In this study the effect of state ownership and insider control is modeled under conditions of imperfect investor protection. I show that state ownership or insider concentration individually result in inefficiently high cost of capital. However the two types of ownership combined result in a monitoring effect that mitigates the negative outcome. The state is a unique owner that does not maximize the present value of future expected cash flows, rather it imposes over-employment or subsidizes companies, ultimately destroying the incentives for efficiency. The presence of the state has one positive monitoring effect when the protection of minority shareholders is imperfect and they face potential expropriation by the controlling manager of the company. The insider/manger commits to limit the diversion of company resources by retaining some insider ownership, which results in poor diversification and leads to higher required rate of return and underinvestment. Because some state ownership makes diversion costlier, the resulting required rate of return is not as high.

The findings are confirmed with an international dataset and econometric techniques that handle unobserved variables and potential simultaneity between insider ownership and the cost of capital. I find that insider ownership concentration or state ownership each by itself results in higher cost of capital, however the interaction between the two decreases this inefficiency.

To disentangle the effects of different types of owners as well the disparity between control and cash flow rights, I am constructing a more detailed dataset for all

Worldscope companies. A more comprehensive study will also include company-level international corporate governance data with time dimension that will become available in the near future.

Appendix 1: Derivation of some equations in the text

Equation 6 (page 23)

Using the form of the firm's profit assumed above: $\Pi = \pi + (1-\delta)K$, the first order condition 5 becomes $(1-\sigma)E\left[M_{+1}\left(\pi^K + (1-\delta)\right)\right] = 1$, now given that $E[M_{it+1}] = \frac{1}{1+R^F_{it+1}}$ and using $E[ab] = E[a]E[b] + \mathrm{cov}[a,b]$, I get $E[\pi^K] = \frac{1}{1-\sigma}\left(1+R^F_{+1}\right) - \frac{\mathrm{cov}\left(M_{+1},\pi^K\right)}{E(M_{+1})} - (1-\delta)$, which is equivalent to equation 6.

Equation 7 (page 24)

The first order condition under imperfect investor protection is:

$\frac{\partial U(C)}{\partial C}\frac{\partial C}{\partial K_{+1}} + \beta E\left[\frac{\partial U(C_{+1})}{\partial C_{+1}}\frac{\partial C_{+1}}{\partial K_{+1}}\right] = 0$, using $E[m_{+1}] = E\left[\beta\frac{U'(C_{+1})}{U'(C)}\right]$, the FOC becomes: $E\left[m_{+1}\frac{\partial C_{+1}}{\partial K_{+1}}\right] = 0$, which is equivalent to (using $c_1 = \alpha(1-d_{+1}) + d_{+1} - p(k,d_{+1},\sigma)$ and $c_2 = (1-\alpha-\sigma)(1-d_{+1})$):

$c_1 E[m_{+1}\Pi^K] + E[(1+R_{+1})m_{+1}]c_2 E[M_{+1}\Pi^K] - E[(1+R_{+1})m_{+1}] = 0$. To simplify this further I need to use the FOC for consumption: $E[m_{+1}(1+R_{+1})] = 1$, now I get equation 7.

Equation 9 (page 25)

The first order condition for α is: $E\left[m_{+1}\frac{\partial C_{+1}}{\partial \alpha}\right]=0$, and

$$\frac{\partial C_{+1}}{\partial \alpha}=\frac{\partial N_{+1}}{\partial \alpha}+\left(1+R^F_{+1}\right)\frac{\partial V}{\partial \alpha},\qquad \frac{\partial N_{+1}}{\partial \alpha}=c_1^{\alpha}\left(\Pi-s(\sigma)\right),\qquad \frac{\partial V}{\partial \alpha}=c_2^{\alpha}E\left[M_{+1}\left(\Pi-s(\sigma)\right)\right].$$

Substituting the last three expressions in FOC for α and using $E\left[m_{+1}\left(1+R_{+1}\right)\right]=1$ I get equation 9.

Equation 10 (page 26)

$$c_1^{\alpha}=1+d_{+1}+\alpha\left(-\frac{\partial d_{+1}}{\partial \alpha}\right)+\frac{\partial d_{+1}}{\partial \alpha}-\frac{\partial p(k,d_{+1},\sigma)}{\partial \alpha},\qquad \text{since}\qquad d^*=\frac{1-\alpha}{k+\eta\sigma},$$

$\frac{\partial d_{+1}}{\partial \alpha}=-\frac{1}{k+\eta\sigma}$, and $\frac{\partial p(.)}{\partial \alpha}=-d_{+1}$, I have $c_1^{\alpha}=1-d_{+1}$. Similarly

$$c_2^{\alpha}=-(1-d)+(1-\alpha-\sigma)\left(-\frac{\partial d_{+1}}{\partial \alpha}\right)=-(1-2d_{+1})-\frac{\sigma}{k+\eta\sigma}.$$

Appendix 2: Estimation of the Marginal Product to Fixed Capital

The derivation below follows Gilchrist and Himmelberg (1998).

Consider the standard Cobb-Douglas production function: $y = AK^{\alpha_K} N^{\alpha_N} X^{\alpha_X}$, where y denotes output, A is total factor productivity, K (property, plant and equipment) and N (intellectual property and other intangible assets) are quasi-fixed capital stocks and X is variable factor input. I assume non-constant returns to scale. Further assume the company faces the inverse demand function: $p(y)$, the variable factor prices are w and the fixed costs are F. Now I define the profit function $\pi(K, N, w, F)$ as the maximum for the optimization problem:

$$\max_{X>0} p(y)y - wX - F$$

subject to $y = AK^{\alpha_K} N^{\alpha_N} X^{\alpha_X}$

The first order condition is the marginal product to fixed capital:

$$\frac{\partial \pi}{\partial K} = \frac{\partial\left[p(y)\left(AK^{\alpha_K} N^{\alpha_N} X^{\alpha_X}\right) - wX - F\right]}{\partial K} = \frac{\partial p(y)}{\partial y}\frac{\partial y}{\partial K} y + p(y)\frac{\partial y}{\partial K};$$

Observing that $\frac{\partial y}{\partial K} = AN^{\alpha_N} X^{\alpha_X} \alpha_K K^{\alpha_K - 1} = \frac{\alpha_K}{K} y$ and that $\frac{\partial y}{\partial p} \frac{p}{y}$ is the price elasticity of demand η, the FOC becomes: $\frac{\partial \pi}{\partial K} = \alpha_K \frac{p(y)y}{K}\left(1 + \frac{1}{\eta}\right)$.[40]

Price times output is simply the revenue of the company and let's denote $\theta = \alpha_K\left(1 + \frac{1}{\eta}\right)$, then the marginal product to capital is simply the sales capital ratio multiplied by a scale parameter that is related to the price elasticity of demand.

To see how I estimate MPK first note that sales capital ratios are readily available from accounting data, next I need an estimate of thetha. Since demand elasticity is product market specific, I am going to assume that thetha will be the same for all firms in a given industry. Then I want an estimator that has an expectation equal to the parameter it estimates. So let the expected marginal product of capital equal the firm's cost of capital in equilibrium and let the cost of capital be the sum of the depreciation rate of fixed capital and the risk adjusted discount rate: $\delta_{it} + r_{it}$. If I substitute the MPK in this equilibrium condition and average over all firms and all time periods in a given industry j, I get:

$$\hat{\theta}_j = \left(\frac{1}{TN}\sum_{i=1}^{N}\sum_{t=1}^{T}\frac{S_{it}}{K_{it}}\right)^{-1} \frac{1}{TN}\sum_{i=1}^{N}\sum_{t=1}^{T}(\delta_{it} + r_{it}).$$

As is customary in the investment literature $\frac{1}{TN}\sum_{i=1}^{N}\sum_{t=1}^{T}(\delta_{it} + r_{it})$ is assumed to be 0.18. Table 6 reports the estimated θ for all industries in my dataset.

[40] Note, that this elasticity variable η is unrelated to the "scare factor" η in the model.

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Table 4. Summary statistics by country and ownership type

Summary statistics show the number of private and state-owned companies by country represented in the sample with at least 4 years of non-missing data for the variables of interest for the period 1992-2001. *SIGMA* is the proportion of the company owned by the state. *OWN* is an estimate of the proportion owned by the insiders out of the portion of the company left for private owners. I use the Worldscope measure "closely held shares" for α and the state ownership data reported by Privatization International and the World Bank for σ, so that $OWN = \frac{\alpha}{1-\sigma}$. MPK is my estimate for the cost of capital or π^K in equation 12, I use the estimator: $\pi_{it}^K = \frac{S_{it}}{K_{it}}\theta_j$, where $\theta_j = \left(\frac{1}{TN}\sum_{i=1}^{N}\sum_{t=1}^{T}(S_{it}/K_{it})\right)^{-1}(0.18)$ is industry j parameter that contains the price elasticity of demand. *TD_TA* (the book value leverage ratio), NI and TA are directly from Worldscope. All summary statistics are averages over all non missing firm-year observations.

Sources: Worldscope, Privatization International, World Bank Privatization database, and author's calculations.

Panel A

Country		N	*SIGMA*	*OWN*	*MPK*	Non Miss
ARGENTINA	Private	2		65.34%	21.98%	8.50
	State	4	43.70%	59.81%	2.58%	7.50
	Total	6		61.88%	9.81%	7.83
AUSTRALIA	Private	162		36.86%	10.14%	7.85
	State	4	43.09%	48.35%	6.79%	6.25
	Total	166		37.08%	10.08%	7.81
CANADA	Private	27		48.22%	8.76%	6.26
	State	2	72.50%	14.23%	3.17%	9.50
	Total	29		44.93%	8.32%	6.48
CHILE	Private	52		63.34%	5.68%	7.90
	State	4	50.24%	52.06%	4.89%	8.50
	Total	56		62.48%	5.62%	7.95
CZECH REP.	Private	20		65.97%	7.79%	5.10
	State	3	84.29%	33.58%	3.80%	5.00
	Total	23		61.81%	7.30%	5.09
DENMARK	Private	52		29.88%	13.53%	7.71
	State	1	62.00%	14.35%	2.35%	9.00
	Total	53		29.54%	13.32%	7.74
FINLAND	Private	52		39.58%	14.23%	8.29
	State	8	56.70%	29.93%	8.78%	8.25
	Total	60		38.32%	13.52%	8.28

Country		N	*SIGMA*	*OWN*	*MPK*	Non Miss
FRANCE	Private	215		60.43%	20.55%	8.60
	State	6	82.82%	18.84%	11.24%	8.00
	Total	221		59.33%	20.28%	8.58
HONG KONG	Private	213		54.21%	10.83%	6.46
	State	1	53.87%	10.42%	5.24%	4.00
	Total	214		54.04%	10.80%	6.45
HUNGARY	Private	3		68.37%	34.46%	6.00
	State	8	67.62%	39.87%	11.06%	6.38
	Total	11		47.31%	17.08%	6.27
INDONESIA	Private	86		63.55%	10.22%	7.42
	State	7	74.78%	28.06%	3.99%	6.57
	Total	93		61.19%	9.81%	7.35
IRELAND	Private	32		31.84%	9.89%	9.13
	State	1	33.68%	19.08%	11.38%	8.00
	Total	33		31.47%	9.94%	9.09
ISRAEL	Private	3		67.40%	6.35%	5.67
ITALY	Private	27		48.89%	16.07%	6.63
	State	4	60.47%	27.51%	12.97%	6.75
	Total	31		46.05%	15.68%	6.65
JAPAN	Private	752		42.01%	11.42%	9.36
	State	7	51.44%	45.21%	8.44%	7.43
	Total	759		42.04%	11.40%	9.34
LUXEMBOURG	Private	2		67.84%	33.23%	6.50
	State	1	29.69%	68.50%	5.45%	10.00
	Total	3		68.10%	23.31%	7.67
MALAYSIA	Private	217		47.09%	7.57%	7.24
	State	16	36.74%	51.12%	7.54%	8.13
	Total	233		47.39%	7.56%	7.30
NETHERLANDS	Private	69		47.50%	17.52%	8.35
	State	3	39.35%	47.99%	12.93%	8.67
	Total	72		47.52%	17.32%	8.36
NEW ZEALAND	Private	29		61.39%	11.48%	7.79
	State	2	74.11%	35.64%	1.54%	5.00
	Total	31		60.24%	10.96%	7.61
NORWAY	Private	47		43.94%	12.47%	8.57
	State	2	68.40%	52.04%	8.72%	9.50
	Total	49		44.30%	12.32%	8.61
PAKISTAN	Private	3		58.77%	19.09%	6.33
PERU	State	1	61.17%	72.66%	0.86%	4.00
PHILIPPINES	Private	18		64.62%	6.71%	4.50
	State	3	63.96%	39.63%	6.52%	4.67
	Total	21		60.94%	6.67%	4.52
POLAND	Private	2		58.25%	4.52%	6.50
	State	9	70.26%	43.52%	9.58%	4.89
	Total	11		46.76%	8.37%	5.18

Country		N	*SIGMA*	*OWN*	*MPK*	Non Miss
PORTUGAL	Private	8		50.20%	7.30%	7.13
	State	6	75.63%	17.43%	2.81%	7.00
	Total	14		37.22%	5.45%	7.07
RUSSIA	Private	2		69.35%	1.21%	5.00
	State	3	61.74%	48.93%	2.33%	4.67
	Total	5		57.43%	1.88%	4.80
SINGAPORE	Private	117		55.27%	9.30%	6.96
	State	3	78.99%	25.85%	11.03%	8.33
	Total	120		54.43%	9.35%	6.99
SLOVAKIA	Private	1		61.71%	9.73%	4.00
	State	2	80.22%	33.93%	2.70%	5.00
	Total	3		41.87%	4.71%	4.67
SPAIN	Private	52		49.78%	10.15%	8.40
	State	5	81.14%	28.00%	4.56%	6.40
	Total	57		48.14%	9.72%	8.23
SRI LANKA	Private	7		30.99%	6.41%	8.00
SWITZERLAND	Private	81		49.30%	12.70%	7.65
	State	3	46.22%	66.34%	7.53%	7.67
	Total	84		49.88%	12.52%	7.65
THAILAND	Private	80		56.22%	9.98%	5.14
	State	8	56.20%	46.72%	4.17%	5.63
	Total	88		55.26%	9.48%	5.18
TURKEY	Private	23		65.99%	17.75%	5.91
	State	6	72.22%	27.86%	27.12%	6.67
	Total	29		57.54%	19.52%	6.07
UK	Private	619		28.33%	14.11%	9.01
	State	7	37.53%	12.70%	5.15%	8.43
	Total	626		28.16%	14.01%	9.00
VENEZUELA	State	1	42.60%	68.78%	2.90%	6.00
ZIMBABWE	Private	3		35.29%	13.17%	5.67
	State	1	81.97%	33.39%	1.15%	4.00
	Total	4		34.93%	10.88%	5.25
Total	Private	3078		52.58%	12.54%	8.20
Total	State	142	60.47%	38.25%	6.71%	6.98
Grand Total		3220		43.27%	12.13%	8.15

Panel B

Country		N	*TD_TA*	NI ($)	TA ($)
ARGENTINA	Private	2	19.04%	-$1,168	$645,855
	State	4	28.36%	$387,629	$5,779,493
	Total	6	24.89%	$242,783	$3,866,961
AUSTRALIA	Private	162	22.48%	$42,503	$1,204,233
	State	4	23.92%	$464,979	$6,323,348
	Total	166	22.52%	$52,083	$1,320,152
CANADA	Private	27	26.39%	$91,524	$1,997,775
	State	2	45.30%	$377,858	$21,563,311
	Total	29	27.84%	$113,550	$3,502,816
CHILE	Private	52	23.40%	$41,761	$1,051,721
	State	4	31.94%	$69,388	$1,990,293
	Total	56	24.04%	$43,891	$1,122,166
CZECH REP.	Private	20	12.63%	$23,435	$640,862
	State	3	17.31%	$99,217	$2,347,605
	Total	23	13.20%	$32,602	$847,323
DENMARK	Private	52	30.60%	$36,565	$566,559
	State	1	37.96%	$44,139	$696,251
	Total	53	30.73%	$36,706	$568,960
FINLAND	Private	52	27.98%	$67,739	$1,103,201
	State	8	40.42%	$180,019	$4,493,382
	Total	60	29.54%	$81,825	$1,528,515
FRANCE	Private	215	22.77%	$49,940	$2,288,493
	State	6	36.25%	$404,569	$31,156,487
	Total	221	23.14%	$59,777	$3,075,426
HONG KONG	Private	213	24.20%	$55,704	$1,001,999
	State	1	28.25%	-$6,649	$332,116
	Total	214	24.21%	$55,431	$999,066
HUNGARY	Private	3	24.03%	-$483	$71,554
	State	8	14.66%	$62,500	$850,319
	Total	11	17.07%	$46,304	$650,065
INDONESIA	Private	86	44.51%	-$320	$284,399
	State	7	50.30%	$78,827	$2,035,395
	Total	93	44.89%	$4,801	$398,004
IRELAND	Private	32	25.10%	$34,038	$728,783
	State	1	24.40%	$46,723	$760,691
	Total	33	25.08%	$34,450	$729,819
ISRAEL	Private	3	27.36%	$16,645	$1,027,470
ITALY	Private	27	23.65%	$89,036	$4,687,178
	State	4	23.71%	-$11,434	$5,169,262
	Total	31	23.66%	$76,611	$4,746,799
JAPAN	Private	752	29.94%	$45,770	$5,039,702
	State	7	37.25%	$628,499	$45,543,050
	Total	759	30.00%	$50,765	$5,370,431

Country		N	*TD_TA*	NI ($)	TA ($)
LUXEMBOURG	Private	2	24.57%	-$49,675	$1,953,155
	State	1	30.58%	$82,393	$11,458,797
	Total	3	26.57%	-$4,134	$5,121,702
MALAYSIA	Private	217	28.75%	$11,019	$351,884
	State	16	29.65%	$88,848	$2,250,693
	Total	233	28.81%	$16,495	$485,617
NETHERLANDS	Private	69	22.65%	$128,720	$2,214,820
	State	3	24.48%	$423,445	$12,220,078
	Total	72	22.72%	$139,956	$2,596,252
NEW ZEALAND	Private	29	27.72%	$32,741	$725,643
	State	2	29.09%	$13,693	$220,843
	Total	31	27.78%	$31,777	$700,207
NORWAY	Private	47	31.69%	$41,986	$1,042,267
	State	2	26.95%	$383,791	$9,484,173
	Total	49	31.49%	$56,847	$1,409,307
PAKISTAN	Private	3	17.29%	$25,502	$212,936
PERU	State	1	19.36%	$55,247	$1,167,847
PHILIPPINES	Private	18	27.18%	-$2,086	$246,553
	State	3	22.04%	$63,533	$1,213,893
	Total	21	26.30%	$9,470	$411,858
POLAND	Private	2	7.45%	-$18,016	$202,701
	State	9	11.27%	$22,667	$804,212
	Total	11	10.40%	$12,952	$660,567
PORTUGAL	Private	8	25.28%	$12,769	$227,856
	State	6	27.43%	$185,182	$4,730,017
	Total	14	26.16%	$83,582	$2,076,958
RUSSIA	Private	2	5.93%	$253,307	$5,138,558
	State	3	16.11%	$332,184	$6,387,732
	Total	5	12.04%	$300,633	$5,888,063
SINGAPORE	Private	117	22.25%	$17,114	$452,159
	State	3	16.54%	$384,535	$2,625,785
	Total	120	22.09%	$27,341	$513,229
SLOVAKIA	Private	1	20.84%	-$111,155	$1,294,047
	State	2	30.27%	-$3,085	$159,440
	Total	3	27.57%	-$33,962	$483,613
SPAIN	Private	52	20.33%	$53,877	$1,634,639
	State	5	18.90%	$499,902	$15,584,823
	Total	57	20.22%	$87,439	$2,684,356
SRI LANKA	Private	7	21.77%	$3,692	$79,654
SWITZERLAND	Private	81	26.92%	$42,397	$1,186,779
	State	3	47.23%	$431,658	$4,619,919
	Total	84	27.63%	$55,941	$1,306,231
THAILAND	Private	80	41.89%	$1,492	$281,803
	State	8	44.32%	$26,003	$1,093,418
	Total	88	42.10%	$3,652	$353,325

Country		N	*TD_TA*	NI ($)	TA ($)
TURKEY	Private	23	21.31%	$13,464	$131,675
	State	6	16.04%	$24,566	$195,680
	Total	29	20.17%	$15,868	$145,531
UK	Private	619	19.29%	$62,836	$1,391,305
	State	7	22.89%	$1,268,403	$24,076,735
	Total	626	19.33%	$75,407	$1,627,899
VENEZUELA	State	1	10.46%	$226,340	$5,898,707
ZIMBABWE	Private	3	13.30%	$7,353	$78,594
	State	1	22.81%	$6,163	$135,753
	Total	4	15.11%	$7,126	$89,481
Total	Private	3078	23.84%	$32,942	$1,211,377
Total	State	142	27.47%	$222,477	$7,071,804
Grand Total		3220	26.04%	$54,723	$2,482,117

Table 5. Summary statistics by industry and ownership type

Summary statistics show the number of private and state-owned companies by 2 digit industry code represented in the sample with at least 4 years of non-missing data for the variables of interest for the period 1992-2001. *SIGMA* is the proportion of the company owned by the state. *OWN* is an estimate of the proportion owned by the insiders out of the portion of the company left for private owners. I use the Worldscope measure "closely held shares" for α and the state ownership data reported by Privatization International and the World Bank for σ, so that $OWN = \frac{\alpha}{1-\sigma}$. MPK is my estimate for the cost of capital or π^K in equation 12, I use the estimator: $\pi_{it}^K = \frac{S_{it}}{K_{it}}\theta_j$, where $\theta_j = \left(\frac{1}{TN}\sum_{i=1}^{N}\sum_{t=1}^{T}\left(S_{it}/K_{it}\right)\right)^{-1}(0.18)$ is industry j parameter that contains the price elasticity of demand. *TD_TA* (the book value leverage ratio), NI and TA are directly from Worldscope. All summary statistics are averages over all non missing firm-year observations.

Sources: Worldscope, Privatization International, World Bank Privatization database, and author's calculations.

Panel A

Industry	2 digit SIC code	State	N	*SIGMA*	*OWN*	*MPK*
Agricultural production- crops	1	Private	12		56.34%	11.37%
Agricultural production-livestock	2	Private	8		39.81%	13.68%
Agricultural services	7	Private	3		24.03%	9.84%
Forestry	8	Private	18		54.88%	2.44%
Fishing, hunting, and trapping	9	Private	4		35.50%	18.00%
Metal mining	10	Private	53		46.96%	2.12%
		State	3	48.75%	69.10%	0.95%
	10 Total	Total	56		48.00%	2.08%
Coal mining	12	Private	12		50.86%	2.49%
		State	1	81.97%	33.39%	1.15%
	12 Total	Total	13		50.12%	2.44%
Oil and gas extraction	13	Private	52		40.18%	2.21%
		State	6	57.36%	52.06%	4.25%
	13 Total	Total	58		41.19%	2.42%
Nonmetallic minerals, except fuels	14	Private	16		32.96%	3.65%
General building contractors	15	Private	123		38.82%	8.68%

Industry	2 digit SIC code	State	N	*SIGMA*	*OWN*	*MPK*
Heavy construction contractors	16	Private	54		43.39%	9.26%
		State	3	72.00%	31.51%	6.14%
	16 Total	Total	57		42.87%	9.12%
Special trade contractors	17	Private	24		46.90%	11.23%
		State	2	37.72%	45.81%	2.47%
	17 Total	Total	26		46.83%	10.57%
Food and kindred products	20	Private	223		47.59%	15.57%
		State	7	54.52%	25.83%	14.70%
	20 Total	Total	230		47.05%	15.55%
Tobacco manufactures	21	Private	10		54.36%	30.78%
		State	1	70.09%	48.16%	25.17%
	21 Total	Total	11		53.84%	30.27%
Textile mill products	22	Private	60		43.90%	15.43%
		State	1	100.00%	0.00%	3.81%
	22 Total	Total	61		43.11%	15.24%
Apparel and other textile products	23	Private	50		46.82%	24.49%
		State	1	40.00%	52.29%	16.18%
	23 Total	Total	51		46.93%	24.34%
Lumber and wood products	24	Private	28		45.81%	10.19%
		State	1	15.10%	49.81%	4.56%
	24 Total	Total	29		45.96%	9.96%
Furniture and fixtures	25	Private	32		40.37%	19.42%
Paper and allied products	26	Private	65		41.21%	12.08%
		State	3	59.48%	23.66%	2.66%
	26 Total	Total	68		40.53%	11.67%
Printing and publishing	27	Private	74		42.66%	18.71%
		State	1	1.42%	48.68%	14.76%
	27 Total	Total	75		42.73%	18.67%
Chemicals and allied products	28	Private	210		39.67%	13.79%
		State	9	59.03%	46.07%	7.54%
	28 Total	Total	219		39.89%	13.58%
Petroleum and coal products	29	Private	17		48.64%	16.11%
		State	10	70.87%	27.03%	12.35%
	29 Total	Total	27		40.70%	14.78%
Rubber and miscellaneous plastics products	30	Private	53		50.49%	9.65%
Leather and leather products	31	Private	16		42.48%	18.50%
Stone, clay, glass, and concrete products	32	Private	111		44.68%	6.44%
		State	6	42.57%	60.44%	3.86%
	32 Total	Total	117		45.38%	6.32%

Industry	2 digit SIC code	State	N	*SIGMA*	*OWN*	*MPK*
Primary metal industries	33	Private	85		42.47%	10.27%
		State	7	64.61%	41.69%	6.82%
	33 Total	Total	92		42.42%	10.06%
Fabricated metal products	34	Private	87		44.36%	13.15%
		State	1	77.74%	32.47%	16.90%
	34 Total	Total	88		44.28%	13.18%
Industrial machinery and equipment	35	Private	189		39.34%	15.14%
		State	2	20.80%	49.65%	15.15%
	35 Total	Total	191		39.43%	15.14%
Electrical and electronic equipment	36	Private	225		44.68%	14.90%
		State	3	40.08%	43.78%	15.19%
	36 Total	Total	228		44.67%	14.90%
Transportation equipment	37	Private	95		44.35%	13.34%
		State	4	69.13%	37.71%	12.51%
	37 Total	Total	99		44.11%	13.31%
Instruments and related products	38	Private	79		37.36%	14.42%
		State	3	71.83%	10.49%	18.70%
	38 Total	Total	82		36.49%	14.56%
Miscellaneous manufacturing industries	39	Private	35		45.44%	13.80%
Local and interurban passenger transit	40	Private	5		26.45%	9.71%
		State	3	45.13%	44.26%	2.32%
	40 Total	Total	8		32.49%	7.13%
Motor freight transportation and warehousing	41	Private	15		35.31%	7.76%
		State	1	75.50%	35.00%	6.34%
	41 Total	Total	16		35.29%	7.69%
Postal Service	42	Private	25		44.38%	15.89%
		State	1	34.80%	64.84%	30.91%
	42 Total	Total	26		44.91%	16.27%
Water transportation	44	Private	63		46.44%	11.39%
		State	3	37.90%	24.28%	2.45%
	44 Total	Total	66		45.54%	11.03%
Transportation by air	45	Private	19		43.09%	15.35%
		State	8	70.14%	19.55%	7.10%
	45 Total	Total	27		36.67%	12.85%
Transportation services	47	Private	36		47.98%	21.82%
		State	1	32.34%	77.77%	19.97%
	47 Total	Total	37		48.59%	21.78%

Industry	2 digit SIC code	State	N	*SIGMA*	*OWN*	*MPK*
Communications	48	Private	75		47.40%	20.12%
		State	21	65.52%	34.12%	5.36%
	48 Total	Total	96		44.55%	16.85%
Electric, gas, and sanitary services	49	Private	100		44.43%	8.05%
		State	20	63.51%	36.74%	4.03%
	49 Total	Total	120		43.37%	7.47%
Wholesale trade--durable goods	50	Private	178		41.51%	10.85%
		State	3	55.89%	34.65%	10.53%
	50 Total	Total	181		41.40%	10.85%
Wholesale trade--nondurable goods	51	Private	129		46.57%	9.53%
		State	2	71.75%	78.05%	3.79%
	51 Total	Total	131		47.02%	9.43%
Building materials, hardware, garden supply, & mobile	52	Private	11		35.97%	8.26%
General merchandise stores	53	Private	79		41.51%	6.33%
Food stores	54	Private	41		46.85%	6.83%
		State	1	67.24%	47.17%	25.81%
	54 Total	Total	42		46.86%	6.89%
Automotive dealers and gasoline service stations	55	Private	20		46.08%	13.50%
Apparel and accessory stores	56	Private	38		45.05%	9.51%
Furniture, home furnishings and equipment stores	57	Private	28		45.31%	9.07%
Eating and drinking places	58	Private	47		38.05%	4.38%
		State	1	10.63%	48.47%	3.16%
	58 Total	Total	48		38.29%	4.35%
Miscellaneous retail	59	Private	46		47.45%	9.55%
		State	2	75.80%	15.47%	6.51%
	59 Total	Total	48		46.51%	9.45%
All Industries		Private	3078		43.50%	12.31%
		State	142	56.98%	37.40%	7.61%
		Total	3220		43.27%	12.13%

Panel B

Industry	2 digit SIC code	State	N	*TD_TA*	NI ($)	TA ($)
Agricultural production-crops	1	Private	12	15.00%	$10,530	$260,839
Agricultural production-livestock	2	Private	8	28.15%	$22,214	$410,845
Agricultural services	7	Private	3	16.74%	$10,241	$196,750
Forestry	8	Private	18	17.10%	$8,687	$239,832
Fishing, hunting, and trapping	9	Private	4	41.54%	$286	$1,505,121
Metal mining	10	Private	53	21.97%	$57,201	$1,602,107
		State	3	7.33%	$7,491	$180,129
	10 Total	Total	56	21.24%	$54,741	$1,531,596
Coal mining	12	Private	12	19.54%	$19,064	$429,821
		State	1	22.81%	$6,163	$135,753
	12 Total	Total	13	19.67%	$18,577	$418,724
Oil and gas extraction	13	Private	52	18.99%	$57,113	$1,712,845
		State	6	23.82%	$255,325	$3,996,445
	13 Total	Total	58	19.46%	$76,893	$1,936,447
Nonmetallic minerals, except fuels	14	Private	16	29.14%	$95,402	$1,682,580
General building contractors	15	Private	123	27.36%	$18,143	$3,146,872
Heavy construction contractors	16	Private	54	20.19%	$25,188	$2,158,048
		State	3	13.34%	$87,308	$1,628,402
	16 Total	Total	57	19.88%	$27,932	$2,134,650
Special trade contractors	17	Private	24	14.80%	$27,037	$1,227,628
		State	2	35.34%	$95,565	$2,640,380
	17 Total	Total	26	16.24%	$31,851	$1,326,871
Food and kindred products	20	Private	223	25.20%	$40,564	$1,192,613
		State	7	32.68%	$21,753	$432,305
	20 Total	Total	230	25.39%	$40,094	$1,173,597
Tobacco manufactures	21	Private	10	27.42%	$312,173	$6,978,886
		State	1	10.14%	$541,823	$19,139,081
	21 Total	Total	11	25.84%	$337,976	$8,345,200
Textile mill products	22	Private	60	31.13%	$3,063	$469,603
		State	1	45.96%	$24,443	$523,780
	22 Total	Total	61	31.38%	$3,419	$470,506
Apparel and other textile products	23	Private	50	28.13%	$8,488	$388,460
		State	1	18.59%	$2,231	$102,652
	23 Total	Total	51	27.96%	$8,377	$383,379
Lumber and wood products	24	Private	28	33.47%	$16,523	$566,127
		State	1	45.95%	$402,385	$11,118,740
	24 Total	Total	29	33.97%	$32,020	$989,927

Industry	2 digit SIC code	State	N	*TD_TA*	NI ($)	TA ($)
Furniture and fixtures	25	Private	32	20.46%	$11,694	$400,805
Paper and allied products	26	Private	65	31.59%	$40,873	$1,772,070
		State	3	33.95%	$20,317	$716,156
	26 Total	Total	68	31.69%	$39,963	$1,725,333
Printing and publishing	27	Private	74	22.36%	$60,873	$1,252,015
		State	1	7.86%	$19,601	$165,702
	27 Total	Total	75	22.22%	$60,455	$1,240,995
Chemicals and allied products	28	Private	210	25.75%	$54,018	$2,200,168
		State	9	19.75%	$99,366	$1,548,563
	28 Total	Total	219	25.55%	$55,537	$2,178,337
Petroleum and coal products	29	Private	17	25.83%	$545,433	$13,907,434
		State	10	27.06%	$737,465	$17,485,857
	29 Total	Total	27	26.28%	$615,553	$15,214,078
Rubber and miscellaneous plastics products	30	Private	53	27.69%	$23,833	$1,251,885
Leather and leather products	31	Private	16	25.79%	$73,871	$2,877,114
Stone, clay, glass, and concrete products	32	Private	111	28.75%	$40,406	$1,522,290
		State	6	33.22%	$45,004	$952,333
	32 Total	Total	117	28.96%	$40,616	$1,496,228
Primary metal industries	33	Private	85	30.41%	$25,308	$3,136,892
		State	7	29.79%	$50,988	$5,271,637
	33 Total	Total	92	30.38%	$26,892	$3,268,416
Fabricated metal products	34	Private	87	24.56%	$15,617	$839,469
		State	1	12.12%	-$3,045	$92,307
	34 Total	Total	88	24.45%	$15,455	$832,980
Industrial machinery and equipment	35	Private	189	24.09%	$27,445	$2,180,774
		State	2	36.61%	$67,550	$2,183,571
	35 Total	Total	191	24.19%	$27,763	$2,180,796
Electrical and electronic equipment	36	Private	225	22.90%	$48,646	$2,754,205
		State	3	22.54%	$14,736	$203,607
	36 Total	Total	228	22.90%	$48,226	$2,722,544
Transportation equipment	37	Private	95	24.89%	$72,571	$5,576,583
		State	4	25.01%	$210,334	$13,470,340
	37 Total	Total	99	24.90%	$77,464	$5,857,562
Instruments and related products	38	Private	79	24.50%	$28,440	$1,350,528
		State	3	30.36%	-$98,938	$10,740,676
	38 Total	Total	82	24.70%	$24,200	$1,663,116
Miscellaneous manufacturing industries	39	Private	35	20.65%	$57,637	$1,052,783

Industry	2 digit SIC code	State	N	*TD_TA*	NI ($)	TA ($)
Local and interurban passenger transit	40	Private	5	41.85%	$86,860	$8,388,622
		State	3	57.81%	$391,797	$47,628,483
	40 Total	Total	8	47.34%	$201,211	$23,103,570
Motor freight transportation and warehousing	41	Private	15	50.58%	$27,493	$2,892,251
		State	1	4.67%	$20,719	$307,338
	41 Total	Total	16	48.41%	$27,172	$2,769,992
Postal Service	42	Private	25	28.21%	$27,989	$1,395,120
		State	1	19.31%	$430,521	$6,355,763
	42 Total	Total	26	27.99%	$38,137	$1,520,179
Water transportation	44	Private	63	38.15%	$33,065	$1,340,903
		State	3	25.94%	$17,649	$241,712
	44 Total	Total	66	37.67%	$32,454	$1,297,371
Transportation by air	45	Private	19	42.45%	$103,478	$4,426,582
		State	8	42.68%	$18,849	$3,956,876
	45 Total	Total	27	42.52%	$78,466	$4,289,107
Transportation services	47	Private	36	23.33%	$42,340	$1,022,137
		State	1	33.16%	$36,871	$711,823
	47 Total	Total	37	23.52%	$42,212	$1,015,910
Communications	48	Private	75	28.72%	$79,168	$3,290,167
		State	21	27.71%	$800,007	$23,927,326
	48 Total	Total	96	28.51%	$234,177	$7,675,221
Electric, gas, and sanitary services	49	Private	100	31.94%	$141,695	$7,059,890
		State	20	34.57%	$220,941	$6,823,087
	49 Total	Total	120	32.32%	$153,159	$7,025,668
Wholesale trade--durable goods	50	Private	178	25.11%	$27,791	$2,215,123
		State	3	43.39%	$59,351	$2,598,173
	50 Total	Total	181	25.41%	$28,305	$2,221,371
Wholesale trade--nondurable goods	51	Private	129	25.12%	$24,661	$1,932,103
		State	2	4.89%	$112,635	$1,409,418
	51 Total	Total	131	24.85%	$25,841	$1,925,093
Building materials, hardware, garden supply, & mobile	52	Private	11	22.26%	$24,562	$509,641
General merchandise stores	53	Private	79	31.56%	$44,170	$3,339,251
Food stores	54	Private	41	24.06%	$116,961	$2,538,221
		State	1	7.55%	$27,317	$291,247
	54 Total	Total	42	23.83%	$115,752	$2,507,938
Automotive dealers and gasoline service stations	55	Private	20	25.00%	$10,799	$296,415
Apparel and accessory stores	56	Private	38	20.21%	$8,151	$554,495

Industry	2 digit SIC code	State	N	*TD_TA*	NI ($)	TA ($)
Furniture, home furnishings and equipment stores	57	Private	28	19.30%	$18,876	$472,794
Eating and drinking places	58	Private	47	21.85%	$33,616	$720,926
		State	1	34.45%	$8,782	$211,273
	58 Total	Total	48	22.16%	$33,017	$708,675
Miscellaneous retail	59	Private	46	20.81%	$118,689	$1,974,211
		State	2	15.26%	$19,079	$138,892
	59 Total	Total	48	20.64%	$115,678	$1,918,596
All Industries		Private	3078	25.92%	$46,353	$2,227,291
		State	142	29.12%	$260,572	$8,780,843
		Total	3220	26.04%	$54,723	$2,482,117

Table 6. Estimated values of thetha per industry

Thetha is a quasi-elasticity of demand measure used in the estimation of the MPK for each firm, based on the assumptions for: a standard Cobb-Douglas production function and firms are at their equilibrium capital stocks. It can be shown that (see derivation in Appendix 2) $MPK = \theta \frac{S}{K}$, and thetha can be estimated as:

$\hat{\theta}_j = \left(\frac{1}{(TN)_j} \sum_{i=1}^{N_j} \sum_{t=1}^{T_j} \left(\frac{S}{K} \right)_{it} \right)^{-1} \frac{1}{(TN)_j} \sum_{i=1}^{N_j} \sum_{t=1}^{T_j} (r_{it} + \delta_{it})$, or the cost of capital is a sales capital ratio times an industry-specific elasticity parameter. $\frac{1}{(TN)_j} \sum_{i=1}^{N_j} \sum_{t=1}^{T_j} (r_{it} + \delta_{it})$ is taken to be 0.18 for all industries (value used by many researchers).

Industry	2 digit SIC code	θ_j
Agricultural production- crops	1	0.0532
Agricultural production- livestock	2	0.0308
Agricultural services	7	0.0211
Forestry	8	0.0151
Fishing, hunting, and trapping	9	0.0290
Metal mining	10	0.1369
Coal mining	12	0.1135
Oil and gas extraction	13	0.1008
Nonmetallic minerals, except fuels	14	0.0719
General building contractors	15	0.0066
Heavy construction contractors	16	0.0251
Special trade contractors	17	0.0207
Food and kindred products	20	0.0443
Tobacco manufactures	21	0.0284
Textile mill products	22	0.0465
Apparel and other textile products	23	0.0263
Lumber and wood products	24	0.0789
Furniture and fixtures	25	0.0366
Paper and allied products	26	0.0623
Printing and publishing	27	0.0350
Chemicals and allied products	28	0.0549
Petroleum and coal products	29	0.0386
Rubber and miscellaneous plastics products	30	0.0575
Leather and leather products	31	0.0248
Stone, clay, glass, and concrete products	32	0.0628
Primary metal industries	33	0.0541
Fabricated metal products	34	0.0415

Industry	2 digit SIC code	θ_j
Industrial machinery and equipment	35	0.0179
Electrical and electronic equipment	36	0.0317
Transportation equipment	37	0.0390
Instruments and related products	38	0.0361
Miscellaneous manufacturing industries	39	0.0307
Local and interurban passenger transit	40	0.1961
Motor freight transportation and warehousing	41	0.1484
U.S. Postal Service	42	0.0704
Water transportation	44	0.0978
Transportation by air	45	0.0276
Transportation services	47	0.0210
Communications	48	0.0589
Electric, gas, and sanitary services	49	0.1251
Wholesale trade--durable goods	50	0.0111
Wholesale trade--nondurable goods	51	0.0119
Building materials, hardware, garden supply, & mobile	52	0.0119
General merchandise stores	53	0.0364
Food stores	54	0.0309
Automotive dealers and gasoline service stations	55	0.0187
Apparel and accessory stores	56	0.0248
Furniture, home furnishings and equipment stores	57	0.0201
Eating and drinking places	58	0.0335
Miscellaneous retail	59	0.0134

Table 7. The Relationship between Inside Ownership and the Cost of Capital

Fixed effects panel regressions of the dependent variable MPK on the measure of insider ownership (OWN), an interactive variable OWN*SIGMA and controls. The variables are defined in tables 4 and 5. Regression (1) is testing structural equation (12), regression (2) includes controls. Top 50 is a sample including the largest 50 firms in each of the countries in the sample having 5 firms or more. Random 50 is a sample consisting of random sub-samples of firms from each country having 5 firms or more. Firm specific intercepts and year dummy coefficients are not reported. The p-values for tests of equality of each coefficient to zero are in parentheses, the test statistics are calculated based on heteroskedasticity and serial correlation robust errors.

Panel A

	Top 50		Random 50	
	(1)	(2)	(1)	(2)
Individual specific intercepts	Yes	Yes	Yes	Yes
Ln(TA)		-0.0115**		-0.0140**
		(0.0003)		(0.0003)
TD/TA		-0.0719**		-0.0541**
		(<.0001)		(0.0037)
SIGMA	-0.006	-0.0097	0.0144	0.0077
	(0.4028)	(0.1915)	(0.4763)	(0.6692)
OWN	-0.0221**	-0.0220**	-0.0218**	-0.0219**
	(0.0035)	(0.0031)	(0.0021)	(0.0013)
OWN*SIGMA	0.536**	0.0324*	0.0601**	0.0420*
	(0.0013)	(0.0393)	(0.0012)	(0.0156)
Year dummies	Yes	Yes	Yes	Yes
No of observations	8116	8115	8434	8433
No of firms	1064	1064	1135	1135

Panel B

	State		Low k		US	
	(1)	(2)	(1)	(2)	(1)	(2)
Individual specific intercepts	Yes	Yes	Yes	Yes	Yes	Yes
Ln(TA)		-0.0162 (0.4005)		-0.0220** (0.0003)		-0.0180* (0.0175)
TD/TA		-0.0811** (0.0029)		-0.0312** (0.0028)		-0.0741** (0.0022)
SIGMA	0.0094 (0.4732)	0.0050 (0.6934)	0.0824 (0.0639)	0.0406 (0.2652)		
OWN	-0.0419 (0.4299)	-0.0357 (0.3995)	0.0192 (0.2253)	0.0049 (0.7533)	-0.0046 (0.7594)	-0.0375** (0.0102)
OWN*SIGMA	0.0776 (0.3574)	0.0612 (0.3592)	-0.0164 (0.6465)	0.0017 (0.9614)		
Year dummies	Yes	Yes	No	Yes	No	Yes
No of obs.	949	949	3644	3643	2536	2534
No of firms	136	136	542	542	276	276

Table 8. Two-Stage Least Squares Estimation of Insider Ownership and the Cost of Capital

Two-stage least squares regressions of the dependent variable ΔMPK on the measure of insider ownership (ΔOWN), an interactive variable $\Delta OWN * SIGMA$ and controls. The original variables are defined in tables 4 and 5, here I use a first differencing transformation. The dependent variable in the first-stage regression is ΔOWN , the instruments are only the controls. Random 50 is a sample consisting of random sub-samples of firms from each country having 5 firms or more. Firm specific and year dummy coefficients are not reported. The p-values for tests of equality of each coefficient to zero are in parentheses, the test statistics are calculated based on heteroskedasticity and serial correlation robust errors.

Panel A

	Top 50		Random 50	
	ΔMPK	*ΔOWN*	*ΔMPK*	*ΔOWN*
Δ ln(*TA*)		-0.297 (0.1042)		-3.58 (0.7469)
ΔTD / TA	-0.0798** (<.0001)	-0.9404 (0.1255)	-0.0678** (<.0001)	-14.47 (0.7479)
ΔSIGMA	0.3096* (0.0139)		0.2206* (0.0111)	
ΔOWN	0.8311* (0.0123)		0.6245** (0.0084)	
*ΔOWN * SIGMA*	-1.2366* (0.0122)		-0.9552** (0.0082)	
ΔMPK		-21.1 (0.1074)		-313.43 (0.7472)
No of observations	6875		7080	
Adjusted R^2	0.00207	0.0000	0.00359	0.0000

Panel B

	State		Low k		US	
	ΔMPK	ΔOWN	ΔMPK	ΔOWN	ΔMPK	ΔOWN
$\Delta \ln(TA)$		-1.7859 (0.6192)		- 0.0990* (0.0241)		-0.0279 (0.9072)
$\Delta TD/TA$	-0.0339 (0.3228)	-12.989 (0.5826)	-0.0079 (0.7258)	- 0.1116* (0.0373)	-0.0731 (<.0001)	0.9973 (0.7577)
$\Delta SIGMA$	-0.1247 (0.3116)		0.5183* (0.0471)			
ΔOWN	-0.3688 (0.2949)		1.2446* (0.0377)		0.1146 (0.1550)	
$\Delta OWN * SIGMA$	0.5552 (0.3005)		-1.9830* (0.374)			
ΔMPK		-220.99 (0.5804)		- 3.6095* (0.0380)		14.93 (0.7880)
No of obs.	793		2982		2247	
Adjusted R^2	0.02267	0.0108	0.00045	0.00079	0.01322	0.0000

Table 9. Descriptive Statistics for Selected Variables in the Sub-samples State and Top 50.

SIGMA is the proportion of the company owned by the state, *MPK* is the estimate for the marginal product of capital (refer to Appendix 2), Δ denotes the change in the respective variable from the year before.

Panel A

Top 50	*SIGMA*	*MPK*	*OWN*	*OWN * SIGMA*
Mean	0.0724	0.1074	0.4518	0.0155
Standard Deviation	0.2216	0.1094	0.2317	0.0604
Sample Variance	0.0491	0.0120	0.0537	0.0037
Minimum	0.0000	0.0004	0.0000	0.0000
Maximum	1.0000	0.9287	1.0000	0.7511
Count	1054	1054	1054	1054

Top 50	Δ*SIGMA*	Δ*MPK*	Δ*OWN*	Δ*OWN * SIGMA*
Mean	-0.0039	0.0002	0.0030	0.0011
Standard Deviation	0.0175	0.0199	0.0512	0.0135
Sample Variance	0.0003	0.0004	0.0026	0.0002
Minimum	-0.1111	-0.1631	-0.3040	-0.1520
Maximum	0.0833	0.1930	0.3062	0.1497
Count	1054	1054	1054	1054

Panel B

State	*SIGMA*	*MPK*	*OWN*	*OWN * SIGMA*
Mean	0.5976	0.0812	0.3643	0.1310
Standard Deviation	0.2872	0.0891	0.2524	0.1245
Sample Variance	0.0825	0.0079	0.0637	0.0155
Minimum	0.0100	0.0010	0.0000	0.0000
Maximum	1.0000	0.7813	0.9886	0.7511
Count	134	134	134	134

State	*ΔSIGMA*	*ΔMPK*	*ΔOWN*	*ΔOWN * SIGMA*
Mean	-0.0310	-0.0005	0.0253	0.0082
Standard Deviation	0.0438	0.0166	0.0756	0.0375
Sample Variance	0.0019	0.0003	0.0057	0.0014
Minimum	-0.1111	-0.0634	-0.3040	-0.1520
Maximum	0.0988	0.1380	0.3062	0.1497
Count	134	134	134	134