Essays on Tunneling, Investor Protection, and Ownership Concentration

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Abstract

Tunneling behavior, which is defined as the transfer of assets and profits out of a firm for the benefit of the firm's controlling shareholders, has become the focus of increasing attention in the theoretical and empirical literature. There are some corporate governance procedures, however, that help to protect investors against tunneling. This paper applies agency theory to study how the two basic mechanisms - legal protection on investor rights and ownership concentration – work together to constrain tunneling in a system of corporate governance. Analytical results in this paper show that tunneling is negatively related to the effectiveness of investor protection, while the relation between tunneling and ownership concentration is non-monotonic because both outcomes are determined by fundamentals including the effectiveness of investor protection, firm return and volatility of return, firm size, controllers' attitude towards risk, etc.

After describing the theoretical framework in detail, the rest of the dissertation is taken up in assembling and assessing various pieces of evidence to see whether or not the predictions from the model are consistent with empirical evidence. I discuss several well-known cases of tunneling in the U.S. and Western European countries to show how tunneling happens in developed countries with good law enforcement and how tunneling is treated differently by different legal systems.

The model makes several predictions about the determinants of corporate ownership concentration that are examined empirically. I study both cross-country and within-country variations in corporate ownership concentration with two newly constructed data sets. The first dataset contains 3875 public companies across states in the U.S. over a 10-year period (1992~2002) and the second dataset covers 1070 stock companies across 45 countries (regions) in a 10-year period (1992~2002). I find that corporate ownership concentration varies systematically with the effectiveness of investor protection and with firm-specific fundamentals such as firm size, firm return, and volatility of firm return in ways that are consistent with the model's predictions.

JEL classification: G34; G32; D23; K49; L25; O51

Keywords: Tunneling, investor protection, ownership concentration, corporate governance

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INTRODUCTION

Tunneling behavior, which is defined as the transfer of assets and profits out of a firm for the benefit of the firm's controlling shareholders[1], has become the focus of increasing attention in the literature. Researchers have documented that tunneling is pervasive. For instance, Bertrand et al. (2002) find significant amounts of tunneling when looking into data on Indian business groups. Johnson et al. (2000a) document incidents of tunneling in "emerging markets" during the 1997-98 Asian financial crisis. Tunneling occurs not only in emerging markets. For example, Johnson et al. (2000b) show how tunneling occurs in developed countries with good law enforcement.

There are some corporate governance procedures, however, that help to protect investors against tunneling. Certain legal institutions limit tunneling by making it costly for the firm's controlling shareholders ("controllers" thereafter). For instance, the right to sue the controllers of the firm constrains their discretionary power and, with it, the ability to divert value out of the firm (Zingales (1995)) and so does any right attributed to minority shareholders (La Porta et al. ("LLSV" thereafter), (1997, 1998)). Ownership arrangement is another important governance mechanism to constrain tunneling. Ownership concentration on the firm's controllers can align controllers' interest with the firm and may, as a result, reduce tunneling. How do these mechanisms work to constrain tunneling, and how are they inter-related in a system of corporate governance? These questions haven't been fully answered in the literature.

[1] Johnson et al. (2000b).

In this dissertation, a model that builds upon the principal-agent theory is developed to understand the impact of investor protection and ownership concentration on tunneling behavior. Following Johnson et al. (2000b), tunneling in this paper is used narrowly to refer to the transfer of resources out of a company to its controllers, and "it does not cover other agency problems, such as incompetent management, placement of relatives in executive positions, excessive or insufficient investment, or resistance to value-increasing takeovers". According to Johnson et al. (2000b), tunneling comes in two forms:

> "First, a controlling shareholder can simply transfer resources from the firm for his own benefit through self-dealing transactions. Such transactions include outright theft or fraud, which are illegal everywhere though often go undetected or unpunished, but also assets sales, contracts such as transfer pricing advantageous to the controlling shareholder, excessive executive compensation, loan guarantees, expropriation of corporate opportunities, and so on. Second, the controlling shareholder can increase his share of the firm without transferring any assets through dilutive share issues, minority freeze-outs, insider trading, creeping acquisitions, or other financial transactions that discriminate against minorities".

The proposed model in this dissertation pertains to the first form of tunneling more than the second form. In the model, tunneling is restricted by two basic mechanisms in a system of corporate governance: legal protection on investor rights and ownership concentration on the controllers. The model provides conditions under which the problem of tunneling can be resolved completely (zero tunneling in equilibrium), while under

other circumstances, it can only be resolved partially and positive tunneling exists in equilibrium due to the risk-averseness of the controllers. The model clearly predicts that the level of tunneling in equilibrium is higher (lower) if the legal institutions protect investor rights less (more) effectively. Comparatively, the relation between tunneling and ownership concentration is non-monotonic. This is because the effect of ownership concentration on tunneling is two-fold: on one hand, it aligns the controllers' interest to the firm, and thus reduces tunneling (the alignment effect); on the other hand, it introduces uncertainty to the income of the risk-averse controllers, and thus induces tunneling (the risk-aversion effect). The optimal level of ownership concentration equates the marginal effects of these two opposite effects and maximizes the firm value by minimizing tunneling in equilibrium.

It has long been argued in the literature that ownership concentration is endogenously determined. However, there has been no consensus on how ownership structure is endogenized in a firm. For example, Demsetz and Lehn (1985) propose that the structure of corporate ownership varies systematically in ways that are consistent with value maximization, while another study by Himmelberg et al. (1999) argues that corporate ownership structure is explained by key variables in the contracting environment in ways consistent with the predictions of principal-agent models. In this dissertation, a firm's ownership concentration is endogenous as the result of investors' attempt in the financial asset market to maximize the firm value by minimizing the controllers' tunneling. Therefore, corporate ownership concentration is endogenized in ways that are consistent with both value maximization and the agency theory. The model

predicts explicitly that the equilibrium ownership concentration in a firm is negatively related to the effectiveness of investor protection. The model also shows what firm-specific fundamentals affect corporate ownership structure and how[2].

After describing the theoretical framework in detail, the rest of the dissertation is taken up in assembling and assessing various pieces of evidence to see whether or not the predictions from the model are consistent with empirical regularities. Existing evidence on tunneling is primarily from developing countries or civil-law countries where investor protection is believed to be weak in relative to advanced common-law countries such as the U.S. and U.K., a phenomenon that is consistent with the model prediction. On the other hand, the model also suggests that as far as the investor protection is imperfect and firm controllers are sufficiently risk-averse, tunneling is likely to occur even in advanced common-law countries, as shown by recent market events in the U.S. In chapter two, I discuss several well-known cases of tunneling in the U.S. and Western European countries to show how tunneling takes place in developed countries with good law enforcement and how tunneling is treated differently by different legal systems.

Even though it is difficult to obtain data that quantify tunneling systematically in the real world, the theoretical framework in this paper generates testable implications that take the form of a number of predicted relations between corporate ownership concentration, various firm level variables, and institutional variables that proxy for the effectiveness of investor protection. These predictions are examined empirically using two newly constructed data sets:

[2] These firm level determinants overlap considerably with variables included in Demsetz and Lehn (1985)'s empirical study.

The first data set contains firm-specific financial information of 3875 public companies from 51 states in the U.S. over a period of 10 years (1992~2002). OLS and IV estimations show that corporate ownership concentration varies systematically with the effectiveness of law enforcement in a state and certain firm-specific fundamentals in ways that are consistent with the model's predictions. These findings provide new insights on the determinants of corporate ownership concentration in the United States.

The second empirical study (chapter four) extends Demsetz and Lehn (1985)'s results and studies the determinants of corporate ownership concentration across countries using a newly constructed data set of 1070 publicly traded stock companies from 45 countries around the world in a 10-year period (1992~2002). OLS and IV estimation results show that corporate ownership concentration varies systematically with respect to certain firm-specific economic variables and country characteristics in ways that are consistent with both value maximization and predictions of the agency theory. For example, it is found in this study that after controlling for firm-level determinants such as firm size, auditing practice, return rate, etc, corporate ownership concentration is significantly lower in countries with more developed stock market and more effective investor protection. These results provide strong evidence in support of the model outlined in chapter one and are consistent with La Porta et al. (1999)'s idea that ownership concentration is a substitute for legal institutions as a mechanism to protect investor rights. These findings are robust across different model specifications and variable measurements.

The dissertation is organized as follows. The model is sketched in chapter one. Chapter two studies tunneling in the real world with case studies. Chapter three examines empirically the model predictions on the determination of corporate ownership concentration using a sample of 3875 U.S. public companies across states. Chapter four studies corporate ownership concentration using a cross-country sample of 1070 stock companies around the world in a 10-year period.

1. A Model on Tunneling

Abstract

A model that draws on the principal-agent theory is developed to understand tunneling and its relations to investor protection and ownership concentration in this chapter. The model suggests that when the controlling shareholders are sufficiently risk-averse and when there is sizeable uncertainty involved in the firm return, the problem of tunneling cannot be resolved completely through legal protection and ownership arrangement. Tunneling in equilibrium is negatively related to the effectiveness of investor protection, while both tunneling and ownership concentration are endogenously determined by a set of firm fundamentals and investor protection in the environment. The model shows precisely what factors determine the level of tunneling and ownership concentration in equilibrium and how.

1.1. Introduction and Related Research

In this chapter I apply agency theory to study tunneling and its relations to investor protection and ownership concentration in a firm. I argue that legal protection on investor rights and ownership concentration are the two basic mechanisms to protect investors against tunneling in a system of corporate governance. Analytical results show that tunneling in equilibrium is negatively related to the effectiveness of investor protection, while the relation between tunneling and ownership concentration is non-monotonic because ownership concentration is endogenous and because firm controllers are risk-averse. In equilibrium, both tunneling and ownership concentration are

endogenously determined by a set of firm-level economic variables and the effectiveness of investor protection in the environment.

This paper builds upon and attempts to make contributions to two related literatures. The first is the recently emerging literature on tunneling and its relation to the legal protection on investor rights (for example, LLSV (1997, 1998, 1999, 2002), Johnson et al. (2000a, b), Bertrand et al. (2002), Himmelberg et al. (2001)).

The term tunneling is coined originally to characterize the expropriation of minority shareholders in the Czech Republic. Johnson et al. (2000b) use the term to describe the transfer of assets and profits out of the firms for the benefit of those who control them. Bertrand et al. (2002) provide direct evidence of tunneling in India and propose an empirical measure of tunneling. Similar behavior has also been under investigation in the literature of law and finance. LLSV (2002) and Johnson et al. (2000a) propose a similar model structure to examine the relation between legal protection on investor rights and "stealing" by the firm's managers from minority shareholders. The current study borrows from these papers the assumption that investor protection can be modeled as a parameter in a cost-of-tunneling technology that makes it costly (to varying degrees) for those who control the firm to tunnel from minority shareholders. Different from LLSV (2002) and Johnson et al. (2000a) in which cost of stealing is assumed to be unrelated to firm characteristics, in this paper, the cost of tunneling varies with firm characteristics such as the volatility of the firm's rate of return. In addition, in LLSV (2002) and Johnson et al. (2000a), ownership concentration is treated as exogenous, while in my model, corporate ownership concentration is endogenous, i.e., an outcome of

the interactions between minority and controlling shareholders in the financial asset market. Furthermore, their models do not use a principal-agent structure, and uncertainty does not play a role in shaping a firm's ownership structure.

Unlike LLSV (2002) and Johnson et al. (2000a) in which legal protection on investor rights is the only way to constrain "stealing", my model suggests that the owners of the firm (i.e., the large group of non-controllers) have some power to preclude expropriation of their assets. To some extent, ownership concentration is a substitute for investor protection as a device that induces the firm controllers to engage in lower levels of tunneling. Thus, owners will strive to pick an optimal corporate ownership structure that effectively attenuates tunneling, and thereby maximizes firm value. In this context, a well-developed financial asset market in which the small group of controllers does not dominate the larger group of investors plays an important disciplinary role in limiting tunneling.

The second literature that this paper fits in is the principal-agent analysis of corporate governance. Starting with the pioneering work of Alchian and Demsetz (1972) and Jensen and Meckling (1976), traditional agency problems, such as incompetent management, excessive or insufficient investment, or resistance to value-increasing takeovers, have been under extensive investigations. This paper borrows the basic analytic structure from agency theory to address the issue of tunneling.

In this paper, large shareholders are modeled as a firm's controllers. The controllers have stronger financial stakes in the firm than the large group of small

shareholders, and consequently, they either participate in the management directly[3] or they make considerable efforts to monitor the firm's managers[4]. Therefore, large shareholders either actually do the tunneling or condone it. Small shareholders, unlike large shareholders, are "free riders" in the sense that they do not spend much time monitoring managers. Their rights are in principle protected by legal institutions, for instance, particular laws on the books, regulatory agencies, etc. Small shareholders can also "vote with their feet" and liquidate their assets in the financial markets. In this model, the potential moral hazard problem is that controllers (the agent) may use tunneling to expropriate investors (the principal), especially the small shareholders.

1.2. The Model

In this section, I introduce a simple framework for analyzing the determinants of tunneling as well as corporate ownership concentration. Consider a firm with common equity, E. This firm is owned by the controller[5] and the larger group of small shareholders. The controller owns share α of the firm's equity and can possibly engage in tunneling. Denote the amount of resources being tunneled out of the firm by the controller as T, and T is constrained to be greater than zero and less than E, meaning

[3] LLSV (2002) find that large shareholders are major directors for most of the firms in their cross-country sample.
[4] Demsetz (1983) and Shleifer and Vishny (1986) propose that the existence of large shareholders leads to better monitoring of managers. Also, see Agrawal and Mandelker (1990) for empirical evidence.
[5] For simplicity, the small group of controllers is treated as one person in the model thereafter.

that the controller won't put extra money into the firm (negative tunneling)[6] and the controller can't possibly tunnel more than the firm's common equity. The controller invests the rest of the firm's equity in a project that yields a rate of return r, where r is a normally distributed random variable with expected value R and variance V, and $R \in [0,1]$.

Tunneling is costly (for example, other people need to be paid off) due to the existence of certain legal institutions that are designed to protect investor rights. The cost of tunneling depends on a measure of the lack of investor protection, denoted p. Lower value of p indicates better investor protection. The firm-specific variable that affects the cost of tunneling is the volatility of the rate of return, V. Uncertainty of the firm return creates tunneling opportunities because it makes it possible that tunneling goes undetected. Also assume that the marginal cost of tunneling is positive and increasing. Let C and T denote the cost of tunneling and the level of tunneling. Then, C ≡ $C(T, p, V)$ is a well-defined function:

$C(T, p, V) > 0$, continuous and second order differentiable;

$C_T(T, p, V) > 0$, $C_p(T, p, V) < 0$, $C_V(T, p, V) < 0$.

Furthermore, the second derivatives are well behaved, i.e., the single crossing property holds:

$C_{TT} > 0$, $C_{Tp} < 0$, and $C_{TV} < 0$.

[6] A recent working paper by Friedman et al. (2003) suggests that under certain conditions, entrepreneurs prop up their firms, i.e., they use their private funds to benefit minority shareholders. However, such "propping" seems to be confined to very special circumstances in countries with weak legal institutions.

The following functional form of $C(T, p, V)$ is employed and it satisfies all the above conditions:

$$C(T, p, V) = \frac{T^2}{2pV} \tag{1}$$

The firm's governance structure in this model can be depicted by the following Figure:

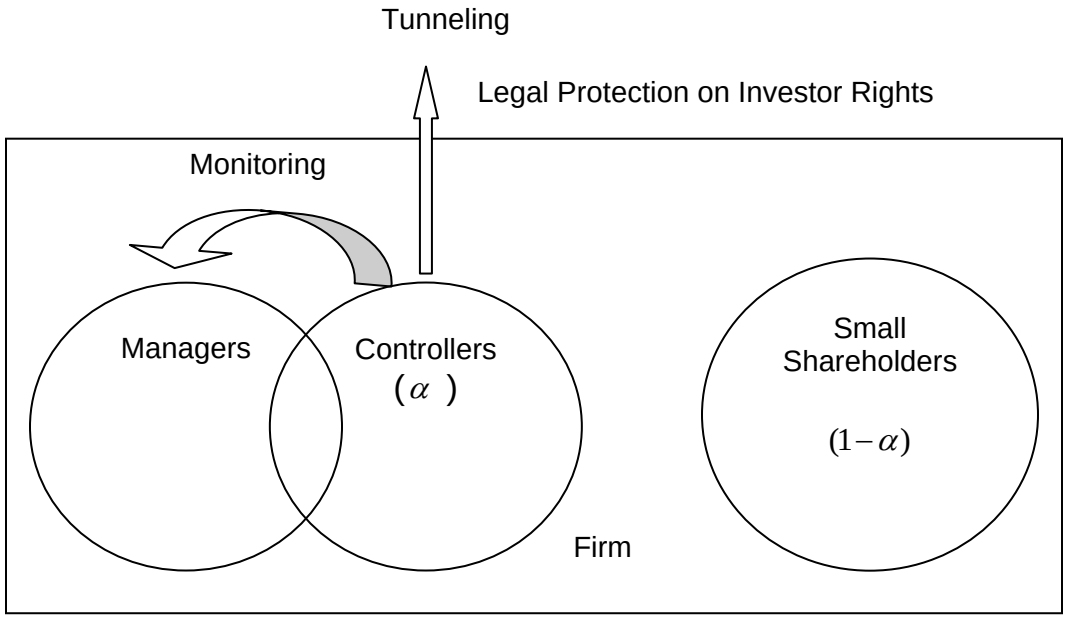

Figure 1: Governance Structure in a Firm

The model has two dates: date 1 and date 2 in timely order. At date 2, the controller diverts T out of the firm and incurs cost C. He/she then invests the rest of the firm's equity in a project that yields a rate of return, r. The controller owns share α of the total return. The controller treats α, r and p as exogenous, and chooses T to maximize his/her expected utility. At date 1, investors (the large group of small investors

and the controller) pick the corporate ownership structure. These two groups interact in this first stage and maximize the expected firm value subject to the participation constraints of both groups. Consistent with this value-maximization, an optimal α is chosen in the financial asset market and the controller's expected tunneling behavior at date 2 is taken into consideration during this process. Therefore, in this model, the degree of ownership concentration on the controller, α, is endogenous as the outcome of the interactions between the controller and small shareholders of the firm.

The controller's financial assets are more deeply entrenched in the firm. Small shareholders typically have less money in one firm per person and can diversify their investments effectively. As a result, they have lower level of exposure to firm-specific risks (unsystematic risks). I capture this distinction by modeling the controller as being risk averse when he/she chooses the amount of tunneling, while taking the overall group of investors in the first stage to be risk neutral. Assume that the controller has the constant absolute risk aversion utility function:

$$U(W) = -e^{-aW} \tag{2}$$

In equation (2), $a > 0$ is the coefficient of absolute risk aversion and W is the controller's income. At date 2, the controller's income is given by:

$$W = \alpha(1+r)(E-T) + T - \frac{T^2}{2pV} \tag{3}$$

Since r is a normally distributed random variable in (3), W is also a normally distributed random variable with the following expected value and variance:

$$E[W] = \alpha(1+R)(E-T) + T - \frac{T^2}{2pV} \tag{4}$$

$$Variance(W) = \alpha^2 (E-T)^2 V \tag{5}$$

Solve the model using backward induction. At date 2, the controller maximizes his/her expected utility which is equivalent to maximizing his/her expected income net of a risk premium:

The controller's optimization problem at date 2:

$$\max_T E[W] - \frac{1}{2} a Variance(W) =$$

$$\left[\alpha(1+R)(E-T) + T - \frac{T^2}{2pV} - \frac{1}{2} a\alpha^2 (E-T)^2 V \right] \tag{6}$$

The first-order condition of (6) gives the following maximum solution as in equation (7) and one can easily verify that the second-order condition is met.

$$T = \varphi(p, V, a, E, R, \alpha) = \frac{pV\left(1 + a\alpha^2 EV - \alpha(1+R)\right)}{1 + pa\alpha^2 V^2} \tag{7}$$

One technical assumption needed to derive the main analytical results of this model is inequality (T.1):

$$1 + R < \min\left\{2\sqrt{aVE}, (2E - pV + pRV)aV\right\} \tag{T.1}$$

This is not a too restrictive assumption, since all it is saying is that the controller is sufficiently risk averse and the uncertainty involved in the return of investment is not

trivial[7]. Under this assumption, the numerator of the right hand side of equation (7) is always positive, i.e., T is always positive[8].

Investors (the controller and the large group of small shareholders as one group) are risk neutral. At date 1, α is chosen by investors in the financial asset market to maximize the firm's expected value[9], $E[\Pi]$, subject to two constraints:

Investors' optimization problem at date 1:

$$\max_{\alpha} E[\Pi] = (1+R)(E-T) = (1+R)(E-\varphi(p,V,a,E,R,\alpha)) \qquad (8)$$

s.t.

$$\alpha(1+R)(E-T)+T-\frac{T^2}{2pV}-\frac{1}{2}a\alpha^2(E-T)^2V-\alpha E \geq 0 \qquad \text{(PC.1)}$$

$$(1-\alpha)(1+R)(E-T)-(1-\alpha)E \geq 0 \qquad \text{(PC.2)}$$

The first constraint (PC.1) is the participation constraint for the controller. It says that the controller's expected payoff is at least as high as what he/she puts into the firm

[7] When the controller is risk neutral, the problem of tunneling is resolved completely (zero tunneling). Refer to Appendix A for proof.

[8] The reason why I need the second term in the parentheses of RHS of (T.1) will be discussed later. Also notice that T is always lower than E given the second technical condition, (T.2), on page 16.

[9] The optimal α^* is chosen through the interactions between the controller and small shareholders in the financial assets market. Any other α that does not maximize the expected firm value is not sustainable in the market. For example, when α is too low, another group of investors with the optimal ownership structure will buy out the firm and make a profit from the increase of the firm's expected value; when α is too high, there is pressure from the market to lower it (for instance, Slovin and Sushka (1993) find that ownership concentration usually goes down following the death of inside block-holders). Therefore, if financial markets are efficient and if such chances of making money through financial transactions are exhausted, only the optimal ownership structure is sustainable in the market. Under this scenario, efficient financial markets play an important role in determining the corporate ownership structure.

initially[10]. The second constraint (PC.2) is the participation constraint for small shareholders. This inequality applies similar constraint for small shareholders as (PC.1) does for the controller. (PC.2) can also be interpreted as the "social efficiency criterion", since it ensures that $(1+R)(E-T) \geq E$. In other words, the firm's existence is justified from the social efficiency point of view if (PC.2) holds. To ensure that this is the case, the following technical condition is applied:

$$E > \left(1 + R + \frac{1}{R}\right) pV \qquad \text{(T.2)}$$

When (T.2) holds, (PC.2) is satisfied but not binding when $\alpha = \alpha^*$ [11], where α^* is the solution to (8). This implies that, to solve the investors' optimization problem, (PC.2) can be ignored. Whether (PC.1) is binding will be discussed later. For now, assume that (PC.1) can also be ignored.

The optimization problem in (8) is equivalent to minimizing $\varphi(p,V,a,E,R,\alpha)$ in (7) by choosing α. Rewrite equation (7) to get the following:

$$\begin{aligned} T = \varphi(p,V,a,E,R,\alpha) &= \frac{pa\alpha^2 EV^2 + pV}{1 + pa\alpha^2 V^2} - \frac{pV\alpha(1+R)}{1 + pa\alpha^2 V^2} \\ &= \quad (RE) \quad - \quad (AE) \end{aligned} \qquad (9)$$

The overall effect of ownership concentration (α) on tunneling can be divided into two different effects: the second term on the RHS of (9), denoted AE, enters T with a

[10] Without loss of generality, the rate of return on riskless assets for the controller is normalized to be zero. This also applies to the small shareholders.

[11] Notice from equation (11) that $T = pV$ when $\alpha = 0$. The maximum expected firm value $E[\Pi] = (1+R)(E-T)$ is at least as high as $(1+R)(E-pV)$, which is bigger than E from (T.2). Since α^* maximizes $E[\Pi]$, (PC.2) is satisfied but not binding when $\alpha = \alpha^*$.

negative sign and it captures the **alignment effect,** which is that the controller's income is aligned with the firm and this reduces tunneling; the first term on the RHS of (9), denoted RE, gives the **risk-aversion effect,** which indicates that holding the controlling stake of the firm exposes the controller's income to the firm-specific risk and thus induces tunneling.

The optimal α depends on the comparison of the marginal alignment effect (MAE) and the marginal risk-aversion effect (MRE) of the ownership concentration (α). MAE and MRE are given by:

$$MAE = \frac{\partial AE}{\partial \alpha} = \frac{pV(1+R)(1-pa\alpha^2V^2)}{(1+pa\alpha^2V^2)^2} \tag{10}$$

$$MRE = \frac{\partial RE}{\partial \alpha} = \frac{2pa\alpha V^2(E-pV)}{(1+pa\alpha^2V^2)^2} \tag{11}$$

One can easily verify that MAE decreases with α, while MRE increases with α [12]. The optimal ownership concentration, α^*, equates MAE and MRE, as shown in Figure 2:

[12] To be exact, the marginal risk-aversion effect (MRE) increases monotonically with α in the closed set $\left[0, \sqrt{\frac{1}{3paV^2}}\right]$ within which the optimal ownership concentration, α^*, is located (ensured by the technical condition, (T.2)). In addition, both MRE and MAE are positive when α is in this set. These conclusions may not hold when α is outside the closed set, but this doesn't affect the main analytical results since the optimization of α is all that we care about.

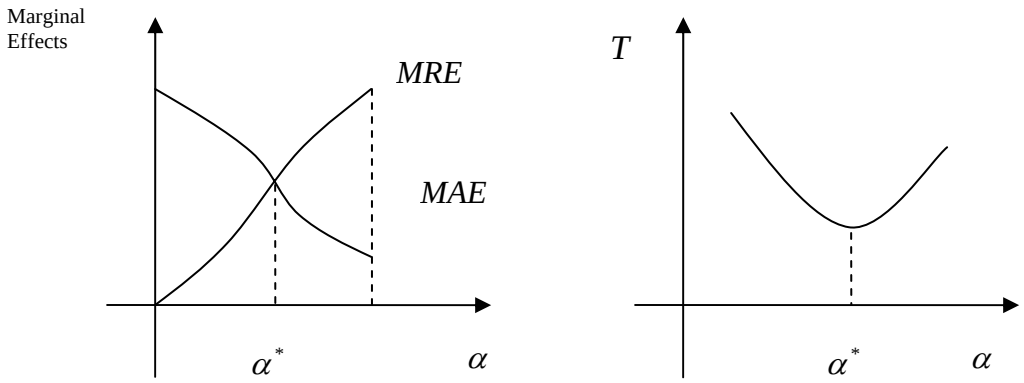

Figure 2: Determination of Ownership Concentration

When α is lower than α^* (Figure 2), the marginal alignment effect dominates the marginal risk-aversion effect and thus higher ownership concentration will reduce tunneling. However, when α gets as high as α^*, further increase of ownership concentration will actually lead to more tunneling due to a strong risk-aversion effect. There exists an optimal ownership concentration, $\alpha^* \in (0,1)$, which minimizes tunneling, and consequently, maximizes the expected firm value.

To examine the optimal ownership concentration further, equate (10) and (11) to derive the following:

$$p(1+R)aV^2\alpha^2 + 2aEV\alpha - 2paV^2\alpha - (1+R) = 0 \qquad (12)$$

From equation (12), it is clear that:

$$\alpha^* = \psi(p, V, a, E, R) \qquad (13)$$

Equation (13) shows that ownership concentration in equilibrium depends on how effectively investor rights are protected, the firm's expected rate of return on investment,

uncertainty of the return, size of the firm's equity and the controller's risk attitude. There are two solutions for α^* with opposite signs. The negative solution is not meaningful in the real world, and thus only the positive solution of α^* is of interest here. Since $\frac{\partial E[\Pi]}{\partial \alpha} > 0$ when $\alpha = 0$, the positive solution α^* of (12) is a maximum solution to the optimization problem (8). The technical condition (T.1) ensures that α^* is an interior solution, i.e. $\alpha^* \in (0,1)$.

Total differentiation of (12) reveals further information about $\psi(\cdot)$. First, total differentiation of (12) with respect to α^* and *p* yields:

$$\psi_p = \frac{\partial \alpha^*}{\partial p} = \frac{aV^2\alpha^*\left(2-\alpha^*-R\alpha^*\right)}{2p(1+R)aV^2\alpha^* + 2aVE - 2paV^2} > 0 \qquad (14)$$

ψ_p has a positive sign. When *p* rises, both *MAE* curve and *MRE* curve shift downward in Figure 2, but the change in *MRE* dominates the change in *MAE* [13]. This leads to a higher α^*. Recall that *p* measures the lack of investor protection. Therefore, this analytical result suggests that ownership concentration on the controller is higher (lower) when investor protection is weaker (stronger), which formalizes the proposal in LLSV (1997) that ownership concentration is a substitute for legal institutions as a mechanism for constraining the expropriation of minority shareholders.

Similarly, function (15) can be derived from (12):

$$\psi_V = \frac{\partial \alpha^*}{\partial V} = -\frac{p(1+R)V\alpha^{*2} + E\alpha^* - 2pV\alpha^*}{p(1+R)V^2\alpha^* + EV - pV^2} < 0 \qquad (15)$$

[13] Detailed proof is available from the author upon request.

ψ_V has a negative sign given (T.2). Intuitively, higher volatility of the firm return indicates higher agency cost due to the risk-averseness of the controller, i.e., the marginal risk-aversion effect increases while the marginal alignment effect decreases (in Figure 2, *MRE* curve shifts upward and *MAE* curve shifts downward). This results in lower ownership concentration.

As for the relation between α^* and R, the following can be derived from (12):

$$\psi_R = \frac{\partial \alpha^*}{\partial R} = \frac{1 - paV^2\alpha^{*2}}{2p(1+R)aV^2\alpha^* + 2aEV - 2paV^2} > 0 \qquad (16)$$

The sign of ψ_R is positive. The intuition behind this analytical result is that higher R makes it more effective to align the controller's interest with the firm while it has no effect on the risk-aversion effect. In Figure 2, when R rises, the *MAE* curve shifts upward and the *MRE* curve remains unchanged. This leads to a higher optimal level of α. Therefore, the rate of return affects corporate ownership concentration in a positive way.

Furthermore, the following expressions about the relation between α^* and a, and the relation between α^* and E can be derived from (12):

$$\psi_a = \frac{\partial \alpha^*}{\partial a} = -\frac{(1+R)/a}{2p(1+R)aV^2\alpha^* + 2aEV - 2paV^2} < 0 \qquad (17)$$

$$\psi_E = \frac{\partial \alpha^*}{\partial E} = -\frac{2aV\alpha^*}{2p(1+R)aV^2\alpha^* + 2aEV - 2paV^2} < 0 \qquad (18)$$

Both (17) and (18) can be signed unambiguously, and both have a negative sign. The intuition behind these equations is straightforward: both higher risk-averseness and bigger size of the firm raise the marginal risk-aversion effect of ownership concentration

relatively (when a rises, the MRE curve shifts upward and MAE curve shifts downward; when E increases, MRE shifts upward and MAE curve remains unchanged in Figure 2) and this leads to a lower α^*. The implication of these results in the real world is also straightforward: ownership is less (more) concentrated in a firm with a larger (smaller) size or if the firm's controller is more (less) risk averse. The above findings are summarized by proposition 1:

***Proposition 1*:** In a firm with risk-averse controller and risk-neutral investors, ownership concentration varies systematically with the following firm-level fundamentals and institutional variables in ways that are consistent with both value maximization and the agency theory:

a) *ceteris paribus*, ownership concentration decreases with the effectiveness of investor protection;
b) *ceteris paribus*, when firm size increases, ownership concentration decreases;
c) *ceteris paribus*, when the firm controller is more (less) risk-averse, ownership concentration is lower (higher);
d) *ceteris paribus*, expected rate of return is positively related to the firm's ownership concentration, while its volatility has a negative relation with ownership concentration.

Now consider the level of tunneling in equilibrium: $T^* = \varphi\left(p, V, a, E, R, \alpha^*\right)$. Application of the envelop theorem yields the following analytical results:

$$\frac{\partial T^*}{\partial p} = \frac{V(1 + a\alpha^{*2}EV - \alpha^*(1+R))}{(1 + pa\alpha^{*2}V^2)^2} > 0 \tag{19}$$

$$\frac{\partial T^*}{\partial a} = \frac{p\alpha^{*2}V^2(E - pV + PEaV^2\alpha^*(1-\alpha^*) + p\alpha^*V(1+R))}{(1 + pa\alpha^{*2}V^2)^2} > 0 \tag{20}$$

$$\frac{\partial T^*}{\partial R} = -\frac{pV\alpha^*}{1 + pa\alpha^{*2}V^2} < 0 \tag{21}$$

$$\frac{\partial T^*}{\partial V} = \frac{p + p^2aV^2\alpha^{*2}}{(1 + pa\alpha^{*2}V^2)^2} > 0 \tag{22}$$

$$\frac{\partial T^*}{\partial E} = \frac{paV^2\alpha^{*2}}{1 + pa\alpha^{*2}V^2} > 0 \tag{23}$$

Inequality (19) holds for obvious reasons: ineffective investor protection (high p) lowers the cost of tunneling and results in high level of tunneling in equilibrium. Inequality (20) shows that the controller's risk-averseness is positively related to tunneling. This is so because high risk-averseness raises the risk-aversion effect (RE) and lowers the alignment effect (AE), which leads to higher level of tunneling in equilibrium. A change in the firm's expected rate of return doesn't affect RE, but it affects AE positively. Therefore, firm return has a negative relation with tunneling in equilibrium (inequality (21)). In the case of a firm's equity size, it doesn't affect AE, but bigger firm size causes RE to rise, which in turn raises tunneling level in equilibrium. Similarly, higher instability of the firm's rate of return leads to more tunneling in equilibrium.

Proposition 2 summarizes the above discussions:

Proposition 2: In a firm with risk-averse controller and risk-neutral investors:

a) *ceteris paribus*, tunneling in equilibrium decreases with the effectiveness of investor protection;

b) *ceteris paribus*, tunneling in equilibrium increases with firm size;

c) *ceteris paribus*, when the firm controller is more (less) risk-averse, tunneling in equilibrium is higher (lower);

d) *ceteris paribus*, the firm's expected rate of return is negatively related to tunneling in equilibrium, while its volatility has a positive relation with tunneling in equilibrium.

Finally, let's look back and have a discussion about the controller's participation constraint, (PC.1). In this paper we are generally interested in the situation where (PC.1) is satisfied and not binding, i.e., both the controller and small shareholders are willing to participate in purchasing the equity of the firm. The situation where the existence of the firm is in jeopardy is uninteresting. Of course, we need to show that there exists at least one compact set for α in [0, 1] in which (PC.1) is satisfied but not binding. As a sketch of the proof, notice that when $\alpha = 0$, (PC.1) is satisfied but not binding. In other words, when the controller doesn't hold any stake of the firm's equity, he/she is willing to participate to get positive net benefit from tunneling. Since the left-hand side of (PC.1) is continuous with respect to α, there exists a range of α in [0, 1], denoted Φ, such that

(PC.1) is satisfied but not binding when $\alpha \in \Phi$. The main analytical results in this paper apply to the situation where $\alpha^* \in \Phi$. Figure 3 illustrates such a situation:

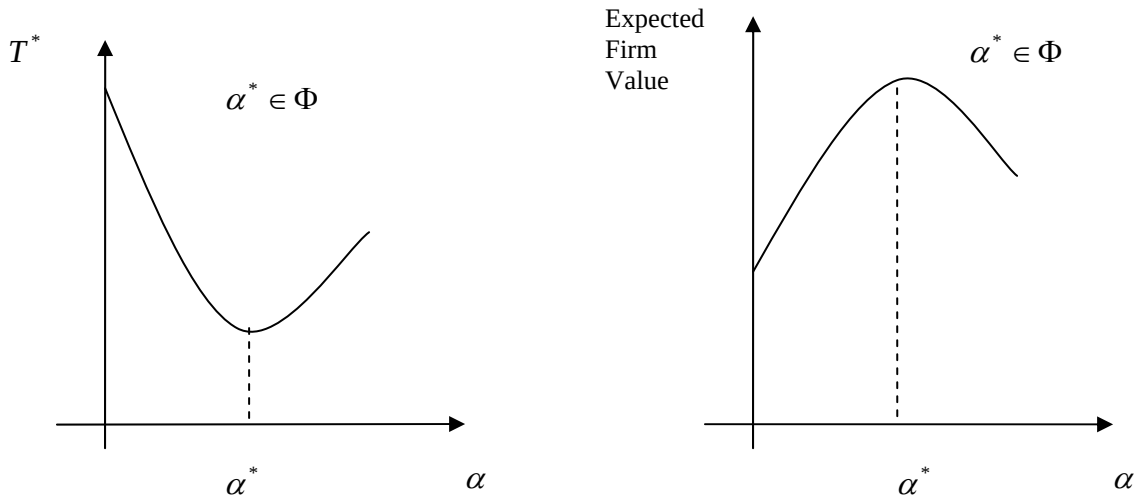

Figure 3: Optimal Ownership Concentration and (PC.1)

1.3. Conclusions

In summary, the model sketched in this chapter shows that legal protection and ownership concentration are the two basic mechanisms to constrain tunneling in a system of corporate governance. When both the controller and the large group of investors are risk-neutral or are very close to risk-neutral, the problem of tunneling can be resolved completely (zero tunneling in equilibrium)[14]. However, in a more realistic setting where the controller of the firm is sufficiently risk-averse, where there is sizeable uncertainty with the rate of return on investment, and where investors as a whole are risk-neutral,

[14] Refer to Appendix A for a detailed proof.

tunneling exists in equilibrium. Given that investor protection is imperfect ($p > 0$), some degree of tunneling has to be tolerated by investors due to the fact that maintaining a controlling ownership block in a firm forces the controller's wealth to be not as diversified as other investors', and consequently, he/she tunnels to offset his/her exposure to firm-specific risks (unsystematic risks). Tunneling in equilibrium decreases with the effectiveness of investor protection and the expected rate of return, and it increases with firm size, controller's risk-averseness, and the instability of the firm's rate of return. In equilibrium, corporate ownership concentration is endogenously determined in ways that are consistent with both value maximization and the agency theory, and its value depends on the effectiveness of investor protection and other firm level fundamentals including firm size, the controller's risk attitude, firm returns, and the volatility of firm returns.

This study provides a basic framework for understanding the endogeneity of tunneling and ownership concentration, and their relations to investor protection. It leaves plenty of room for future research. For instance, this paper doesn't consider firm-level heterogeneities in investor protection. One possible source of this heterogeneity is the different auditing practice implemented in different firms. Some firms are under better auditing than others. Sound auditing practice may provide extra protection of investor rights in addition to the protection from formal legal institutions and thus may change the cost function of tunneling. Similar to corporate ownership concentration, such firm-level investor protection is likely to be endogenous rather than being exogenous. Future model construction should take firm-level heterogeneity in investor protection into consideration.

2. An Empirical Study on Tunneling

Abstract

This chapter shows with case studies how tunneling occurs even in developed countries with good law enforcement, and how tunneling is treated differently under different legal systems. It echoes Johnson et al. (2000b)'s proposition that English common laws are more protective in terms of constraining tunneling than various forms of civil-law systems. On the other hand, it is also argued in this chapter that even common-law systems are not designed to induce zero violations and tunneling can be a significant matter in advanced common-law countries. Tunneling takes various forms in the real world and can be pervasive under some circumstances as shown by the case of Adelphia Communications Corp. in the U.S.

2.1. Introduction and Related Research

It is difficult to observe and measure tunneling empirically in a systematic way because to do that, detailed information about a firm's transactions with other entities is needed to assess whether the controllers are enriched at the expense of the firm's investors. This is especially true in developed market economies due to the continuing organizational innovations and rapid emerging of new financial instruments in the financial markets. Tunneling can be hidden in a series of indescribably complex financial transactions so that it is almost impossible to be detected. Bertrand et al. (2002) propose an empirical measurement of tunneling. However, their measurement only takes account of tunneling involving transfer pricing within business groups, which is, at best, a subset

of tunneling in the real world. Direct evidence on how tunneling takes place in the real world is generally confined to case studies in the literature.

Existing evidence reveals that the theoretical framework and its predictions presented in the previous chapter are consistent with a number of empirical regularities. One important implication of the model is that there is more (less) tunneling in countries where legal institutions provide less (more) effective investor protection. As a matter of fact, tunneling is more pervasive in developing countries where the legal system is relatively weak than in developed countries with good law enforcement. For instance, Bertrand et al. (2002) find significant amount of tunneling when looking into data on Indian business groups. Incidents of tunneling were widely observed in "emerging markets" during the 1997-98 Asian financial crisis, as documented by Johnson et al. (2000a).

On the other hand, it should be acknowledged that developed countries are not immune to tunneling. The model in chapter one suggests that the occurrence of tunneling doesn't require strong conditions that are specific to developing countries. As far as investor protection is imperfect, tunneling is likely to occur. Johnson et al. (2000b) shows with case studies that tunneling also happens in developed French civil-law countries with good law enforcement since the legal system is less protective in French civil-law countries than in English common-law countries. Along this line, the current study goes one step further to show how tunneling of some forms are treated differently under different legal systems by comparing two cases of tunneling. One case (SARL Peronnet) was ruled in favor of the controlling shareholder by a French court, while the attempt to

tunnel from minority shareholders was blocked by a U.S. court in the other case (Zapata Corp.).

Tunneling in developed common-law countries such as the U.S. and U.K., has received less attention in the literature. In this paper I argue that tunneling is not a trivial matter in developed common-law countries, because even in these countries, such legal institutions are not designed in a way that attempts to create a situation of zero violations, simply because pursuing such an extreme goal would be uneconomic. I draw on the recent market events in the U.S. to illustrate the various forms that tunneling takes. Special attention is paid to the case of Adelphia Communications Corp.

2.2. How are Civil-law Systems and Common-law Systems Different in Terms of Constraining Tunneling?

When tunneling takes the form of outside theft or fraud, it is treated as illegal by almost all types of legal systems. However, when tunneling comes in other forms, such as asset sales and contracts advantageous to the controlling shareholders, it is not necessarily considered as illegal by all courts. A transaction involving tunneling which is illegal under one legal system may be ruled legal under another legal system. In general, English common-law systems are believed to be more protective of investor's rights than the various civil-law systems (LLSV (1998)). Johnson et al. (2000b) show with several cases that sometimes tunneling occurs legally in developed civil-law countries.

According to Johnson et al. (2000b), the superiority of common-law systems in constraining tunneling is reflected in the following comparisons with various civil-law systems:

> "[In sum], courts in civil law countries may accommodate more tunneling than courts in common law countries because of: 1) a narrower application of the duty of loyalty largely to transactions with no business purpose, 2) a higher standard of proof in conflict of interest situations, 3) a greater responsiveness to stakeholder interests, and 4) a greater reliance on statutes rather than fairness to regulate self-dealing transactions."

While I believe that Johnson et al. (2000b)'s perception about the difference between a civil-law system and a common-law system in terms of constraining tunneling is right, their proposition can be strengthened by a comparative study of some real-world cases that shows how similar situations involving tunneling are actually treated differently by courts under different legal systems. Johnson et al. (2000b) document several cases about how tunneling can be ruled legal by courts in Western European countries with French civil-law origins. However, the other half of the comparison, i.e., how similar transactions are ruled by courts under a common-law system, is missing.

In this section, I examine two cases of tunneling that involve similar transactions: SARL Peronnet in France and Zapata Corp. in the U.S. The difference in court rulings on these cases reflects the different ways in which certain forms of tunneling are treated by the legal system.

2.2.1. Case One: SARL Peronnet

For the purpose of comparison, I will first draw on Johnson et al. (2000b) and present a well-known case of tunneling in a civil-law system to show how the courts see the law in such a system.

SARL Peronnet is a French company controlled by the Peronnet Family. The Peronnet Family later established a new company, SCI, which is solely owned by family members. SCI bought some land and took out a loan to build a warehouse. SCI then leased the warehouse to SARL Peronnet and used the proceeds to repay the loan. In 1999, SAICO, a minority shareholder of SARL Peronnet, sued the Peronnet Family. SAICO claimed that the Peronnet Family expropriated minority shareholders of SARL Peronnet by giving the leasing contract to an entity (namely, SCI) that was related to the controlling shareholder while it was possible for SARL Peronnet to find a cheaper deal (for example, the proposal to build a warehouse by SAICO). This situation can be depicted by Figure 4.

As documented by Johnson et al. (2000b), a French court ruled against SAICO and held the transaction between SCI and SARL Peronnet legal under French civil law. The ruling was on two grounds. First, the court held that the decision by Peronnet to pay SCI to warehouse its products was not against the social interests. Second, it held that SARL Peronnet expanded its business during the time and its expansion had benefited SAICO as well.

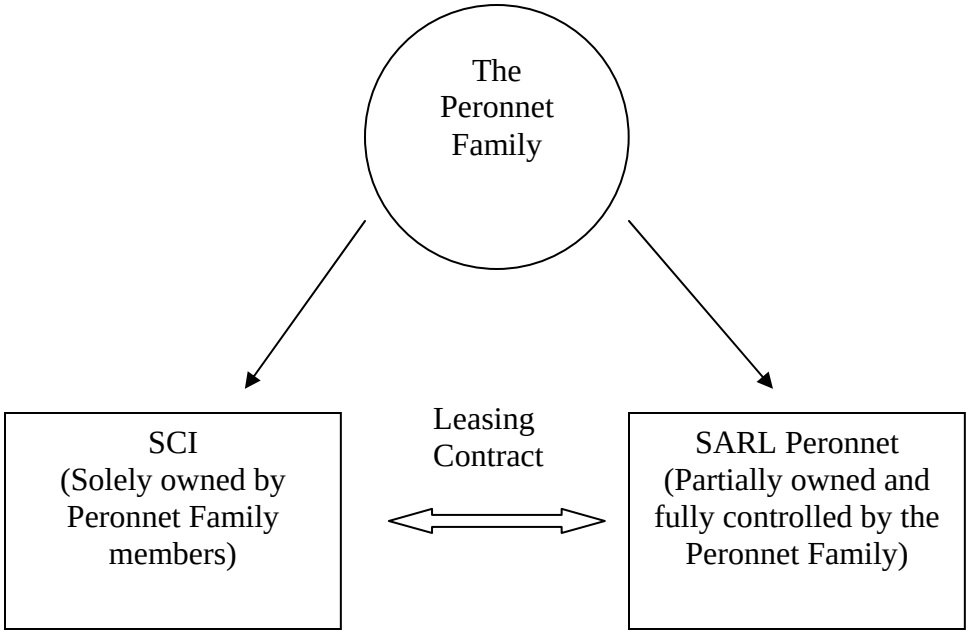

Figure 4: Control Structure in SARL Peronnet and SCI

It is difficult to speculate on how a court would rule on this case under a common-law system without an independent valuation on the fairness of the leasing contract. But it is interesting to check how the plaintiff, a minority shareholder, had more difficulties to successfully challenge the controlling shareholder under a civil-law system than under a common-law system in this case:

First, the French court applied a higher standard of proof in conflict of interest situations. It could thus be argued that the decision to build a warehouse through SCI was not solely intended to benefit the controlling shareholders (i.e., the Peronnet Family), and had a legitimate business purpose that also benefited the minority shareholders. Under French law, this was sufficient to rule against SAICO, while in the U.S. or U.K., this

would not have prevented the plaintiff from proving the existence of conflict of interest situation in this case.

Second, the French court relied on statutes rather than fairness to regulate self-dealing transactions. As reported in Johnson et al. (2000b), "[The court] took no interest in the questions of whether the creation of SCI, and the prices it charged SARL Peronnet for the use of the warehouse, were fair to SAICO and other minority shareholders". As long as SAICO (the minority shareholder) has not suffered an actual loss, the law protected the Peronnet Family. In the U.S. and U.K., courts would have been very suspicious of the conduct of the Peronnet Family unless it could demonstrate that the leasing contract was fair through an independent valuation in this case.

Third, sales of SARL Peronnet expanded during the period of the lawsuit. Therefore, the French court held that the decision by Peronnet to pay SCI to warehouse its products was not against the social interests. By doing this, the court showed a greater responsiveness to stakeholder interests than courts in the U.S. and U.K. would have. In contrast, courts in the U.S. and U.K. would have been more focused on whether the minority shareholder's interest was violated by the controlling shareholder in this situation.

2.2.2. Case Two: Zapata Corp.

Zapata Corp. (U.S.) was founded in 1953 by former President George Bush as an oil-drilling and gas company. In 1993, financier Malcolm Glazer bought a 32 percent

stake in the Company. Shortly after taking over as Chairman in 1994, Malcolm Glazer installed his son, Avram Glazer, as Zapata's Chief Executive, and began to sell off the Company's oil and gas interests. Today, the group's principal activities are to process, market and distribute fish meal and fish oil products, and it also supplies automotive airbag fabric, cushions and technical fabrics.

Two Zapata dealings with entities that are related to the Glazer Family in 1990's cast Glazer in a questionable light. In 1994, Malcolm Glazer sold the Company his 31 percent share of Envirodyne Industries, Inc. ("Envirodyne"), a food-packaging manufacturer that primarily makes sausage casings. The Envirodyne purchase reportedly helped finance Malcolm Glazer's 1995 purchase of the National Football League's Tampa Bay Buccaneers, and is currently the subject of shareholder litigation.

Another dispute between the Glazer Family and the minority shareholders of Zapata that has been ruled by a court is of more interests here. In 1996, Malcolm Glazer, who controlled 45 percent of the Zapata Corp.'s stock, attempted to have the Company buy his Houlihan's Restaurants Inc., a string of eateries. Glazer was the 73 percent owner of Houlihan's. The proposed deal invoked a lawsuit against Glazer Family by shareholders of Zapata, alleging that Glazer would enrich himself at the expense of Zapata from the deal. Minority shareholders of Zapata asked the court to block the deal because if the takeover proceeded as being negotiated, Glazer would stand to gain $59 million at the expense of Zapata. The situation can be depicted by Figure 5.

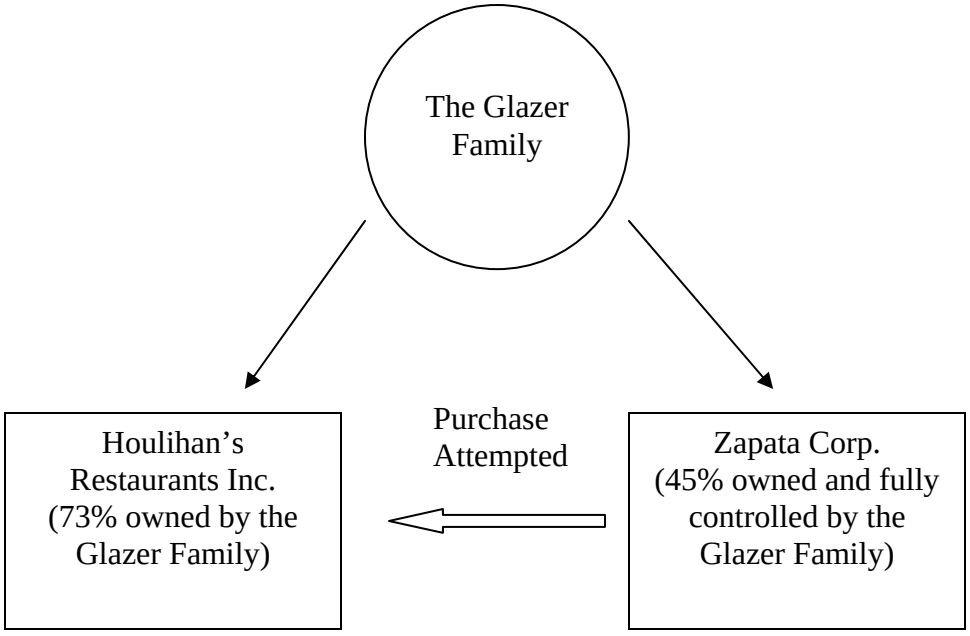

Figure 5: Control Structure in Zapata Corp. and Houlihan's Restaurants

A Delaware court ruled against Glazer Family and the deal was blocked. The court ruled that the deal had to be approved by 80 percent of Zapata shareholders. The court made it clear that the ruling was intended to "protect minority shareholders of Zapata from being expropriated by controlling shareholders"[15]. Glazer Family didn't challenge the court's ruling and the proposal to sell Houlihan's Restaurants to Zapata was later dropped.

Would a court under a civil-law system have ruled on this case differently? It is hard to conjecture. Some insights can be gained from comparing this case with the way in which the French court ruled on SARL Peronnet, though. Had this case been tried under a

[15] Glazer v. Pasternak, 693 A.2d 319, 321 (Del. 1997).

French civil-law system, the odds for the controlling shareholders to prevail in court would have been increased by the following factors:

First, the defendant could argue that the proposed deal had a legitimate business purpose and its intention was not to solely benefit the controlling shareholders. For example, the deal could benefit Zapata's expansion to the restaurant business, and Zapata Corp. was generating a healthy return at the time (which it did). In other words, it would have been harder for Zapata shareholders to prevail in such a case that involved self-dealing transaction with a plausible business purpose under a French civil-law system.

Second, the plaintiffs would have had to work hard to prove that they suffered an actual loss since otherwise the French civil-law judgment rule, with an emphasis on legal certainty, may end up protecting the Glazer Family. Comparatively, a U.S. court has a higher level of judicial discretion to assess the terms of transactions and to make rules. This flexibility puts a U.S. court on a better position to rule on the ground of fairness. As a consequence, it does a better job in stopping tunneling that involves self-dealing transactions with a plausible business purpose.

2.3. Tunneling in Advanced Common-law Countries: A Case in the U.S.

While the point that common-law systems are more protective than civil-law systems in terms of constraining tunneling is well taken, it should also be acknowledged that tunneling in advanced common-law countries is not a trivial matter. The model in

chapter one suggests that as far as investor protection is imperfect, tunneling is likely to occur. Effective investor protection requires well-developed legal systems to enforce contractual rights. It also requires well-developed accounting systems with integrity since investors can not make informed decisions to maximize the value of their investments without accurate information about a firm's fundamentals. Even in developed common-law countries, such legal institutions and law enforcement are not designed in a way that attempts to create a situation of zero violations, simply because pursuing such an extreme goal would be uneconomic.

Recent market events in the U.S. provide plenty of opportunities for us to examine how tunneling occurs in an advanced common-law country with good law enforcement. One good example is the case of Adelphia Communications Corp.

2.3.1. Case Three: Adelphia Communications Corp.

Adelphia Communications Corp., a Pennsylvania cable company[16], was founded by John Rigas in 1972. It went public in 1986 and its shares had been widely held and traded on NASDAQ since then (until June 3, 2002). By 1999, Adelphia was the 6th largest cable company in the U.S. and had expanded to telephone business, sports radio station, and sports cable television channel, and had many other smaller subsidiaries in 29 states and Puerto Rico.

[16] The company reincorporated to Colorado in 2003 after the SEC filed the case against the company and the Rigas Family.

As the founder of Adelphia, the Rigas Family maintained full control over the company until May, 2002. John Rigas was the CEO and chairman of the board before May, 2002; His son, Tim Rigas, was the CFO; His second son, Michael Rigas, was the Vice President of Operations; His third son, James Rigas, was the Vice President of Strategic Planning. The family controlled five of the nine members of the board, and it owned 77 percent of the company's voting rights. Adelphia issued Class A shares of common stock, which are mainly for public investors, and Class B shares of common stock, which have 10 times the voting power of Class A shares and which have been held almost exclusively by the Rigas Family. Therefore, the family's ownership stake in terms of Adelphia's common equity (about 25 percent) was much lower than the votes it controlled.

On July 24, 2002, the Securities and Exchange Commission (SEC) filed charges against John Rigas and his three sons. The Rigas were charged, among other things, for having "concealed rampant self-dealing by the Rigas Family, including the undisclosed use of corporate funds for Rigas Family stock purchase and the acquisition of luxury condominiums in New York and elsewhere"[17]. While the case is still under prosecution, according to files released by the SEC, tunneling has been pervasive in the company since at least 1998 and it has taken various forms:

First, use of company funds to finance undisclosed open market stock purchase by the Rigas Family. This includes three open market purchases, occurring respectively on October 30, 1999, April 30, 2000, and February 1, 2001, of a total of $59 million of

[17] Complaint: SEC v. Adelphia Communications Corp. & Rigas Family, 2002.

Adelphia securities by Highland, a general partnership of the Rigas Family, using funds that Highland obtained from the Adelphia and for which it never reimbursed or otherwise compensated Adelphia.

Second, assets sales. The Rigas Family paid $464,930 for 3,656 acres of land, located in Potter County, Pennsylvania. Later in February 2000, Adelphia paid $26,535,070 for the rights to the timber on the property, purportedly consisting of valuable hardwood cherry.

Third, outright theft and fraud. The Rigas Family used approximately $12.8 million in Adelphia funds for the construction of a golf club and a golf course on land, located near Coudersport, Pennsylvania, mostly owned, directly or indirectly, by the Rigas Family. In addition, the Rigas Family had enjoyed exclusive use of luxury condominiums in Colorado and Mexico, and at least two New York apartments, all of which were paid by Adelphia.

Fourth, payment of personal debt with Adelphia funds. The Rigas Family used $241,167,006 Adelphia funds to pay personal margin loans and other debt on behalf of the Family.

Through the transactions and dealings set forth above, the Rigas Family was allegedly enriched by at least $300 million at the expense of Adelphia and its shareholders. The situation can be depicted by Figure 6.

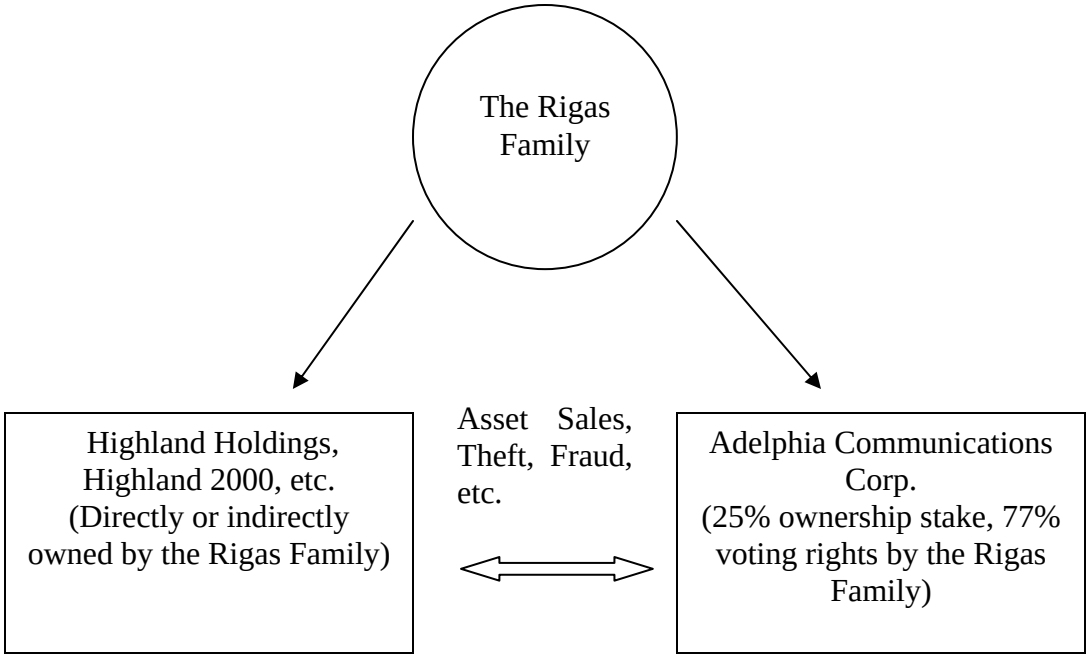

Figure 6: Adelphia Communications Corp. and the Rigas Family

It is interesting to have a closer look at the timing of tunneling in the case of Adelphia. Adelphia became a public company in 1986 and it had been under control of the Rigas Family for years, but it seemed that the alleged massive amount of tunneling did not occur until late 1990s. What's special about late 1990s? It was a period of hard time for Adelphia. The company was hit by a series of bad news, some of which applied to the whole cable industry and the other to Adelphia specifically: technology slowdown, slowing economy, increased competition in the cable industry, and over-capacity problems faced by Adelphia. Its stock price dropped continuously (Figure 7) and return on investment plummeted with increasing risks. The timing of tunneling in the case of Adelphia seems to confirm the proposition of the model (chapter one) that tunneling is

more likely to happen when investment in the firm generates lower returns and involves higher risks.

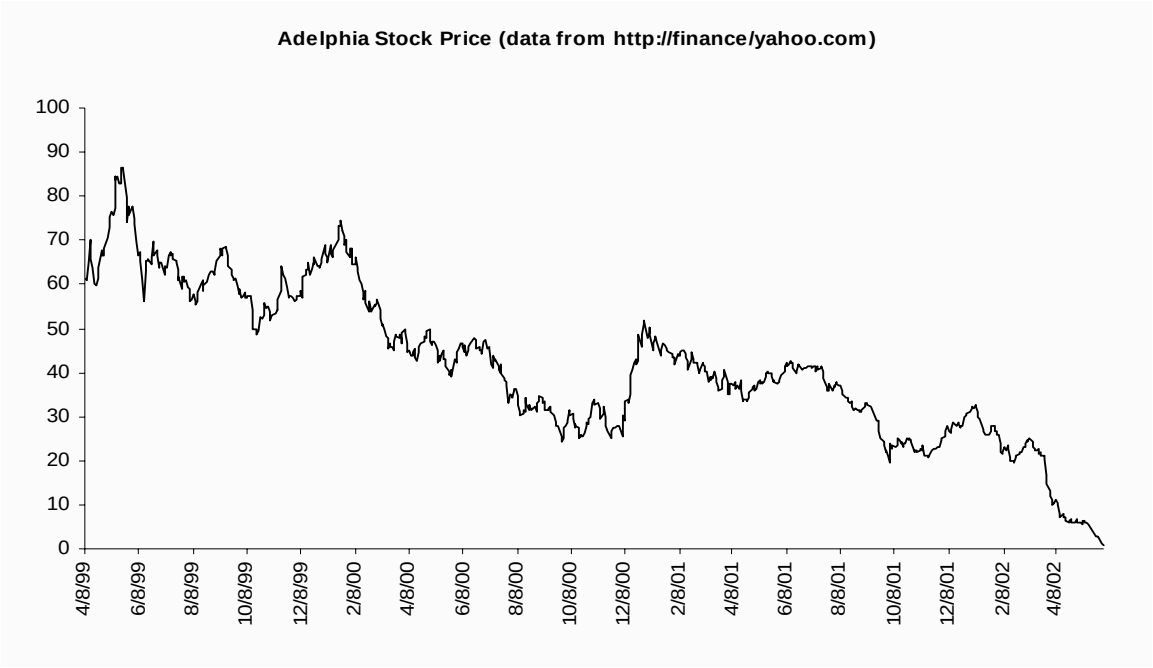

Figure 7: Adelphia Stock Price since Late 1990s

2.4. Conclusions

Tunneling takes various forms in the real world. While it is true that tunneling is more pervasive in developing countries where legal system is weak than in developed countries, it also occurs in developed countries with good law enforcement. When tunneling takes the form of outside theft or fraud, it is treated as illegal by almost all types of legal systems. However, when tunneling comes in other forms, such as asset

sales and contracts advantageous to the controlling shareholders, it is not necessarily considered illegal everywhere. Generally speaking, English common-law systems are more protective than French civil-law systems. As can be shown by the case of SARL Peronnet in France and the case of Zapata Corp. in the U.S., courts in common-law countries do a better job in stopping tunneling that involves self-dealing transactions with a plausible business purpose than courts in civil-law countries.

Tunneling in developed common-law countries such as in the U.S. and U.K., has received inadequate attention in the literature. As the case of Adelphia illustrates, tunneling is not a trivial matter even in the U.S. While the model in chapter one provides some general assistance in identifying the types of companies where tunneling is more likely to occur, a way in which tunneling can be measured systematically in the real world is still to be found. Such a measurement is crucial for studying tunneling empirically. More work is needed along this line.

3. From Theory to Empirical Assessment: Implications on Corporate Ownership Concentration in U.S. Corporations

Abstract

In light of the model's predictions in the first chapter, this chapter examines the determinants of corporate ownership concentration empirically using a newly constructed data set that contains 3875 public companies from 51 states in the U.S. during a 10-year period (1992-2002). Corporate ownership concentration is found to vary systematically with the effectiveness of law enforcement in a state and with firm-specific fundamentals such as firm size, firm return, and volatility of firm return in ways that are consistent with the theoretical framework outlined in chapter one.

3.1. Introduction and Related Research

The difficulty to obtain systematic data on tunneling in the real world doesn't mean that it is impossible to test the model predictions (chapter one) in a systematic way. The theoretical framework presented in the first chapter predicts a number of testable relations between corporate ownership concentration, various firm-level variables, and variables that proxy for the effectiveness of investor protection (Proposition 1). All these variables are empirically measurable, thanks to the new development in the literature of law and finance. In this chapter, I examine the determinants of corporate ownership concentration empirically using a newly constructed data set that contains 3875 public companies from 51 states in the U.S. during a 10-year period (1992-2002). The primary

goal is to test systematically whether the firm-level economic fundamentals and the effectiveness of investor protection are empirically significant determinants of corporate ownership concentration, and whether these variables affect corporate ownership concentration in ways that are predicted by the model. In doing this, I also attempt to re-examine and expand the conventional wisdom on the determinants of corporate ownership concentration.

This study differs from past work in a number of ways. Demesetz and Lehn (1985) study determinants of corporate ownership in the U.S. and find that the structure of corporate ownership varies systematically in ways that are consistent with value maximization. In the current study, I use a dataset that includes more firms (3875 public companies in the U.S.) and covers a more recent and longer time range (1992~2002). The extended coverage allows us to comment on the robustness of Demesetz and Lehn (1985)'s results. Some of the findings in this paper are consistent with Demesetz and Lehn (1985)'s conclusions. For example, similar to Demesetz and Lehn (1985), I find that ownership concentration is relatively low in large firms. Other findings in this paper are in clear contrast to Demesetz and Lehn (1985)'s results. For instance, my study detects significant positive relation between ownership concentration and firm return, and negative relation between ownership concentration and the volatility of firm return. More important, this study expands Demsetz and Lehn (1985)'s analysis to include state-level determinants of ownership concentration in the regressions. I find that corporate ownership concentration varies systematically with the effectiveness of law enforcement across states in the U.S. after controlling for a large set of covariates.

This paper investigates ownership concentration rather than managerial ownership (for the latter approach, see Himmelberg et al. (1999), (2001)). The distinction between these two concepts has been vague in the literature. In this paper I argue that it is critical to distinguish between these two concepts. Ownership concentration measures how a firm's ownership is concentrated on its controllers, while managerial ownership is an indictor of the interests of the officers and directors in the firm who are, at best, only a potential subset of the controllers. Since large shareholders either participate in management directly or are vigorously engaged in monitoring management, ownership concentration is a better indicator of the controllers' interests in a firm than managerial ownership[18].

3.2. Data and Variable Measurements

One major prediction by proposition 1 (chapter one) to be tested is that corporate ownership concentration varies systematically with the effectiveness of investor protection after controlling for various firm level economic variables. While several cross-country studies (such as LLSV (1999), Himmelberg et al. (2001), and Qu (2004a)) have documented positive evidence of a significant relation between ownership structure and investor protection, these studies bear the same shortcoming that exists due to various

[18] For more discussions about the role of large shareholders in corporate governance, refer to Shleifer and Vishny (1986), Agrawal and Mandelker (1990), and Demsetz (1983). Using a cross-country data set, Qu (2004a) finds that ownership concentration has a marginally negative correlation with managerial ownership.

unobservable or unquantifiable heterogeneities in institution, culture and economic conditions across countries. This is why recent studies have been focusing more on the variation in law enforcement and its economic implications within a country (e.g., Laeven and Woodruff (2003), Berkowitz and Clay (2003)).

If the economic reasoning of the model presented in chapter one is sound, tunneling is costly and its cost varies with the legal environment in which the firm conducts its business. In a large country such as the U.S., law enforcement varies significantly across states. Therefore, the quality of law enforcement in a state where a firm's principal business is located is an important factor in determining how costly it is for the controllers to tunnel from the minority shareholders. Consequently, it affects the decision-making of both controllers and investors and has an impact on the company's ownership structure. Following this lead, in this chapter, I conduct a within-country study and examine the determinants of corporate ownership concentration using a sample of public companies across states in the U.S.

For a within-country and cross-state study to be possible, one important question needs to be addressed first: How to measure the effectiveness of investor protection across states in the U.S.?

There are two basic approaches to measure the effectiveness of investor protection in the literature: measure of the quality of laws on book, and measure of the effectiveness of law enforcement. Empirical studies in the literature didn't find significant variation in the laws on book across states. Therefore, in this study the measurement of the effectiveness of investor protection focuses on quantifying the

effectiveness of law enforcement across states. This measurement is based on a recent study by Berkowitz and Clay (2003). These researchers examine the current and past conditions of legal institutions and their enforcements in 48 continental states in America and find significant variations in the effectiveness of law enforcement across states. The primary measurement of the quality of law enforcement used in Berkowitz and Clay (2003) as well as in this paper is corruption. This variable (Corruption) measures the federal public corruption convictions by district over 1992 – 2001, per 100,000 population (measured in 1996). The numeric value of this variable varies significantly across states, ranging from 0.41 in Colorado to 7.06 in Mississippi. High numeric value of this variable indicates poor investor protection since it will be less costly for the controllers to engage in tunneling in a more corruptive environment. A positive relation between Corruption and corporate ownership concentration is predicted by the model.

In addition, to control for the possible effects of other state characteristics on corporate ownership concentration in a state, I collect data about per capita income (GSP), growth rate (Growth), business tax rate (Tax), and population density (Density) in a state. For the first three state characteristics, 10-year average (1992-2002) value is used in regressions, while population density in a state is measured in midyear 2000 (Table 1). These data are obtained from the Census Bureau and Bureau of Economic Analysis of the U.S. Commerce Department.

Table 1: State Characteristics

State name	Indirect business tax/GSP	Real GSP per capita	Growth rate of real GSP	Persons per square mile	Corruption	Civil Post-Rev.	Climate
Alabama	0.07	23304.16	0.03	87.6	3	1	39.73
Arizona	0.08	25361.60	0.07	45.2	1.55	1	2.19
Arkansas	0.07	22217.56	0.03	51.3	1.44	1	20.87
California	0.07	32030.36	0.04	217.2	2.89	1	6.78
Colorado	0.07	31344.87	0.06	41.5	0.41	0	3.96
Connecticut	0.08	39061.32	0.03	702.9	2.13	0	14.00
Delaware	0.06	39740.57	0.04	401.1	2.43	0	16.15
Florida	0.10	25130.84	0.04	296.4	4.84	1	27.91
Georgia	0.07	29664.38	0.05	141.4	3.1	0	20.26
Idaho	0.07	24265.86	0.06	15.6	3.33	0	3.59
Illinois	0.08	31855.55	0.03	223.4	5.54	0	11.49
Indiana	0.07	26832.81	0.03	169.5	1.85	0	14.62
Iowa	0.08	26918.94	0.03	52.4	1.01	0	10.83
Kansas	0.08	26927.70	0.03	32.9	1.57	0	10.95
Kentucky	0.08	24761.16	0.03	101.7	4.03	0	16.23
Louisiana	0.10	26556.31	0.03	102.6	5.98	1	27.92
Maine	0.10	23910.51	0.03	41.3	3.04	0	13.50
Maryland	0.07	29447.10	0.03	541.9	1.76	0	15.57
Massachusetts	0.06	35500.51	0.04	809.8	2.82	0	14.07
Michigan	0.08	27717.77	0.03	175	1.64	0	10.59
Minnesota	0.07	31091.02	0.04	61.8	1.25	0	7.18
Mississippi	0.08	20513.91	0.03	60.6	7.06	1	24.63
Missouri	0.07	27237.30	0.03	81.2	3.3	1	13.00
Montana	0.09	21215.28	0.03	6.2	3.5	0	3.65
Nebraska	0.07	28535.77	0.03	22.3	0.54	0	9.72
Nevada	0.09	32152.23	0.06	18.2	2.04	0	1.99
New Hampshire	0.08	30754.95	0.05	137.8	0.6	0	11.77
New Jersey	0.09	35729.33	0.03	1134.4	3.36	0	15.35
New Mexico	0.09	26055.58	0.06	15	2.28	1	2.16
New York	0.09	35363.44	0.03	401.9	4.47	0	12.11
North Carolina	0.08	27976.16	0.04	165.2	1.37	0	18.24
North Dakota	0.09	24584.89	0.03	9.3	6.15	0	4.22
Ohio	0.07	28002.18	0.03	277.3	4.34	0	14.06
Oklahoma	0.07	22817.69	0.03	50.3	2.6	0	12.82
Oregon	0.06	29069.32	0.07	35.6	0.77	0	15.73
Pennsylvania	0.07	27639.46	0.02	274	3.13	0	13.67
Rhode Island	0.08	27516.78	0.03	1003.2	2.64	0	13.40
South Carolina	0.07	24125.78	0.04	133.2	3.37	0	20.38
South Dakota	0.08	26685.55	0.04	9.9	4.58	0	7.99
Tennessee	0.08	26949.27	0.04	138	3.26	0	20.28
Texas	0.09	29530.87	0.05	79.6	2.38	1	12.99
Utah	0.07	24873.00	0.06	27.2	0.77	0	4.03
Vermont	0.09	25791.53	0.03	65.8	1.68	0	9.90
Virginia	0.07	30325.38	0.04	178.8	3.04	0	18.23
Washington	0.11	30615.09	0.04	88.6	1.89	0	11.40
West Virginia	0.09	20314.77	0.02	75.1	2.3	0	16.92
Wisconsin	0.08	27684.41	0.04	98.8	1.43	0	9.65
Wyoming	0.12	33217.95	0.03	5.1	2.87	0	3.56

Table 2: State Distribution of Firms in the Sample

*: state code (in parentheses) conforms to the National Bureau of Standards' Federal Information Processing Standards (FIPS) codes. Under the FIPS classification system, a unique code is assigned to every state in the United States and its territories. These codes are used to identify a company's principal location.

State name*	Number of Firms in the Sample	State name*	Number of Firms in the Sample
Alabama (01)	40	Montana (30)	5
Alaska (02)	2	Nebraska (31)	15
Arizona (04)	45	Nevada (32)	33
Arkansas (05)	21	New Hampshire (33)	19
California (06)	616	New Jersey (34)	178
Colorado (08)	85	New Mexico (35)	6
Connecticut (09)	93	New York (36)	329
Delaware (10)	14	North Carolina (37)	69
District of Columbia (11)	12	North Dakota (38)	4
Florida (12)	178	Ohio (39)	151
Georgia (13)	100	Oklahoma (40)	33
Hawaii (15)	8	Oregon (41)	47
Idaho (16)	8	Pennsylvania (42)	196
Illinois (17)	166	Rhode Island (44)	11
Indiana (18)	59	South Carolina (45)	23
Iowa (19)	25	South Dakota (46)	6
Kansas (20)	22	Tennessee (47)	48
Kentucky (21)	34	Texas (48)	319
Louisiana (22)	33	Utah (49)	31
Maine (23)	9	Vermont (50)	11
Maryland (24)	67	Virginia (51)	79
Massachusetts (25)	200	Washington (53)	67
Michigan (26)	84	West Virginia (54)	7
Minnesota (27)	127	Wisconsin (55)	58
Mississippi (28)	11	Wyoming (56)	4
Missouri (29)	67		
		Total Sample Size	3875

The model outlined in chapter one proposes the following firm level determinants of corporate ownership concentration: firm size, firm return, volatility of firm return, and the controller's risk attitude. While it is difficult to measure the risk aversion of a firm's controllers, the other three variables are empirically measurable. The main sources of the firm level financial information are the Disclosure SEC Database and Compustat

Database. The Compustat Database contains a wide range of data items about a firm's fundamentals such as equity size, accounting profit rate, etc., but it doesn't report enough information about a firm's ownership structure for the purpose of this study. The Disclosure SEC Database provides more complete coverage of ownership structure for public companies[19]. I combine the financial information from these two databases by matching firms' ticker symbols.

Table 3: Industry Distribution of Firms in the Sample

	Number of Firms	Percentage
Financial (SIC range 6000~6999, included)	645	16.65%
Utility (SIC range 4900~4999, 4600~4699)	124	3.20%
Communication (SIC range 4800~4899)	71	1.83%
Other Industries	3035	78.32%
Total	3875	100%

Only firms that are currently active and firms that have been in business for at least 6 years (for the purpose of calculating meaningful values of firms' expected return rate and its volatility) are included in the data set. After elimination of firms that lack enough financial information in the databases, the data set consists of 3875 public companies from 51 states in a 10-year period (1992~2002). These companies are classified as financial companies (including banks), utility, communication, and

[19] To be included in the SEC database, a company must provide direct goods or services and file with SEC or other government agencies.

companies in other industries, respectively, and their primary businesses spread in 408 distinct four-digit SICs. Table 2 and Table 3 give the country-wise and industry-wise distribution of companies in the data set, respectively.

Measurements of variables are constructed in ways that are consistent with the model (chapter one) and with common practice in the literature. Table 4 describes the variables and Table 5 reports summary statistics of variables.

Table 4: Variable Description and Data Sources

Variable Name	Variable Description
C_5%	Variable to measure ownership concentration in a firm. It is equal to the sum of the 5% shareholders' share of the firm's outstanding stocks. Source: *SEC* Database.
C_insider	Insider ownership, equal to the sum of the insiders' (officers and directors) share of the firm's outstanding stocks. Source: *SEC* Database.
Dfin	Financial dummy, equal to 1 if the firm is a financial firm (4-digit SIC ranges from 6000 to 6999). Source: *Compustat* Database.
Duti	Utility dummy, equal to 1 if the firm is a utility company (4 digit SIC ranges from 4600 to 4699 or from 4900 to 4999). Source: *Compustat* Database.
Dcomm	Communication dummy, equal to 1 if the firm's primary business area is communication (4-digit SIC ranges from 4800 to 4899). Source: *Compustat* Database.
SIZEa	Primary measurement of the size of the firm, equal to the firm's accounting common equity – total (in million U.S. dollars). Natural log value of 10-year average (1992~2002, if available) of the firm's common equity – total is used in the regressions. Source: *Compustat* Database.
SIZEb	Size of the firm, measured by the firm's common equity – tangible (in million U.S. dollars). Natural log value of 10-year average (1992~2002, if available) of the firm's common equity – tangible is used in the regressions for robustness checks. Source: *Compustat* Database.
SIZEc	Size of the firm, measured by the stockholders' equity – total (in million U.S. dollars). Natural log value of 10-year average (1992~2002, if available) of the stockholders' equity – total is used in the regressions for robustness checks. Source: *Compustat* Database.
RETURNa	Primary measurement of the firm's accounting rate of return, equal to the after-tax return on common equity - total. Value of 10-year average (1992~2002, if available) of the firm's after-tax return on common equity - total is used in the regressions. Source: *Compustat* Database.
RETURNb	Accounting rate of return, measured by the firm's after-tax return on common equity – tangible. Value of 10-year average (1992~2002, if available) of the firm's after-tax return on common equity - tangible is used in the regressions for robustness checks. Source: *Compustat* Database.
RETURNc	Accounting rate of return, measured by the firm's after-tax return on stockholder's equity – total. Value of 10-year average (1992~2002, if available) of the firm's after-tax return on stockholder's equity - total is used in the regressions for robustness checks. Source: *Compustat* Database.
VARa	Primary measurement of the instability of the firm's accounting rate of return, equal to the variance of the firm's after-tax return on common equity – total in the past 10 years (1992~2002, if available). Source: *Compustat* Database.
VARb	Alternative measurement of the instability of the firm's accounting rate of return, equal to the variance of the firm's after-tax return on common equity – tangible in the past 10 years (1992~2002, if available). Source: *Compustat* Database.
VARc	Alternative measurement of the instability of the firm's accounting rate of return, equal to the variance of the firm's after-tax return on stockholder's equity – total in the past 10 years (1992~2002, if available). Source: *Compustat* Database.
CORRUPTION	Federal public corruption convictions by district over 1992 – 2001, per 100,000 population (measured in 1996). Source: Berkowitz and Clay (2003).
OTHER STATE CHARACTERISTICS	Four variables: 1. GSP: measure of the state income, equal to the 10-year average (1992~2002) of real gross state product (the value added in production by the labor and property located in a state, chained 1996 dollars) per capita; 2. GROWTH: measure of the growth rate of the real gross state product (chained 1996 dollars) from 1992~2002; 3. Business tax: measure of a state's business tax rate, equal to the 10-year average (1992~2002) of the ratio of the indirect business tax rate to the gross state product; 4. DENSITY: measure of the population density in a state, equal to the number of persons per square mile in midyear 2000. Source: Census Bureau, Bureau of Economic Analysis of the U.S. commerce department.
Civil Post-Rev. Dummy	Equal to 1 if a state was originally settled by France, Spain, or Mexico, and had substantial numbers of land grants from these countries and was acquired subsequent to the American Revolution. Source: Berkowitz and Clay (2003).
Climate	Annual average temperature*Annual average humidity*Annual average precipitation*0.0001. Source: Berkowitz and Clay (2003).

Table 5: Summary Statistics of Variables

*: indicating that the data is available in 48 states and variable statistics is state-wise.

Variable Name	Mean	Median	Standard Deviation	Maximum	Minimum	Number of Observations
C_5%	0.42	0.40	0.27	1.00	0	3875
C_insider	0.13	0.05	0.18	1.00	0	3872
SIZEa (million US$)	604.50	84.39	2251.41	48475.50	0.05	3539
SIZEb	449.10	61.80	1773.73	48505.40	0.05	3600
SIZEc	614.63	85.66	2275.62	48475.50	0.05	3554
RETURNa	0.04	0.09	0.23	0.99	-1.00	3539
RETURNb	0.05	0.10	0.25	0.99	-0.99	3273
RETURNc	0.03	0.09	0.23	0.87	-1.00	3554
VARa	0.27	0.01	0.91	9.99	0	3539
VARb	0.38	0.02	1.12	9.98	0	3273
VARc	0.24	0.01	0.83	9.98	0	3554
Dfin	0.17	0	0.37	1	0	3875
Duti	0.03	0	0.18	1	0	3875
Dcomm	0.02	0	0.13	1	0	3875
Law Enforcement						
Corruption	2.74	2.62	1.52	7.06	0.41	48*
Instruments for Law Enforcement						
Civil Post-Rev.	0.21	0	0.41	1	0	48*
Climate	13.13	13	7.50	39.73	1.99	48*
Other State Characteristics						
Tax	0.08	0.07	0.01	0.12	0.06	48*
GSP	28102.47	27578.12	4398.66	39740.57	20314.77	48*
Growth	0.04	0.03	0.01	0.07	0.02	48*
Density	185.52	88.1	254.03	1134.4	5.1	48*

I have two measurements of corporate ownership structure. The primary one, C_5%, measures ownership concentration in a firm. It is equal to the sum of the 5% owners' share of the firm's outstanding stocks, where 5% owners refer to all individuals, companies, banks or funds that own at least 5% of the company's shares. Inspection of data reveals that corporate ownership concentration (C_5%) varies widely across firms, ranging from 0 to 100%. The mean value of C_5% is around 42% in the sample. In other words, ownership is fairly concentrated in the majority of public companies in the United States, a picture that is in contrast to Berle and Means (1932)'s image of dispersed

ownership. For the purpose of comparison, I construct another measurement of ownership structure: insider ownership (C_insider). It measures the interest of officers, directors and beneficial owners who hold at least 1000 shares in the firm. Simple treatment of data reveals that ownership concentration (C_5%) is only marginally correlated with insider ownership (C_insider), (panel A, Table 6). This suggests that the distinction between ownership concentration and managerial ownership is empirically significant.

Table 6: Correlations between Variables

Panel A: Correlations between firm-specific variables

	C_5%	C_insider	SIZEa	SIZEb	SIZEc	RETURNa	RETURNb	RETURNc
C_5%	1							
C_insider	0.3	1						
SIZEa			1					
SIZEb			0.91	1				
SIZEc			0.99	0.91	1			
RETURNa						1		
RETURNb						0.1	1	
RETURNc						0.83	0.13	1

Panel B: Correlations between state-specific variables

	Corruption	Civil Post-Rev.	Climate	GSP	Growth	Business Tax	Population Density
Corruption	1						
Civil Post-Rev.	0.25	1					
Climate	0.31	0.32	1				
GSP	-0.17			1			
Growth	-0.4			0.17	1		
Business Tax	0.3			-0.09	-0.25	1	
Population Density	0.08			0.53	-0.17	-0.07	1

Estimation results may be sensitive to how the firm level economic fundamentals are measured. For example, Himmelberg et al. (1999) suggest that the tangibility of a firm's equity may have an impact on the agency cost and, subsequently, affect the firm's ownership structure. To control for the possible impact of variable measurements, I construct alternative measurements for each of the firm level determinants. I have three measurements of firm size: SIZEa (primary measurement), SIZEb, and SIZEc. They take the value of the firm's common equity – total, common equity – tangible, and the stockholder's equity – total, respectively. Natural log value of 10-year (annually from 1992 to 2002, if available) average of these variables is used in regressions. Some companies report negative equity value. These "outliers" are excluded from the regressions. Not surprisingly, the correlations between these alternative measurements are high (panel A, Table 6). The coefficient on this variable is expected to have a negative sign.

I construct three measurements of a firm's accounting profit rate, corresponding to the three measurements of firm size: RETURNa (primary measurement), RETURNb, and RETURNc. They are calculated as the firm's after-tax return on common equity – total, on common equity – tangible, and on stockholder's equity – total, respectively. Value of 10-year average (1992~2002, if available) of the accounting profit rate (annual) is used in regressions. Firms whose average accounting profit rate is beyond (-100%, +100%) are treated as "outliers" and are deleted from the regressions since these firms were likely involved in some special event (for example, merger, acquisition, change of

accounting rules, etc.) during the past 10 years. The sign of the coefficient on this variable is predicted to be positive by the model (chapter one).

Measurements of the instability of a firm's accounting profit rate are constructed in similar ways. VARa (primary measurement), VARb, and VARc give the variance of the firm's after-tax return on common equity – total, on common equity – tangible, and on stockholder's equity – total in the past 10 years (if available), respectively. Some companies' financial reports show exceptionally high volatility in their accounting profit rate (greater or equal to 10) and these companies are treated as outliers and are excluded from the regressions[20].

Previous studies on the determinants of corporate ownership concentration document significant industry effects. For example, Demsetz and Lehn (1985) report that in regulated industries such as utility and financial industry, ownership concentration tends to be low[21]. To account for possible industry effects, I construct three industry dummy variables – Dfin, Duti, Dcomm – to indicate whether a company is in the financial, utility or communication industries. These three industries are often believed to be under special regulations at the federal or state level.

Expression (24) gives the primary reduced-form estimation model. Quadratic forms of variables are included in regressions to take care of possible nonlinearities. In addition to this primary model, various model specifications and variable measurements are tested for the purpose of robustness checks.

[20] The regression results are not sensitive to this cut-off.

[21] This result is consistent with equation (14) in chapter one. Special regulatory rules in some industries provide extra protection on investor rights (low value of p in relative to other industries). This results in relatively low ownership concentration in firms of these industries.

$$C\_5\%_{ij} = \beta_0 + \beta_1 Dfin + \beta_2 Duti + \beta_3 Dcomm + \beta_4 SIZE_{ij} + \beta_5 SQU\_SIZE_{ij} + \beta_6 RETURN_{ij} + \beta_7 SQU\_RETURN_{ij} + \beta_8 VAR_{ij} + \beta_9 CORRUPTION_i + \beta_{10\sim13} OTHERS_i + \varepsilon_{ij} \quad (24)$$

β **s:** coefficients to be estimated;

SQU_~: quadratic form of variables;

OTHERS: other state characteristics (GSP, Tax, Growth, and Density);

Subscript i : state index, from 1 to 48;

Subscript j : firm index, from 1 to up to 616;

ε **:** i.i.d. error term, taking care of all other unexplained variables.

3.3. OLS Regression Analysis

Table 7 reports the OLS regression results with different model specifications. All regressions correct for possible correlation of the errors at the state level (clusters). The dependent variable is ownership concentration (C_5%). The relation between ownership concentration and the effectiveness of law enforcement is clearly negative (regressions (1) to (3) in Table 7). The coefficient on corruption is positive and highly significant (5% significance level). This result is not sensitive to the use of the 10-year sub-sample which contains firms with at least 10 years' financial information in the databases (regressions (5) and (6) in Table 7). Since natural log value of this variable is used in regressions, the estimation result can be explained as follows: if the legal environment of a state is 1%

more corruptive, this will result in 0.02~0.03 percentage point increase in ownership concentration.

Table 7: OLS Regression Analysis

Note: columns (1) ~ (4) report regression results using the full sample; columns (5) & (6) present the regression results using the 10-year sub-sample (companies that have at least 10-year financial reports in COMPUSTAT); dependent variable is C_5%; standard errors (in parentheses) adjust for heteroscedasticity; natural log values of SIZE, Corruption, GSP, and Density are used in regressions; E+nn or E-nn means multiply by 10 to + or -nn power; *** indicates a significance level of 1%; ** indicates a significance level of 5%; * indicates a significance level of 10%.

Variables	Regressions					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.59** (0.47)	-3.20*** (0.60)	-2.59*** (0.35)	-2.53*** (0.35)	0.72 (0.60)	-3.58*** (0.76)
Dfin	-0.13*** (0.01)	-0.13*** (0.01)	-0.14*** (0.01)	-0.14*** (0.01)	-0.07*** (0.02)	-0.06*** (0.02)
Duti	-0.25*** (0.02)	-0.24*** (0.02)	-0.24*** (0.02)	-0.24*** (0.02)	-0.24*** (0.02)	-0.23*** (0.03)
Dcomm	-0.01 (0.04)	0.02 (0.04)	0.02 (0.04)		-0.04 (0.06)	0.40E-02 (0.06)
SIZEa	-0.02*** (0.26E-02)	0.35*** (0.04)	0.35*** (0.04)	0.34*** (0.04)	-0.03*** (0.32E-02)	0.38*** (0.04)
SQUSIZEa		-0.01*** (0.97E-03)	-0.01*** (0.96E-03)	-0.01*** (0.96E-03)		-0.01*** (0.12E-02)
RETRUNa	0.11*** (0.02)	0.07*** (0.02)	0.09*** (0.02)	0.07*** (0.02)	0.16*** (0.03)	0.14*** (0.03)
SQURETa		-0.13*** (0.05)		-0.13*** (0.05)		
VARa	-0.01* (0.56E-02)	0.47E-02 (0.64E-02)	-0.39E-02 (0.55E-02)	0.55E-02 (0.65E-02)	-0.01 (0.73E-02)	-0.32E-02 (0.74E-02)
Corruption	0.03** (0.01)	0.02** (0.01)	0.02** (0.84E-02)		0.03** (0.01)	0.03** (0.01)
Other State Characteristics	INCLUDED	INCLUDED	NOT INCLUDED	NOT INCLUDED	INCLUDED	INCLUDED
R-square	0.09	0.12	0.11	0.11	0.10	0.14
F test	30.82	36.30	56.97	65.33	21.49	27.93
Observation	3539	3539	3539	3539	2144	2144

Firm size has a negative overall effect on ownership concentration, and strong nonlinearity is detected once quadratic form of this variable is included in the regressions (regressions (1) ~ (4) in Table 7). The turning point between a positive and negative relation is around 17~17.5 (natural log value), which corresponds to 24~40 million US$.

Compare this to the sample mean (604.50 million) and it seems to suggest that the negative relation between firm size and ownership concentration is more likely to exist for large firms rather than small firms. This result persists with the exclusion of state-specific variables (regression (4) in Table 7) and is not sensitive to the use of the 10-year sub-sample (regressions (5) and (6) in Table 7).

Similar to Demsetz and Lehn (1985), strong industry effects are detected in this OLS regression analysis. The coefficients on the financial dummy and utility dummy are negative and significant (both at 1% level). This suggests that, compared to firms in other industries, financial companies and utility companies have low ownership concentration after controlling for other factors that affect ownership concentration. On average, corporate ownership concentration in the financial industry is 6%~14% lower than that in other industries, and ownership concentration in utility companies is about 23%~25% lower. The coefficient estimate on the communication dummy is empirically insignificant, which may reflect the course of deregulation that has been going on in this industry.

Coefficient estimate on firm's accounting profit rate shows a positive relation with ownership concentration and this relation is highly significant (at 1% level). This finding is consistent with my model prediction and is in contrast to Demsetz and Lehn (1985)'s result. Strong nonlinearity is detected when including the quadratic form of this variable in the regressions. Both the significance level and the magnitude of the coefficient estimate change very little with the exclusion of state-specific variables

(regression (4) in Table 7) or with the use of the 10-year sub-sample (regressions (5) and (6) in Table 7).

Coefficient estimate on the volatility of firm's profit rate is negative as expected, but is empirically insignificant (except regression (5) with the 10-year sub-sample in Table 7). In addition, the sign of coefficient estimate is sensitive to the inclusion of the quadratic form of the accounting profit rate. While this result neither supports nor contradicts my model prediction, it suggests that the correlation between firm return and its risk could be an important factor that affects the estimation results. Since my model doesn't elaborate on this correlation, I am reluctant to speculate on any model specification that takes account of this issue, and will just leave it for future work.

Regressions with insider ownership (C_insider) as the dependent variable yield empirically insignificant coefficient estimates (Table 8). No significant relation between managerial ownership and law enforcement is detected. This result is in clear contrast to that of Himmelberg et al. (2001). Doubt is cast on the practice in previous work that uses the term "ownership concentration" and the term "managerial ownership" interchangeably. This empirical finding confirms the proposition that for the purpose of revealing the governance arrangement in a firm, it is the ownership concentration rather than the managerial ownership or insider ownership that is relevant.

Table 8: OLS Regression Analysis: Insider Ownership

Note: standard errors (in parentheses) adjust for heteroscedasticity; natural log values of SIZE, Corruption, GSP, and Density are used in regressions; E+nn or E-nn means multiply by 10 to + or -nn power; *** indicates a significance level of 1%; ** indicates a significance level of 5%; * indicates a significance level of 10%.

Variables	Dependent Variable: Insider Ownership (C_insider)	
	(1)	(2)
Constant	0.45 (0.32)	0.74* (0.43)
Dfin	-0.13E-03 (0.80E-02)	-0.11E-03 (0.80E-02)
Duti	-0.03** (0.01)	-0.03** (0.01)
Dcomm	0.04 (0.03)	0.04 (0.03)
SIZEa	-0.03*** (0.17E-02)	-0.06** (0.03)
SQUSIZEa		0.73E-03 (0.71E-03)
RETRUNa	0.05*** (0.02)	0.05*** (0.02)
SQURETa		0.71E-02 (0.04)
VARa	-0.87E-03 (0.37E-02)	-0.18E-02 (0.39E-02)
Corruption	-0.71E-02 (0.79E-02)	-0.70E-02 (0.79E-02)
Other State Characteristics	INCLUDED	INCLUDED
R-square	0.08	0.08
F test	28.83	24.50
Observation	3539	3539

In general, OLS estimation results show high consistency with the model predictions (chapter one). The firm-level economic variables specified as determinants of ownership concentration by the model all have the predicted relations with ownership concentration and most of these relations are found to be empirically significant. After controlling for the firm-level determinants, corporate ownership concentration varies systematically with the effectiveness of law enforcement across states. The positive relation between corporate ownership concentration and public corruption is empirically

significant. The overall estimation model is highly significant, too. These results are robust with the inclusion of other state characteristics and with the use of the 10-year sub-sample. Some of the OLS results resemble existing findings in the literature (for example, the negative relation between C_5% and SIZE and the strong industrial effect as documented by Demsetz and Lehn (1985)), while others differ from past work.

3.4. IV Estimation

Until this point, the quality of law enforcement in a state has been treated as being exogenous both in the model and in the regressions. However, the possibility that the effectiveness of legal system is endogenous itself has been well recognized in the literature. For example, one recent working paper by Laeven and Woodruff (2003) proposes that larger firms may demand a better legal system. It may also be true that when corporate ownership spreads in a larger group of investors, there is greater demand for more protective law enforcement. Thus dispersed ownership may be one important factor that causes a strong legal system to come forward in the first place. Such endogeneity problem may bias the OLS estimator and make it inconsistent.

To tackle this possible endogeneity problem, I construct instrumental variables and implement IV procedure to estimate the coefficients of interest. Since the potential endogeneity problem involves the variables measuring law enforcement in a state, I focus on instrumenting for CORRUPTION, i.e. to find variables that are substantially

correlated to this variable and are believed to be unrelated to other variables included in the regressions. One recent study by Berkowitz and Clay (2003) provides a number of candidates for this purpose. Berkowitz and Clay (2003) find that the initial legal system and the initial climate environment in a state have persistent effect on the quality of contemporary institutions. For example, states that were originally settled by Great Britain – a common law country – have better contemporary institutions than states that were originally settled by France, Spain, Mexico, and Netherlands – all civil law countries. Also, contemporary institutions in a state are found to be highly correlated with the initial climate environment of that state. Meanwhile, there is no obvious reason to believe that these initial conditions are in any way correlated with corporate ownership concentration or other firm level fundamentals at present. Following these leads, I use two variables that indicate the initial legal environment and initial climate environment as instruments for the contemporary quality of law enforcement in a state: Civil Post-Rev. dummy, equal to 1 if a state was originally settled by France, Spain, or Mexico, and had substantial numbers of land grants from these countries and was acquired subsequent to the American Revolution; Climate variable, equal to the product of annual average temperature, annual average humidity, and annual average precipitation (divided by 10,000). Data about these two variables are taken directly from Berkowitz and Clay (2003). The correlations between these variables are reported in panel B of Table 6.

I use a standard 2SLS procedure to carry out the IV estimation. The results of IV regressions are reported in Table 9. All regressions correct for possible correlation of the errors at the state level (clusters).

Table 9: IV Estimation

Note: panel A reports the second-stage results of the 2SLS estimation and Panel B reports the first-stage results with Corruption as the dependent variable; Column (1) and column (2) report estimation results using climate variable as instrument for Corruption; Column (3) presents the estimation results using the Civil Post-Revo dummy variable that indicate the initial legal environment in a state as instrument; standard errors (in parentheses) adjust for heteroscedasticity; natural log values of SIZE, Corruption, GSP, and Density are used in regressions; E+nn or E-nn means multiply by 10 to + or -nn power; *** indicates a significance level of 1%; ** indicates a significance level of 5%; * indicates a significance level of 10%.

	Panel A: Second Stage Dependent Variable: C_5%		
Variables	(1)	(2)	(1)
Constant	0.21 (0.62)	-3.65*** (0.71)	0.69 (0.49)
Dfin	-0.14*** (0.01)	-0.14*** (0.01)	-0.13*** (0.01)
Duti	-0.25*** (0.02)	-0.24*** (0.02)	-0.25*** (0.02)
Dcomm	-0.01 (0.04)	0.02 (0.04)	-0.01 (0.04)
SIZEa	-0.02*** (0.30E-02)	0.35*** (0.04)	-0.02*** (0.27E-02)
SQUSIZEa		-0.01*** (0.98E-03)	
RETRUNa	0.11*** (0.02)	0.08*** (0.02)	0.11*** (0.02)
SQURETa		-0.11** (0.05)	
VARa	-0.01** (0.56E-02)	0.23E-02 (0.65E-02)	-0.01* (0.56E-02)
Corruption	0.11 (0.08)	0.13 (0.08)	0.01 (0.03)
Other State Characteristics	INCLUDED	INCLUDED	INCLUDED
	Panel B: First Stage Dependent Variable: Corruption		
Climate	0.01*** (0.13E-02)	0.01*** (0.13E-02)	
Civil Post-Revo. Dummy			0.28*** (0.01)
Other State Characteristics			
Tax	10.52*** (0.52)	10.54*** (0.52)	9.96*** (0.45)
GSP	-0.15 (0.09)	-0.14 (0.09)	-0.31*** (0.07)
Growth	-17.90*** (1.06)	-17.88*** (1.06)	-20.38*** (1.04)
Density	0.19*** (0.02)	0.19*** (0.02)	0.23*** (0.01)
Adjusted R-square	0.45	0.45	0.49

Panel A of Table 9 reports the second-stage results of the 2SLS estimation and Panel B reports the first-stage results with Corruption as the dependent variable. Column

(1) and column (2) present results using initial climate environment as instrument for Corruption, and column (3) reports coefficient estimates using the initial legal condition (Civil Post-Rev. dummy) as instrument. In general, 2SLS estimation results highly resemble the OLS results as reported in Table 7. All the coefficient estimates retain their signs as in OLS regressions. Coefficient estimates on firm level fundamentals and industry dummies are very close to the OLS estimates. Interestingly, the coefficient estimates on law enforcement are generally bigger in IV estimation than in OLS estimation (Table 9). This seems to suggest that the real effect of law enforcement on corporate ownership concentration is bigger than that shown in OLS regressions once the potential endogeneity problem is accounted for.

3.5. Robustness Checks

The empirical results reported above are robust across different model specifications and estimation procedures (Table 7-9). For example, the relation between ownership concentration and the set of firm-specific variables, and the relation between ownership concentration and state-level law enforcement remain significant with the inclusion of other state characteristics. The observed relations persist when using the 10-year sub-sample which includes only firms that have at least 10 years' financial reports in the databases. These results change very little when instrumenting for the effectiveness of law enforcement in regressions.

How are the firm-level fundamentals measured may matter to the estimation results. To account for this concern, I replicate the OLS regression analysis using alternative measurements for firm size, accounting profit rate and its volatility. Table 10 reports the results for robustness checks using these alternative variable measurements.

Table 10: Robustness Checks

Note: dependent variable is C_5%; standard errors (in parentheses) adjust for heteroscedasticity; natural log values of SIZE, Corruption, GSP, and Density are used in regressions; E+nn or E-nn means multiply by 10 to + or -nn power; *** indicates a significance level of 1%; ** indicates a significance level of 5%; * indicates a significance level of 10%.

Variables	Regressions			
	(1)	(2)	(3)	(4)
Constant	0.45 (0.49)	-2.53*** (0.62)	0.65 (0.47)	-2.96*** (0.61)
Dfin	-0.13*** (0.01)	-0.13*** (0.01)	-0.13*** (0.01)	-0.13*** (0.01)
Duti	-0.24*** (0.02)	-0.23*** (0.02)	-0.24*** (0.02)	-0.23*** (0.02)
Dcomm	-0.07 (0.05)	-0.04 (0.05)	-0.47E-02 (0.04)	0.01 (0.04)
SIZEb	-0.02*** (0.27E-02)	0.27*** (0.04)		
SQUSIZEb		-0.80E-02*** (0.10E-02)		
RETRUNb	0.06*** (0.02)	0.05*** (0.02)		
SQURETb		-0.13*** (0.04)		
VARb	-0.01*** (0.46E-02)	-0.59E-03 (0.61E-02)		
SIZEc			-0.02*** (0.27E-02)	0.34*** (0.04)
SQUSIZEc				-0.01*** (0.10E-02)
RETURNc			0.11*** (0.02)	0.07*** (0.03)
SQURETc				-0.14*** (0.05)
VARc			-0.01* (0.64E-02)	0.21E-02 (0.73E-02)
Corruption	0.02** (0.01)	0.02* (0.01)	0.02** (0.01)	0.02** (0.01)
Other State Characteristics	INCLUDED	INCLUDED	INCLUDED	INCLUDED
R-square	0.09	0.11	0.09	0.12
F test	28.70	31.30	31.15	36.21
Observation	3273	3273	3554	3554

In general, the OLS and IV estimation results reported in previous section are robust. Coefficient estimates on Corruption and industry dummies are insensitive to alternative measurements for the firm level fundamentals. All other coefficient estimates retain their signs and level of significance. The overall model remains to be highly significant.

3.6. Conclusions

Empirical assessment in this chapter generates results that are highly consistent with the model's predictions (chapter one). Using a data set of 3875 public companies from 51 states in the U.S., I study the determinants of corporate ownership concentration with an estimation structure suggested by the model. I find that corporate ownership concentration is negatively related to firm size, positively related to firm's accounting profit rate, and negatively related to the instability of accounting profit rate. These relations are statistically significant. Strong industry effects are detected. After controlling for these firm-level determinants, ownership concentration varies systematically with the effectiveness of law enforcement across states in ways that are consistent with the model predictions. These findings persist when I instrument for the effectiveness of law enforcement with initial legal systems and initial climate environment in a state. Furthermore, these results are robust across different model specifications and variable measurements.

This study suggests several directions for future research. First, my results call for closer examination of the composition of controllers in a firm. What types of investors control the firm may have important implications on the firm's governance arrangement and on the controllers' tunneling behavior. For example, there has been debate on what role is played by institutional investors in a firm's governance arrangement. One interesting feature about institutional investors that has been often overlooked in the literature is that they act less risk-aversely than other big shareholders due to the fact that they can effectively diversify their investments. Therefore, if institutional owners are indeed active in corporate governance, my model will suggest that the growing influence of institutional investors plays a positive role in constraining tunneling. Such questions merit more careful investigation in the future.

Second, in this paper I only examined the economic impact of legal institutions in a firm's environment. When heterogeneous institutions, different cultures and various levels of development are taken into consideration, investor protection may come from various sources other than formal legal institutions. For example, family value and entrepreneur's concern about his/her reputation may be important factors in constraining tunneling in some countries. Such concerns may even induce entrepreneurs to use their own money to benefit minority shareholders as compensation to the weak legal systems in some developing countries (Friedman et al. (2003)). How do these factors affect the cost function of tunneling? Are they empirically measurable and important? More theoretical and empirical work is needed along this line.

4. What Determines Corporate Ownership Concentration around the World?[22]

Abstract

This chapter extends Demsetz and Lehn (1985)'s results and studies the determinants of corporate ownership concentration across countries using a newly constructed data set of 1070 publicly traded stock companies from 45 countries. OLS and IV estimation results show that corporate ownership concentration varies systematically with respect to certain firm-specific economic variables and country characteristics in ways that are consistent with both value maximization and predictions of agency theory. For example, it is found in this chapter that after controlling for firm-level determinants such as firm size, auditing practice, return rate, etc, corporate ownership concentration is significantly lower in countries with more developed stock market and more effective investor protection. These results provide strong evidence in support of the model in chapter one and are consistent with La Porta et al. (1999)'s idea that ownership concentration is a substitute for legal institutions as a mechanism to protect investor rights. These findings are robust across different model specifications and variable measurements.

4.1. Introduction and Related Research

Ownership structure is a primary element in determining governance arrangements in a firm. Corporations can have concentrated ownership by active owners or dispersed ownership through domestic and international markets. In some countries like the US and UK, firms with dispersed ownership structure are more common than in other countries. Why does the ownership structure differ across firms and across

[22] This paper is forthcoming on *Advances in Financial Economics*, Volume 9 (2004).

countries? What are the key elements that determine corporate ownership concentration? These are the questions that this paper attempts to answer.

It has been argued since Demsetz and Lehn (1985) that ownership concentration in a firm is endogenous depending on various firm-specific variables such as firm size, instability of the firm's accounting profit rate, and whether or not the firm is in certain industries. They propose that the structure of corporate ownership varies systematically in ways that are consistent with value maximization. However, another study by Himmelberg et al. (1999) argues that managerial ownership is explained by key variables in the contracting environment in ways consistent with the predictions of principal-agent models. There has been no consensus in the literature on how ownership structure is endogenized in a firm.

A recent working paper by Qu (2004b) proposes another explanation about the endogeneity of corporate ownership concentration. In that paper, a model based on agency theory is developed to study tunneling behavior, defined as the transfer of assets and profits out of a firm for the benefit of its controlling shareholders (controllers). Qu (2004b) argues that ownership concentration is determined as investors try to maximize the expected firm value by minimizing the level of tunneling. In this context, corporate ownership concentration is endogenized in ways that are consistent with both value maximization and the agency theory.

In light of this new development of theory, the present study investigates empirically the determinants of corporate ownership concentration around the world. I first develop hypotheses about the determinants of corporate ownership concentration

that are consistent with Qu (2004b)'s model and argue that different forms of ownership are adapted to various firm-specific variables and certain country-specific variables. I then examine the conjectures about the impact of these two groups of variables on corporate ownership concentration empirically using a newly constructed dataset of 1070 publicly traded stock companies from 45 countries around the world.

Empirical findings in this paper generally confirm Qu (2004b)'s model predictions. OLS and IV estimations find statistically significant relations between ownership concentration and various firm-specific economic variables including firm size, the accounting profit rate, the volatility of the profit rate, the firm's auditing practice, which industry the firm is in, and whether or not preferred stocks are issued extensively. After controlling for these firm-level determinants, the estimation results strongly support the hypothesis that corporate ownership concentration varies systematically across countries depending on certain country characteristics, among which the development of stock market and the effectiveness of legal protection on investor rights are important ones. Specifically, it is found in this paper that *ceteris paribus*, firms are less (more) likely to have high ownership concentration in countries that have more (less) advanced stock markets or provide more (less) effective investor protection. These results are consistent with La Porta et al. (1999)'s idea that ownership concentration is a substitute for legal institutions as a mechanism to protect investor rights.

The current study differs from past work in a number of ways. Unlike the studies that try to explain managerial ownership (such as, Himmelberg et al. (1999), (2001)), in

this paper, I argue that it is critical to make a distinction between ownership concentration and managerial ownership. Ownership concentration measures how a firm's ownership is concentrated on its big shareholders, while managerial ownership is only an indictor of the interests of a potential subset of the controllers (the firm's officers and directors). Since big shareholders either participate in the management directly or provide significant monitoring to the management, ownership concentration is a better indictor of the firm controllers' interest in the firm than managerial ownership[23]. Therefore, for the purpose of revealing a firm's governance structure, ownership concentration is more relevant than managerial ownership[24]. From this perspective, this paper follows the vein of Demsetz and Lehn (1985) and attempts to explain corporate ownership concentration rather than managerial ownership.

On the basis of Demsetz and Lehn (1985)'s results, this paper expands the conventional wisdom about the determinants of corporate ownership concentration within one country to the multi-country context with country characteristics being accounted for. Some of the findings in this paper are consistent with Demsetz and Lehn (1985)'s results. For example, Demsetz and Lehn (1985) find that ownership concentration is relatively low in firms with large size using a sample of 511 big U.S. corporations. Similar relation is also detected using the newly collected international dataset. Some of the findings in this paper are in contrast to Demsetz and Lehn (1985)'s results. For instance, the

[23] For more discussion about the role of large shareholders in corporate governance, refer to Shleifer and Vishny (1986), Agrawal and Mandelker (1990), and Demsetz (1983).

[24] The empirical results in this paper provide evidence in support of this argument. For example, ownership concentration is found to be negatively correlated with managerial ownership in the sample of 1070 public companies from 45 countries.

accounting rate of return is found to be positively related to ownership concentration, and the instability of the profit rate has a negative relation with ownership concentration, while Demsetz and Lehn (1985) report the opposite. In addition, I take advantage of the newly available data sources since Demsetz and Lehn (1985) and study a number of firm-level and country-level determinants that are not examined in Demsetz and Lehn (1985)'s regression analysis. For example, this paper documents a significant positive relation between the ratio of preferred stocks in total capital and ownership concentration. It also investigates the relation between corporate ownership concentration and certain country characteristics such as the development of its stock market and how effectively investors' rights are being protected in a country.

The rest of the paper is organized as follows. Part 4.2 develops hypotheses about the determinants of corporate ownership concentration in light of Qu (2004b)'s theoretical findings. Part 4.3 describes the variables included in the regression analysis and the sources of data. Part 4.4 reports the main estimation results. Part 4.5 checks the robustness of the main results, and part 4.6 concludes.

4.2. Determinants of Corporate Ownership Concentration

A recent working paper by Qu (2004b) argues that corporate ownership concentration is endogenized in ways that are consistent with both value maximization (Demsetz and Lehn (1985)) and predictions of the agency theory (Himmelberg et al.

(1999)). Ownership concentration on the firm's controllers has two basic effects. One effect is that the controllers' interests are now aligned to the firm value and this makes the controllers' interests consistent with other investors'. This effect is named the **alignment effect** by Qu (2004b). While alignment effect helps to protect investors from agency problem, the other effect, called **risk-aversion effect,** works on the opposite direction. To maintain a controlling stake of the firm's equity, the controllers' wealth is not as diversified as other investors' and the controllers have to bear higher risk related to the firm. This makes the firm controllers more risk-averse than other investors. Due to this risk-averseness, the controllers may engage in tunneling[25] just trying to obtain a risk premium. From this perspective, ownership concentration on the firm's controllers provides an incentive for them to tunnel from the minority shareholders and makes the controllers' interests distant from other investors'. Both effects increase with ownership concentration. Since the risk-aversion effect grows faster than the alignment effect as ownership concentration rises, there is an optimal ownership concentration that equates the marginal alignment effect and the marginal risk-aversion effect, and consequently, maximizes the expected firm value by minimizing tunneling.

The existence of the financial assets market ensures that the optimal ownership concentration is the equilibrium outcome as the result of the interactions between the firm controllers and the large group of small shareholders in the market. Whenever a firm's ownership concentration deviates from its optimal level so that the firm's expected value is not maximized, there is a chance for other investors to buy out the firm and make a

[25] Tunneling is defined as the transfer of assets and profits out of the firm for the benefit of the firm's controllers. For more discussion about tunneling behavior, refer to Johnson et al. (2000) and Qu (2004b).

profit through the increased financial assets value of the firm. In other words, assuming that the financial market is efficient and such chances to make money through financial transactions are exhausted, corporate ownership concentration in equilibrium is at its optimal level. Therefore, the endogeneity of ownership concentration is consistent with value maximization, as well as the agency theory. Further detail about the model can be found in Qu (2004b).

The above discussion suggests a general rule to identify the determinants of corporate ownership concentration: any variable that affects the marginal alignment effect and/or the marginal risk-aversion effect will have an impact on corporate ownership concentration. In this paper, these variables are categorized into two groups: firm-specific variables and country-specific variables. Their expected relations to corporate ownership concentration will be discussed separately as follows.

4.2.1. Firm-level Determinants

Qu (2004b) proposes the following variables on the firm level that will possibly affect a firm's ownership concentration: firm size, rate of return, instability of the rate of return, and the controller's risk attitude. While it is difficult to measure a person's risk attitude empirically, the other three variables are measurable.

Size of the firm. Big size makes it difficult for the controller to maintain a controlling stake of the firm and thus his/her wealth has to be considerably entrenched in the firm. Therefore, as firm size increases, the marginal risk-aversion effect increases in

relative to the marginal alignment effect (in Figure 2, *MRE* curve shifts upward). This lowers the equilibrium ownership concentration. In other words, there exists a negative relation between firm size and ownership concentration.

Firm's rate of return. Higher profit rate makes it more effective to align the controller's interest to the firm by ownership stake. The marginal alignment effect increases (*MAE* curve shifts upward in Figure 2), which results in a higher ownership concentration. Therefore, a positive relation between these two variables is expected. Previous studies on this relation yield mixed results (see, Demsetz and Lehn (1985), Himmelberg et al. (1999), among others).

Instability of the firm's rate of return. As the instability of a firm's rate of return increases, the marginal risk-aversion effect becomes stronger in relative to the marginal alignment effect (*MRE* curve shifts upward in relative to *MAE* curve in Figure 2). As a result, the equilibrium ownership concentration decreases. I will test whether the expected negative relation does exist in this empirical study. Past work again generates mixed results (for example, Demsetz and Lehn (1985) document a positive relation, but Himmelberg et al. (1999) report a negative relation).

In addition, there are some other firm-specific variables that seem to be important enough to merit investigation in light of Qu (2004b)'s model:

Firm-level investor protection. Investor protection should be interpreted as a parameter that varies not only across countries, but also across firms, as proposed by Himmelberg et al. (2001). For example, in firms under better auditing, controllers are better monitored, and the need to align the controllers' interest becomes less important

(*MAE* curve shifts downward in relative to *MRE* curve in Figure 2). This suggests a negative relation between the quality of the firm's auditing and ownership concentration. However, such argument is only valid under the assumption that the firm's auditing practice is an exogenous variable. The alternative assumption would be that the auditing practice in a firm, like the corporate ownership concentration, is a choice variable as investors try to maximize the firm value. Under this alternative assumption, a positive relation between these two variables is likely to exist. I will assess these two different hypotheses in this study.

Industry fixed effects. In regulated industries such as utility and financial industry, the existence of special regulatory rules could provide extra protection on investor rights compared to other industries. For firms in these industries, the need to align the controllers' interests becomes relatively unimportant (*MAE* curve shifts downward in relative to *MRE* curve in Figure 2). Therefore, corporate ownership concentration is relatively low in industries with special regulatory rules. Past work suggests several such industries. For example, Demsetz and Lehn (1985) find that in regulated utility and financial industries of the U.S., ownership concentration tends to be low. In this paper, a cross-country sample is used to test the existence of industry fixed effects on ownership concentration.

Different forms of stock ownership. Although not very common in the U.S., preferred stocks are issued to investors as an alternative to common stocks in some firms. The issuance of preferred stocks usually allows big holders of a firm's common stocks to maintain their control over the firm. If preferred stock is a significant source of a firm's

capital, ownership concentration within the group of common stockholders is likely to be high.

Cost of debt financing. It has been proposed in the literature that if debt financing is less costly for a firm, the firm may rely less on equity financing and more on debt financing. As a result, the firm's ownership may be less diversified and the controller may hold a higher stake of the firm's equity. This hypothesis of negative relation between these two variables will be tested in this paper.

4.2.2. Country-level Determinants

Certain country-specific variables that characterize the environment outside a firm have great impacts on the governance arrangements within the firm, as reflected by its ownership concentration. Understandably, one can give a long list of such variables. In light of Qu (2004b)'s model, I focus on two aspects of a firm's environment in this study: the legal environment, and the development of stock market.

Legal environment. It has been argued since La Porta et al. (1997) that legal protection on investor rights varies significantly across countries. For example, English common law countries are generally believed to provide more effective investor protection than French civil law countries. If the legal institutions in a firm's environment protect investor rights well, the need to align the controllers' interests through ownership arrangement becomes relatively unimportant (the *MAE* curve shifts downward in relative to *MRE* curve in Figure 2). This implies a negative relation between ownership

concentration and the effectiveness of legal protection on investor rights in a country. Another way to derive this hypothesis is that since legal protection on investor rights and ownership concentration are two alternative ways to protect investors from agency problem, the relation between these two variables is negative. This study will test whether legal protection on investor rights is an empirically significant explanatory variable of ownership concentration in firms around the world, and whether this relation is negative as expected.

Development of the stock market. The disciplinary role played by the financial market in the area of corporate governance has long been recognized in the literature. A well-developed stock market is important for the corporate ownership concentration to be optimized. It keeps investors well informed and increases ownership diversification. Therefore, firms in a country with well developed stock market are likely to have low ownership concentration, i.e., a negative relation between these two variables is expected.

Equation (25) gives the primary reduced-form estimation model used in this study. Quadratic forms of variables are included to take care of possible nonlinearities. In addition to this primary model, various alternative model specifications and variable measurements are tested in the IV estimation and robustness checks.

$$\begin{aligned} C5_{ij} = {} & \beta_0 + \beta_1 Duti_{ij} + \beta_2 Dbank_{ij} + \beta_3 SIZE_{ij} + \beta_4 SQU\_SIZE_{ij} + \beta_5 RETURN_{ij} \\ & + \beta_6 STDEV_{ij} + \beta_7 AUDIT_{ij} + \beta_8 PRE/CAP_{ij} \\ & + \beta_9 LAW\_BOOK_i + \beta_{10} LEGALITY_i + \beta_{11} ADE\_STOCK_i + \varepsilon_{ij} \end{aligned} \tag{25}$$

β **s:** coefficients to be estimated;

C5: measure of corporate ownership concentration;

Duti: dummy variable for utility industry;

Dbank: dummy variable for banking sector;

SIZE: firm size;

RETURN: the firm's expected rate of return;

STDEV: instability of the firm's rate of return;

AUDIT**:** firm's auditing practice;

PRE/CAP**:** ratio of preferred stocks in the firm's total capital;

LAW_BOOK: quality of laws on book to protect investor rights;

LEGALITY**:** effectiveness of law enforcement;

ADE_STOCK**:** adequacy of stock market;

SQU_~: quadratic form of variables;

Subscript i : country index, from 1 to 45;

Subscript j : firm index, from 1 to up to 30;

ε **:** i.i.d. error term, taking care of all other unexplained variables.

4.3. Data and Measurements

This empirical study is based on a newly constructed dataset that includes 1070 publicly traded stock companies from 45 countries (regions) in a 10-year period (1992~2002). Almost every major economy in the world (excluding mainland China[26], Russia and other transitional economies[27]) is sampled in the data set. Table 11 gives the sample distribution across countries.

[26] Mainland China is excluded from the data set due to its special economic and legal institutions.
[27] Russia and other transitional economies, such as former socialist Eastern-European countries, are excluded from the data set due to the massive change in these countries' legal institutions during the past decade.

Table 11: Sample Distribution and Country Specific Variables

Country/Region Name	Number of Firms in the Sample	Adequacy of Financing Through Stock Market	Quality of Laws on Book	Legality
ARGENTINA	7	2.78	4	12.34
AUSTRALIA	27	7.96	4	20.44
AUSTRIA	30	5.27	2	20.76
BELGIUM	30	6.55	0	20.82
BRAZIL	30	4.34	3	14.09
CANADA	30	7.31	5	21.13
CHILE	30	5.63	5	14.7
COLOMBIA	4	2.73	3	11.58
DENMARK	30	6.32	2	21.55
EGYPT	2	N/A	2	11.34
FINLAND	30	8	3	21.49
FRANCE	30	7.42	3	19.67
GERMANY	30	8.47	1	20.44
GREECE	30	7.96	2	14.91
HONG KONG	30	8.58	5	19.11
INDIA	30	6.05	5	12.8
INDONESIA	30	5.51	2	9.16
IRELAND	30	6.17	4	18.92
ISRAEL	15	6.35	3	16.54
ITALY	30	5.39	1	17.23
JAPAN	30	5.9	4	20.36
JORDAN	3	N/A	1	12.54
MALAYSIA	30	6.35	4	16.67
MEXICO	14	5.15	1	12.82
NETHERLANDS	30	8.63	2	21.67
NEW ZEALAND	29	6.98	4	21.55
NORWAY	30	7.13	4	21.78
PAKISTAN	10	N/A	5	8.98
PERU	8	N/A	3	10.1
PHILIPPINES	30	4.56	3	8.51
PORTUGAL	25	5.89	3	17.2
SINGAPORE	30	7.93	4	19.53
SOUTH AFRICA	30	6.8	5	14.51
SOUTH KOREA	29	6.63	2	14.23
SPAIN	30	6.46	4	17.13
SRI LANKA	13	N/A	3	10.4
SWEDEN	30	8.39	3	21.56
SWITZERLAND	30	7.76	2	21.91
TAIWAN	9	7.07	3	17.62
THAILAND	30	4.86	2	12.94
TURKEY	30	5.4	2	11.84
UK	30	6.94	5	20.41
US	30	8.74	5	20.85
VENEZUELA	2	3.33	1	13.33
ZIMBABWE	3	N/A	3	11.59

As a rule, the firm-level financial information is taken from the Disclosure *Worldscope* database. This database is updated monthly and it provides detailed firm-level financial information about publicly traded stock companies around the world. The most recently available annual data in a 10-year period (1992~2002) are used to construct my dataset. Only firms that are currently active and firms that have been in business for the past ten years are included in the dataset[28]. In addition, the following types of firms are excluded from the data set:

- Firms that have been acquired by other firms in the past ten years;
- Firms that have been involved in major mergers in the past ten years;
- Firms that are state owned or have the state as one of the major shareholders;
- Firms that have less than six yearly financial reports for the past ten years in *Worldscope*;
- Firms that do not report shareholder information.

In each country, up to thirty firms of different sizes are sampled. Due to data availability, some developing countries have less than thirty firms in the sample (Table 11). Since firm size varies significantly across countries, the following rule of sampling is applied: for countries with plenty of companies available in *Worldscope*, ten large companies (in order of their current common equity value), ten medium-sized companies (with common equity at around US$ 500 million) and ten small companies (in order of

[28] This is a general rule. In some cases, data are missing from a firm's financial reports. Also, for some developing countries that have relatively small number of companies in the database, this rule is relaxed to six years in order to accommodate more companies from those countries.

their current common equity value) are randomly sampled; for countries with relatively limited number of firms in *Worldscope*, I generally go through each of their firms included in *Worldscope*. During the sampling process, only about 10% of firms whose financial reports I went through provide sufficient information for the purpose of this research. Therefore, while the size of my data set accounts for about 5% of the firms from the 45 countries in *Worldscope*, the sampling process covers up to 10,700 firms, roughly 50% of all the firms from those countries in the database.

All the firms in the data set are publicly traded stockholding companies. These companies are classified as industrial, bank, utility, transportation and other financial companies respectively, and their primary businesses spread in 387 different four-digit SIC industries. Table 12 presents the industry distribution of firms in the sample.

Table 12: Industry Distribution of Firms in the Sample

Industry Classification	Number of Firms in the Sample
Industrial	743
Bank	93
Utility	73
Transportation	44
Other Financial	117
Total Number of Firms	1070
Unique 4-digit SIC Industries	387

Table 13: Variable Description and Source

Variable Name	Variable Description
*C*5	Variable to measure ownership concentration in a firm. It is equal to the percentage of a firm's outstanding common stocks owned by the top five shareholders. Most countries have a 5% disclosure rule. So only shareholders who hold at least 5% of the firm's common stocks are included when calculating C5. For firms with less than 5 such big shareholders, only shares of those who do are counted. Source: *WorldScope* Database.
Dbank	Bank dummy, equal to 1 if the firm is a bank. Source: *WorldScope* Database.
Duti	Utility dummy, equal to 1 if the firm is a utility company. Source: *WorldScope* Database.
Dtran	Transportation dummy, equal to 1 if the firm is a transportation firm. Source: *WorldScope* Database.
Dother	Dummy of other financial firms, equal to 1 if the firm is classified as in other financial industries. Source: *WorldScope* Database.
AUDIT	Variable to measure a firm's auditing practice. It equals 2 if the firm's auditor is one of the "big six" auditing companies and if the firm's auditing report is qualified; 1 if one of the two conditions is met; 0 otherwise. Source: *WorldScope* Database.
SIZE	Firm size, measured by its common equity value (in thousand US$). 10-year (1992~2002) average of the firm's common equity (SIZEa) is the primary measurement of this variable. An alternative measurement, SIZEc - current common equity value - is used in robustness checks. Source: *WorldScope* Database.
LOG-SIZE	The natural log of firm size.
RETURN	Accounting rate of return on equity. In the primary regression model, 10-year average of the firm's return on equity (RETURNe) is used. For the purpose of robustness check, the data set also contains information about the firm's average return on assets (RETURNa) in the past 10 years. Source: *WorldScope* Database.
STDEV	Instability of the firm's accounting profit rate, measured by the standard deviation of its annual accounting rates of return. In the primary regression model, standard deviation of return on equity (STDEVe) in the past 10 years is used. Information about the standard deviation of return on assets (STDEVa) is available and used for robustness check. Source: *WorldScope* Database.
PRE/CAP	Ratio of preferred stocks in the firm's total capital. Source: *WorldScope* Database.
INT	Five year average of the firm's effective interest rate. Source: *WorldScope* Database.
ADE_STOCK	Measure of the adequacy of financing to companies through stock market in a country, calculated as the stock market capitalization divided by gross private domestic investment (as of 2000). Source: World Bank Data & Statistics.
LEGALITY	Measure of the effectiveness of law enforcement in a country. It is the composite of five individual variables that measure different aspects of law enforcement in a country: efficiency of judiciary system (L1), rule of law (L2), corruption (L3), risk of expropriation (L4), and risk of contract repudiation (L5). Principle component analysis suggests the following formula to calculate this index: LEGALITY= .381*(Efficiency of judicial system)+ .5778*(Rule of law)+ .5031*(Corruption)+ .3468*(Risk of expropriation)+ .3842*(Risk of contract repudiation). Higher value of legality index indicates better quality of law enforcement in a country. Sources: La Porta et al. (1997), Berkowitz et al. (2003).
LEG_BOOK	Measure of the availability of laws on book to protect shareholder rights. The range for the index is from zero to six. High value of this variable indicates that a country's legal system favors shareholders against firm controllers in the corporate decision-making process. Source: La Porta et al. (1997).

Measurements of variables are constructed in ways that are consistent with Qu (2004b)'s model and with common practice in the literature. Table 13 describes the variables used in this study. The dependent variable, *corporate ownership concentration*, is measured following Demsetz and Lehn (1985). $C5$ - percentage of shares controlled by top five shareholders – is used as the primary measurement. Demsetz and Lehn (1985) also use $C20$ and the Herfindahl index as alternative measures of ownership concentration. Since *Worldscope* only reports information about major shareholders of a firm and a 5% disclosure rule is usually applied in most of the countries, measurements of $C20$ and Herfindahl index can't be obtained. But since the correlations between these alternative measurements are likely to be high (Demsetz and Lehn (1985)), econometric findings using these alternative measures are possibly similar. Demsetz and Lehn (1985) apply a logistic transformation to $C5$ – LN(C5/(1-C5)) – in their regression analysis. I implement similar transformation when testing the robustness of my results. For the purpose of comparing my results to past work on managerial ownership, I also construct a measure of managerial ownership, MGMTOWN, which takes the value of the percentage of shares owned by the firm's directors and top officers.

I use two basic approaches to get the measurements of *legal protection on investor rights* in a country: LAW_BOOK and LEGALITY. The first variable measures the quality of laws on book designed to protect investor rights, and the second measures the effectiveness of law enforcement in a country. Data about these two variables in different countries are taken directly from the literature. La Porta et al. (1997) examine legal rules covering protection of corporate shareholders and creditors, the origin of these

rules, and the quality of their enforcement in 49 countries. They assemble a data set covering legal rules pertaining to the rights of investors, and to the quality of enforcement of these rules, in 49 countries that have publicly traded companies. They also create shareholder and creditor rights indices for each country. Using these data, they find evidence of systematic variation in laws, regulations and their enforcement quality across countries. The current study uses La Porta et al. (1998) as the basic source for data about LAW_BOOK. This variable ranges from 0 to 6 with higher value indicating that a country's legal system favors shareholders against firm controllers in the corporate decision-making process.

La Porta et al. (1997) also propose five different variables to measure the quality of law enforcement (LEGALITY) in a country: efficiency of judiciary system, rule of law, corruption, risk of expropriation, and risk of contract repudiation. The correlations between these variables are high. To deal with this problem, I follow Berkowitz et al. (2003) and use the principal component technique to construct a composite legality proxy (LEGALITY). It ranges from 8.51 to 21.91 with higher value indicating more effective law enforcement. Natural log value of this variable is used in the regression analysis. For the purpose of robustness checks, regression results that use the five separate legality proxies (L1, L2, L3, L4, and L5 respectively) are also reported.

I have two measures of *firm size.* The primary measurement (SIZEa) is calculated as the ten-year average of the firm's common equity (in thousand US$). The natural log value of this variable is used in regressions. For the purpose of robustness checks, the

current (usually as of December 31, 2002) common equity value of the firm (SIZEc) is used as an alternative measurement of firm size.

The primary measurement of *the firm's rate of return,* RETURNe, is given by the ten-year average of the firm's annual accounting rate of return on equity. I also construct an alternative measurement of this variable, RETURNa, by calculating the ten-year average of the firm's return on assets for the purpose of robustness checks. Accordingly, I have two measures of *the instability of the firm's return*: STDEVe and STDEVa, which are the standard deviations of the firm's accounting rate of return on equity and return on assets in the past ten years respectively.

The firm-level investor protection, AUDIT, is measured by a discrete variable that describes the auditing practice in a firm. This variable is the sum of two dummy variables: the auditor dummy which equals one if the firm's auditor is one of the "big six" auditing companies and zero otherwise; the auditor's report dummy which equals one if the auditor's report is qualified and zero otherwise. Therefore, this variable takes one of the three values: 0, 1, and 2, with higher value indicating better auditing practice thus more effective firm-level investor protection.

Measurement of *the cost of debt financing,* INT, is given by the five-year average of the firm's effective interest rate (annual).

Measure of *the adequacy of the stock market in a country,* ADE_STOCK, is calculated as the country's stock market capitalization divided by its gross private domestic investment (as of 2000). High value of this variable indicates that the stock market in this country provides adequate financing for firms. This measure is only

available in 39 countries, thus regressions involving this variable have less observations than others.

4.4. Main Findings

4.4.1. Simple Treatment of Data

Table 14 gives the summary statistics of variables involved in the regression analysis.

Table 14: Summary Statistics of Variables (Primary Measurement)

Note: * indicates that information about the corresponding variable is available in 39 countries; ** indicates that information about the corresponding variable is available in all 45 countries; E+nn or E-nn means multiply by 10 to + or -nn power.

Variable Name	Mean	Median	Standard Deviation	Maximum	Minimum	Number of Observations
C5	0.49	0.50	0.26	1	0	1070
SIZEa (1000 US$)	1.33E+06	2.82E+05	3.76E+06	6.24E+7	285.9	1063
LOG-SIZEa	19.12	19.46	2.17	24.86	12.56	1063
RETURNe	0.09	0.11	0.27	1.50	-1.78	1064
STDEVe	0.28	0.12	0.62	12.88	0	1070
PRE/CAP	0.01	0	0.05	0.96	0	1044
INT	0.11	0.07	0.11	0.92	0	884
AUDIT	0.78	1	0.46	2	0	1070
Country-specific Variables						
ADE_STOCK	6.40	6.46	1.55	8.74	2.73	39*
L1 (Efficiency of Judiciary System)	7.78	8.00	2.10	10.00	2.50	45**
L2 (Rule of Law)	6.90	7.80	2.84	10.00	0.00	45**
L3 (Corruption)	7.11	7.38	2.26	10.00	2.15	45**
L4 (Risk of Expropriation)	8.22	8.31	1.53	9.98	5.22	45**
L5 (Risk of Contract Repudiation)	7.75	8.57	1.73	9.98	4.68	45**
LEGALITY	16.42	17.13	4.29	21.91	8.51	45**
LEG_BOOK	3.04	3	1.35	5	0	45**

Inspection of ownership data reveals that, corporate ownership concentration ($C5$) varies widely across firms and countries, ranging from 0 to 100%. The mean value of $C5$ is around 50% in the sample. This implies that ownership is fairly concentrated in the majority of firms instead of being dispersed. This picture of corporate ownership structure around the world resembles that of La Porta et al. (1999) and differs from Berle and Means (1932)'s description of dispersed ownership.

Simple treatment of data reveals that corporate ownership concentration varies systematically with respect to investor protection and development of stock market across countries as expected. In countries with weak legal system, corporate ownership concentration is relatively high. This can be seen from Figure 8. The horizontal axis in Figure 8 measures the legality in a country, and on the vertical axis is the percentage of firms with $C5$ value greater or equal to 50% in that country. The slope is clearly negative with R-square value equal to 0.28. Table 15 tells the same story as Figure 8 does. In Table 15, a country has "high legality" if its LEGALITY value is greater than the sample average (16.42) of all the countries; "low legality" if otherwise. Similarly, a country is categorized in "high ownership concentration" if the percentage of firms with high ownership concentration ($C5$ greater or equal to 50%) in that country is greater than the sample mean of all the countries; "low ownership concentration" if otherwise. Most of the countries (31 out of 45) fall in the "high-low" category or "low-high" category. In other words, firms are more likely to have high ownership concentration in countries with less effective investor protection, and vice versa.

Figure 8: Legal Protection and Ownership Concentration

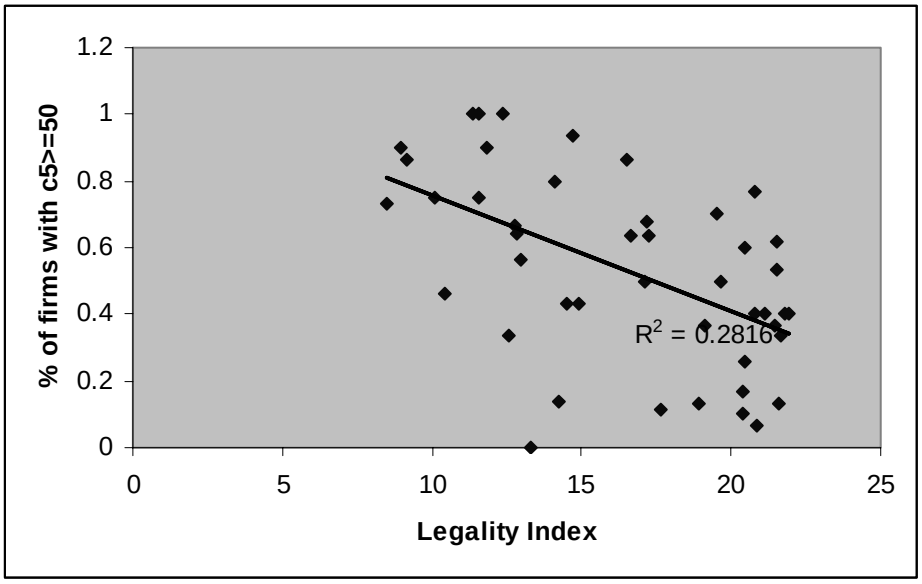

Table 15: Legal Protection and Ownership Concentration

	High Ownership Concentration	Low Ownership Concentration
High Legality	7	15
Low Legality	16	7

Figure 9 and Table 16 reveal the similar pattern regarding the relation between ownership concentration and the adequacy of stock market in a country. A negative relation between these two variables is clearly present.

Figure 9: Adequacy of Stock Market and Ownership Concentration

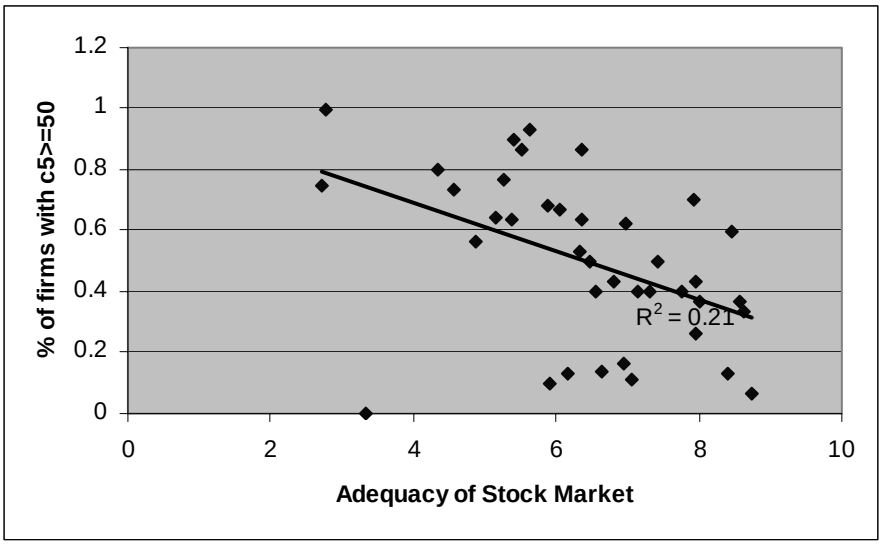

Table 16: Adequacy of Stock Market and Ownership Concentration

	High Ownership Concentration	Low Ownership Concentration
Highly Developed Stock Market	3	16
Poorly Developed Stock Market	20	6

While inspection of data confirms the expected relations between ownership concentration and the two country-level variables, it must be noted that without controlling for the firm-level variables that have an impact on ownership concentration, the patterns revealed by such simple treatment of data can be illusionary. To derive more reliable conclusions, multivariable regression analysis is needed[29].

[29] One caveat of La Porta et al. (1999)'s study is that they do not make efforts to control for firm-specific variables that may also affect a firm's ownership structure.

4.4.2. Multivariable OLS Regression Analysis

The trends suggested by the simple treatment of data are confirmed by multivariable OLS regression analysis. Table 17 reports the OLS estimation results using different model specifications. All regressions correct for possible correlation of the errors at the country level. The dependent variable is ownership concentration ($C5$). In the raw data, a few observations have exceptionally high (>=100%) or low (<=-100%) returns on equity. These "outliers" are removed from the data used in regressions. The main estimation results are not sensitive to this cutoff.

The relation between ownership concentration and proxies of investor protection is negative as expected (regression (1) through (6) in Table 17) after controlling for other variables that possibly affect ownership concentration. The coefficient estimate on legality is negative and highly significant (1% significance level). The coefficient estimate of law on books is also negative and significant. These results suggest that both the quality of laws on book and the effectiveness of their enforcement are important determinants of firms' ownership concentration in a country. Specifically, *ceteris paribus*, 1% improvement in legality of a country will lead to 0.13~0.17% reduction in corporate ownership concentration in that country.

Table 17: OLS Regression Analysis

Note: dependent variable is C5; standard errors (in parentheses) adjust for heteroscedasticity; SIZE, ADE_STOCK, LEGALITY are natural log values; E+nn or E-nn means multiply by 10 to + or -nn power; *** indicates a significance level of 1%; ** indicates a significance level of 5%; * indicates a significance level of 10%.

Variables	Regressions					
	(1)	(2)	(3)	(4)	(5)	(6)
CONSTANT	-0.88	1.86***	-0.83	-0.53	-0.79	-1.12*
	(0.59)	(0.11)	(0.59)	(0.60)	(0.59)	(0.61)
INDUSTRY DUMMIES	INCLUDED	INCLUDED	INCLUDED	INCLUDED	INCLUDED	INCLUDED
SIZE	0.26***	-0.02***	0.25***	0.23***	0.25***	0.29***
	(0.06)	(0.39E-02)	(0.06)	(0.06)	(0.06)	(0.06)
SQU_SIZE	-0.73E-02***		-0.73E-02***	-0.67E-02***	-0.72E-02***	-0.82E-02***
	(0.15E-02)		(0.15E-02)	(0.15E-02)	(0.15E-02)	(0.15E-02)
RETURN	0.03	0.06	0.06	0.05	0.05	0.05
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
SQU_RETURN			-0.11			
			(0.09)			
STDEV	-0.01	-0.03	-0.05	-0.02	-0.02	-0.01
	(0.03)	(0.03)	(0.07)	(0.03)	(0.03)	(0.03)
SQU_STDEV			0.05			
			(0.05)			
AUDIT				0.05***		
				(0.02)		
PRE/CAP					0.34***	0.14
					(0.12)	(0.19)
INTEREST						-0.02*
						(0.01)
ADE_STOCK	-0.21***	-0.24***	-0.20***	-0.20***	-0.21***	-0.24***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)
LAW_BOOK	-0.01**	-0.01**	-0.01**	-0.02***	-0.02***	-0.11*
	(0.58E-02)	(0.58E-02)	(0.57E-02)	(0.58E-02)	(0.59E-02)	(0.64E-02)
LEGALITY	-0.14***	-0.15***	-0.15***	-0.17***	-0.14***	-0.13***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
R-square	0.19	0.17	0.19	0.21	0.20	0.21
F test	21.22	20.14	18.20	20.75	20.34	16.28
Observations	999	999	999	976	976	823

The development of a country's stock market is another country-specific variable that is empirically significant in explaining corporate ownership concentration in that country. In countries with more advanced stock market, corporate ownership concentration is significantly lower than in other countries. Specifically, if the adequacy of stock market improves by 1%, corporate ownership concentration will decrease by 0.13~0.17% in general, *ceteris paribus*.

Firm size has a negative overall effect on ownership concentration (regression (2) in Table 17). Since natural-log value is used in regressions, the coefficient estimation on this variable can be explained as 1% increase in a firm's common equity leading to about 0.02 percentage point decrease in ownership concentration. Furthermore, significant nonlinearity is detected when including quadratic form of this variable in the regressions (regression (1), (3), (4), (5) and (6)). The turning point is around 17.36. Compare this to the sample mean (19.12) of LOGSIZE and it appears that the negative relation between firm size and ownership concentration is more likely to exist for medium to large firms than for small firms.

Similar to Demsetz and Lehn (1985), strong industry fixed effect is detected in the banking sector. The coefficient on the bank dummy is negative across all model specifications. This suggests that compared to other types of firms, banks have relatively low ownership concentration around the world. This is consistent with the fact that the banking sector is generally under special regulation for most of the countries in the sample. I also include in the regressions other industry dummies that indicate whether a firm is in the utility, other financial, or transportation industries. Coefficient estimates on these variables are generally insignificant.

Coefficient estimates on the accounting profit rate and its instability take expected signs (regressions (1) through (6) in Table 17). The accounting profit rate is found to be positively related to ownership concentration, while the instability of profit rate is negatively related to ownership concentration. Both results are consistent with Qu (2004b)'s model and are in contrast to Demsetz and Lehn (1985)'s results. However, it

must be noted that coefficient estimates on both variables are statistically not different from zero.

Other firm-specific variables that are empirically significant include the firm's auditing practice, and whether preferred stocks account for a significant portion of the firm's total capital. In firms under better auditing (for instance, the firm chooses one of the "big six" auditing firms as its auditor and/or the firm's auditing report is qualified), ownership concentration is found to be significantly higher than other firms. This evidence supports the hypothesis that both the firm's auditing practice and its ownership concentration are choice variables as investors make decisions about how to best protect themselves from potential agency problem. OLS regressions also suggest that when a firm is engaged in extensive issuance of preferred stocks to investors, the ownership concentration in terms of common stocks tends to be high. The coefficient estimate on the effective interest rate is negative as expected, which suggests that when a firm has access to credits at low cost, its ownership tends to be less dispersed. But this result should be treated with caution given the fact that the coefficient estimate on this variable is empirically insignificant.

In general, multivariate OLS regression analysis confirms Qu (2004b)'s model predictions. The coefficient estimates all take the expected signs and the overall estimation model is highly significant. Some of Demsetz and Lehn (1985)'s results are robust with the inclusion of country-level determinants in a cross-country setting, while some of their results are in contrast to the findings documented here. In addition, my results support strongly the idea that, after controlling for firm-specific variables,

corporate ownership concentration varies systematically with the development of stock market and the effectiveness of legal protection on investor rights in a country.

4.4.3. IV Estimation

Until now legal protection on investor rights has been treated as being exogenous in the OLS regressions. However, the potential endogeneity problem with the effectiveness of investor protection in a country has been recognized by various studies. One recent working paper by Laeven and Woodruff (2003) proposes that larger firms may demand a better legal system. It may also be true that when corporate ownership spreads in a larger group of investors, there is greater demand for more protective legal institutions. Thus low ownership concentration and large number of owners may play a role in causing a strong legal system to come forward. In other words, the effectiveness of investor protection can be endogenous itself and the causality relation assumed by the OLS procedure can actually be the other way around. This endogeneity problem may cause OLS estimator to be biased and inconsistent.

To tackle this endogeneity issue, I construct instrumental variables and implement a standard 2SLS procedure to estimate variable coefficients. Since the possible endogeneity problem involves the variables measuring legal protection on investor rights in a country, and the relation between ownership concentration and investor protection is of primary interest in this paper, I focus on instrumenting for LEGALITY and LAW_BOOK, i.e. to find variables that are highly correlated to these two variables but

are independent with other variables. New development in the literature of law and finance suggests a number of candidates, two of which are more relevant than others for the purpose of this study. The first one is the origin of a country's legal system. It has been argued since La Porta et al. (1997) that investor protection is more effective in countries with English common law origin than countries with other legal origins, such as French civil law origin. Dummy variables about whether the legal institutions in a country have English common law origin or French civil law origin can be good instruments for the quality of laws on book as well as the effectiveness of law enforcement in a country. Along another line of inquiry, Berkowitz et al. (2003) study the so-called "transplant effect". They find that how a country's legal institutions were originally formed has a persistent effect on legality of that country. For countries whose legal institutions were unreceptively transplanted from other countries, legality is generally low. Based on this argument, I construct an "unreceptive-transplant" dummy variable as instrument for LEGALITY in the IV estimation.

Table 18 presents the results of IV estimation using the dummy variable for English common law origin and the dummy variable for "unreceptive-transplant" as instruments for LEGALITY and LAW_BOOK. All regressions correct for possible correlation of the errors at the country level. The dependent variable is ownership concentration ($C5$). 2SLS estimation results highly resemble the OLS estimation results. All the coefficient estimates retain their signs and significance level as in OLS regressions. The absolute value of coefficient estimate on legality is somewhat higher than that in OLS regressions. This seems to suggest that after the endogeneity problem

being accounted for, the real effect of legality on corporate ownership concentration is greater than that shown in the OLS regressions.

Table 18: 2SLS Estimation (Instrumental Variables)

Note: dependent variable is C5; standard errors (in parentheses) adjust for heteroscedasticity; SIZE, ADE_STOCK, LEGALITY are natural log values; instrumental variables for LEGALITY and LAW_BOOK are: dummy variable for unreceptive transplant and dummy variable for English common law countries; E+nn or E-nn means multiply by 10 to + or -nn power; *** indicates a significance level of 1%; ** indicates a significance level of 5%; * indicates a significance level of 10%.

Variables	Regressions		
	(1)	(2)	(3)
CONSTANT	-0.79	1.95***	-0.73
	(0.60)	(0.13)	(0.61)
INDUSTRY DUMMIES	INCLUDED	INCLUDED	INCLUDED
SIZE	0.25***	-0.02***	0.25***
	(0.06)	(0.40E-02)	(0.06)
SQU_SIZE	-0.73E-02***		-0.72E-02***
	(0.15E-02)		(0.15E-02)
RETURN	0.03	0.05	0.06
	(0.04)	(0.04)	(0.04)
SQU_RETURN			-0.12
			(0.09)
STDEV	-0.01	-0.03	-0.06
	(0.03)	(0.03)	(0.07)
SQU_STDEV			0.06
			(0.05)
ADE_STOCK	-0.19***	-0.21***	-0.18**
	(0.06)	(0.06)	(0.06)
LAW_BOOK	-0.01	-0.01	-0.01
	(0.84E-02)	(0.86E-02)	(0.84E-02)
LEGALITY	-0.16***	-0.20***	-0.18***
	(0.06)	(0.06)	(0.06)
R-square	0.19	0.17	0.19
F test	21.15	19.95	18.12
Observations	999	999	999

4.4.4. Ownership Concentration Vs. Managerial Ownership

The distinction between ownership concentration and managerial ownership hasn't been clear in the literature when studying firm ownership structure. Qu (2004b)

argues that it is critical to make a distinction between these two variables. For the purpose of revealing a firm's governance arrangements, ownership concentration – shares owned by big shareholders – is more relevant than managerial ownership. My empirical results support this argument. For the 373 firms in my sample that also report information about managerial ownership (MGMTOWN), I detect a negative correlation (*correl* = -0.127) between these two variables. When $C5$ is replaced with MGMTOWN as dependent variable in the regressions, most of the observed relations disappear and the coefficient estimates become empirically insignificant[30].

4.5. Robustness Checks

The main estimation results are robust across different model specifications and variable measurements. Table 19 reports the results for further robustness checks. Regression (1) in Table 19 gives the coefficient estimates when the firm size is measured by its current common equity value (SIZEc) instead of the 10-year average. In regression (2), 10-year average of return on assets (RETURNa) and its standard deviation (STDEVa) are used to measure the firm's accounting profit rate and its instability. Regressions (3) through (6) use separate legality proxies to replace the composite legality index.

[30] The estimation results using managerial ownership as dependent variable are available from the author upon request.

Table 19: Robustness Checks

Note: dependent variable is C5; standard errors (in parentheses) adjust for heteroscedasticity; SIZE, ADE_STOCK, LEGALITY, L1, L3, L4, L5 are natural log values; E+nn or E-nn means multiply by 10 to + or -nn power; *** indicates a significance level of 1%; ** indicates a significance level of 5%; * indicates a significance level of 10%.

Variables	Regressions					
	(1)	(2)	(3)	(4)	(5)	(6)
CONSTANT	-0.16	-0.83	-1.02*	-1.00*	-0.56	-0.52
	(0.40)	(0.57)	(0.60)	(0.60)	(0.60)	(0.59)
INDUSTRY DUMMIES	INCLUDED	INCLUDED	INCLUDED	INCLUDED	INCLUDED	INCLUDED
SIZEa		0.25***	0.25***	0.25***	0.24***	0.23***
		(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
SIZEc	0.18***					
	(0.04)					
SQU_SIZEa		-0.72E-02***	-0.73E-02***	-0.73E-02***	-0.70E-02***	-0.67E-02***
		(0.15E-02)	(0.15E-02)	(0.15E-02)	(0.15E-02)	(0.15E-02)
SQU_SIZEc	-0.55E-02***					
	(0.10E-02)					
RETURNe	0.06		0.05	0.06	0.04	0.01
	(0.04)		(0.04)	(0.04)	(0.04)	(0.04)
RETURNa		0.16**				
		(0.08)				
STDEVe	-0.02		-0.02	-0.02	-0.02	-0.02
	(0.03)		(0.03)	(0.03)	(0.03)	(0.03)
STDEVa		0.19E-02				
		(0.03)				
PRE/CAP	0.40***	0.34***	0.33***	0.34***	0.34***	0.35***
	(0.13)	(0.12)	(0.12)	(0.13)	(0.12)	(0.12)
ADE_STOCK	-0.21***	-0.21***	-0.25***	-0.24***	-0.20***	-0.16***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
LAW_BOOK	-0.02***	-0.02**	-0.01*	-0.01**	-0.02***	-0.02***
	(0.59E-02)	(0.59E-02)	(0.60E-02)	(0.59E-02)	(0.60E-02)	(0.60E-02)
LEGALITY	-0.14***	-0.13***				
	(0.04)	(0.04)				
L1			-0.08***			
			(0.03)			
L3				-0.08***		
				(0.02)		
L4					-0.27***	
					(0.06)	
L5						-0.30***
						(0.05)
R-square	0.21	0.20	0.20	0.20	0.21	0.22
F test	21.12	20.61	19.96	19.99	21.11	22.19
Observations	974	974	974	974	974	974

The OLS and IV estimation results reported in part 4.4 persist under these alternative model specifications and variable measurements. The coefficient estimates retain their signs and significance level. Among the five separate variables that measure the effectiveness of a country's law enforcement, efficiency of judicial system (L1),

corruption (L3), risk of expropriation (L4), and risk of contract repudiation (L5) are found to be negatively related to corporate ownership concentration and these relations are empirically significant. Not reported in Table 19 is a replication of Table 17's results in which logistic transformation of $C5$ is used as the dependent variable. The main results are not sensitive to this transformation[31].

4.6. Conclusions

Using a newly constructed data set of 1070 stock companies from 45 countries around the world, this paper substantially expands Demsetz and Lehn (1985)'s results and shows that the variation in corporation ownership concentration across firms and countries can be explained considerably by firm-specific economic variables that have an impact on the governance arrangement in the firm and certain country-specific variables. Among the firm-specific variables that are empirically significant are firm size, its quadratic form, whether or not a firm is in certain industries, the firm's auditing practice, and whether or not preferred stocks account for a significant portion of the firm's total capital. After controlling for these firm-specific variables, I find that ownership concentration varies systematically across countries depending on the development of a country's stock market, the quality of the country's legal institutions to protect investor rights and the effectiveness of law enforcement. These results are robust across different

[31] The estimation results using logistic transformation of $C5$ as dependent variable are available from the author upon request.

model specifications and variable measurements. The empirical findings in this paper provide positive evidence in support of Qu (2004b)'s model and are consistent with La Porta et al. (1999)'s idea that ownership arrangement is a substitute for legal institutions as a mechanism to protect investor rights.

APPENDIX A

Risk-neutral Controller and Risk-neutral Investors

Consider a situation where both the controller and investors (as a whole) are risk neutral. Solve the model starting with the controller's optimization problem at date 2. The controller's utility function increases with his/her income. Therefore, for a risk-neutral controller, his/her problem at date 2 is to maximize his/her expected payoff, $E(W)$, by choosing the level of tunneling. Other variables (such as α, R, E, p, and V) are exogenous to the controller.

The controller's problem at date 2:

$$\underset{T}{Max}\, E[W] = \underset{T}{Max}[\alpha (1+R)(E-T) + T - \frac{T^2}{2pV}] \qquad \text{(A.1)}$$

The first-order condition is given by:

$$\frac{\partial E[W]}{\partial T} = 1 - \frac{T}{pV} - \alpha (1+R) = 0$$

$$\Rightarrow \quad T = \varphi(p, V, R, \alpha) = pV(1 - \alpha (1+R)) \qquad \text{(A.2)}$$

One can easily see that T^* is a maximum solution to (A.1) by checking the second-order condition of (A.1). Maximum tunneling occurs when α is zero. (T.2) ensures that the controller can not tunnel more than the firm's equity.

Since negative tunneling is not allowed in this model, T takes the following functional form:

$$T = \begin{cases} pV(1-\alpha(1+R)) & \alpha \in [0,1/(1+R)] \\ 0 & \alpha \in (1/(1+R),1] \end{cases} \quad \text{(A.3)}$$

At date 1, α is chosen by investors in the market to maximize the firm's expected value, $E[\Pi]$. The optimization problem is given by[32]:

Investors' optimization problem at date 1:

$$\max_{\alpha} E[\Pi] = (1+R)(E-T) = (1+R)(E-\varphi(p,V,R,\alpha)) \quad \text{(A.4)}$$

Since R and E are exogenous, this optimization problem is equivalent to minimizing T by choosing α. Given that T is non-negative and given that the resource tunneled out of the firm is non-productive and it reduces the total amount of investment which generates a positive expected rate of return, the first-best solution will be that T^* is minimized to be zero. It is obvious from (A.3) that the first-best outcome is achieved by choosing α to be within [$1/(1+R)$, 1] at date 1. There is no tunneling in equilibrium and the firm's expected value is maximized.

Therefore, under the assumption that both investors and the controller are risk-neutral, the problem of tunneling is resolved completely by the controller owning a stake of the firm's equity that is high enough. In this case, tunneling decreases monotonically

[32] Both participation constraints for the controller and small shareholders are satisfied and non-binding in this case.

with respect to α when α is in the closed set $[0, 1/(1+R)]$. Intuitively, ownership concentration on the controller aligns the controller's interest to the firm. This reduces the controller's incentive to tunnel, because he/she will be tunneling partially from himself/herself. In this case, ownership concentration on the controller only has one effect on tunneling - the "alignment effect". This effect increases monotonically with α and the marginal alignment effect is constant in the closed set $[0, 1/(1+R)]$. In Figure 10, T decreases linearly with α, and α^* is chosen such that the marginal alignment effect is zero.

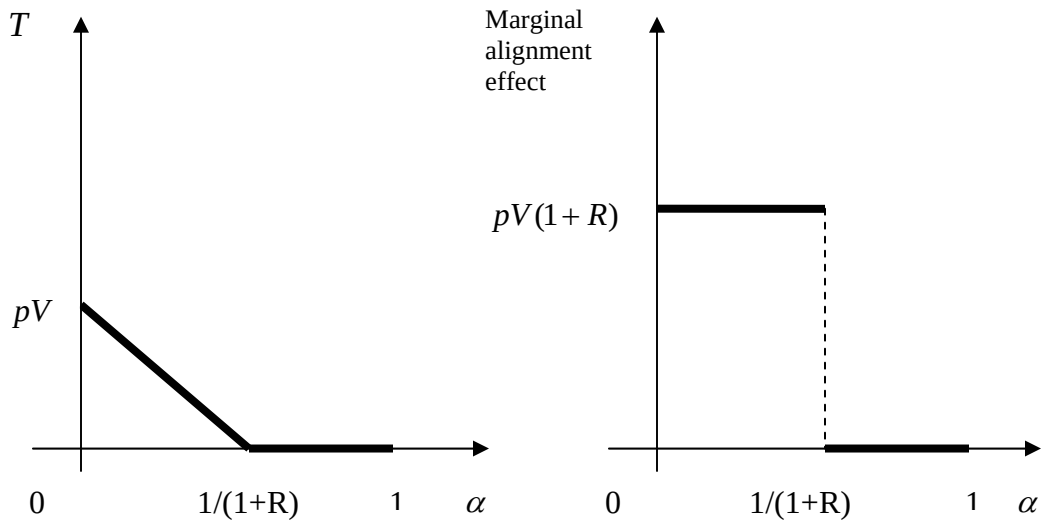

Figure 10: Alignment Effect of Ownership Concentration on Tunneling When the Controller Is Risk Neutral

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