Corporate governance, finance, and the real sector*

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Abstract

This paper presents a theory of the linkages between corporate governance, corporate finance and the real sector of an economy. We consider entrepreneurs whose ability to raise capital is limited by the presence of agency costs in both the equity and debt markets. We show that poor corporate governance and low investor protection generates less competitive economies, populated by firms with more concentrated ownership structures and greater leverage. The quality of the corporate governance system can also affect an economy's industry structure: better corporate governance promotes the development of sectors more exposed to moral hazard, such as the high-technology industry. Also, in countries with poor corporate governance entry in new markets is more likely to occur via already established firm, leading to a prevalence of conglomerates in such economies. We examine entrepreneurs' preferences for governance quality, and we argue that entrepreneurs prefer good governance when they operate either in markets of larger size, such as in more mature economies, or in young and growing industries, that is in sectors that require firms to access the equity markets repeatedly. Finally, we show that entrepreneurs may have a preference for "extreme" corporate governance systems, where the quality of corporate governance and the level of investor protection are either very high or very low. This suggests that entrepreneurs operating in economies endowed with a corporate governance system of low quality may have little or no incentive to seek (or to lobby for) an improvement of the governance system of their economy. Thus, countries would "segment" themselves in two groups: those with a high quality of corporate governance and those with low quality, with relatively little transition from one group to the other.

1. Introduction

What is the effect of the corporate governance system on the financial and industrial structure of an economy? Consider, for example, the case of Finland. During the past three decades the Finnish financial markets experienced a major shift from a bank-based financial system, similar to that in continental Europe and Japan, towards an Anglo-Saxon type financial system based primarily on securities markets. The stock market boomed, the banking sector consolidated and the ownership structure of companies changed dramatically as domestic institutions divested their shareholdings, especially to foreign investors.[1] In parallel, the industrial composition and financial structure of the economy also changed: earlier on, the Finnish economy was dominated by highly levered companies, mostly related to the forest industry, whereas today it is dominated by an equity financed high-tech sector. Hyytinen, Kuosa, and Takalo (2002) show that these shifts in corporate financing and the real economy followed a major change in the corporate governance regime of the country, and argue that the development of shareholder protection was a major driver in this reorganization.[2]

In this paper, we present a theory of the linkages between corporate governance, corporate finance and the real sector of an economy. By using a stylized model, we examine the relationships that emerge in equilibrium among the corporate governance system of an economy and its industrial and financial structure, and we generate empirical predictions that are consistent with observed stylized facts. By explicitly endogenizing industry equilibrium, we show that the quality of corporate governance and investor protection affects industry concentration. Thus, the causality between the quality of an economy's corporate governance and its degree of competition may indeed run in the opposite way to the one suggested in traditional theory (see, for example, Alchian, 1950, and Stigler, 1958): poor corporate governance and investor protection may in fact lead to high industry concentration. We show that poor corporate governance and low level of investor protection affects firms' financing choices, and lead to more levered firms, with a more concentrated ownership structure. Second, we show that the quality of the corporate governance system affects an economy's industry structure: better corporate governance promotes more capital intensive sectors and those more exposed to moral hazard, such as high-technology industries. Finally, we show that firms can have a preference for "extreme" corporate governance regimes, that is, for corporate governance systems that are either a very high or a very low quality, affecting their incentives to

[1] See, e.g., Hyytinen, Kuosa, and Takalo (2002) and Karhunen and Keloharhu (2001).

[2] An example of the shift in industrial composition is that in the year 2000 the Finnish firms filed domestically nearly twice as many patent applications as in 1980, at a per capita rate that was the second highest in the European Union. Today the country ranks as one of the most competitive and least corrupt countries in the world, according to the rankings from World Economic Forum, IMD and Transparency International.

lobby their politicians for good or bad governance. This suggests that countries would "segment" themselves in two groups: those with a high quality of corporate governance and those with low quality, with relatively little transition from one group to the other.

We consider an economy endowed with entrepreneurs that have limited wealth and who seek financing in competitive capital markets to fund their enterprises. In the product market there is free-entry in that all entrepreneurs that obtain financing are able to enter in the consumer goods' market. Thus, the degree of competition in the economy is endogenous and is determined only by the ability of entrepreneurs to finance their firms. Entrepreneurs are endowed with technologies of different efficiency, with the more efficient ones requiring less invested capital. The ability of an entrepreneur to find financing is limited by the presence of agency costs in both the debt and the equity markets. We model the agency cost of equity in a way similar to Jensen (1986) and Stulz (1992, 2005), and assume that a firm's insiders may transform some of the cash-flow to equity (that is the firm's free cash flow, net of payments to creditors) as private benefits. As in Pagano and Roell (1998) and Stulz (2005), the private use of the firm's resources is inefficient, and generates a costly leakage (that is, the firm's insiders can transform one dollar's value of firm's cash flow in an amount of private benefits that has a value less than a dollar). The presence of this inefficiency makes rasing funds as outside equity costly to the entrepreneur, since outside investors rationally anticipate the entrepreneur's appropriation of company resources. We model the agency cost of debt as a traditional risk-shifting problem (see Jensen and Meckling 1976, and Galai and Masulis, 1976). We assume that firms have access to two technologies: a safer but costlier technology that produces superior goods, and a riskier but cheaper technology that on average produces goods that are valued less by the firms' customers. As it is typical in the presence of moral hazard in the debt markets, firms must maintain a certain minimum level of equity, to limit the potential moral hazard problem. Thus, the presence of the agency cost of debt implies that firms face debt capacity in the debt market.

We show that corporate governance problem in the equity market interacts in an essential way with the moral hazard problem in the debt market. When a firm's insiders have a better ability to appropriate corporate resources (that is when the agency costs of equity are more severe) debt becomes more desirable, since it allows to reduce the inefficiencies of outside equity financing. The firm's ability to issue debt, however, is limited by the moral hazard problem in the corporate debt market. Correspondingly, when a firm faces a more severe moral hazard problem in the debt market, it will require greater equity financing to curb the risk-shifting incentives. The extent of equity financing, in turn, is limited by the quality of the corporate governance system. Thus, the simultaneous presence of the agency costs of debt and equity determines the overall ability of firms to raise capital in the financial markets, and limits the ability of new firms to enter a potentially profitable industry. In this way, the interaction of corporate

governance and moral hazard affects industry concentration, the degree of competition and firms' capital structure.

Our model determines endogenously an economy's industry concentration and the financial structure of the corporate sector as a function of economy-wide factors, such as the overall quality of the corporate governance system, and sector-specific factors, such as an industry's exposure the moral hazard problem. We show that economies characterized by worse corporate governance systems are also characterized by greater industry concentration, higher debt to equity ratios (when equity is measured either at book or market value), more concentrated ownership, and greater returns on assets. These results are a direct consequence of endogeneity of industry concentration in our model: bad corporate governance reduces a firm's ability to raise capital, limiting entry and increasing firms' profits; in turn, greater profits increase firms' debt capacity, leading to greater leverage and more ownership concentration. These results help to explain the stylized facts that emerge from cross countries studies such as La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997) and (1998), Stulz (2005), and (1998), among others.

Within an economy, we show that sectors characterized by greater moral hazard problems have also lower debt ratios, less concentrated ownership, greater returns on assets, and greater industry concentration.[3] We also show that the correlation between leverage and firm profitability (given by the return on assets) differs when measured across different industries or within the same industry, and we find that the correlation between leverage and profitability is positive within an industry, but it becomes negative when the comparison is made across industries. These results help to explain the negative relation between leverage and profitability documented in Titman and Wessels (1988), Rajan and Zingales (1995), and Fama and French (2002), among others. They also help to explain the relevance of industry specific factors in determining firms' capital structures documented in Mackay and Phillips (2005).

We also investigate entrepreneurs' preference for good governance and, therefore, their incentives to lobby for good or bad governance. We show that the quality of the corporate governance system has an ambiguous impact on entrepreneurs' welfare. More efficient entrepreneurs (that is, those able to raise sufficient funds and enter the market) on the one hand benefit from good governance, because it reduces the cost of raising equity in the capital markets, but on the other hand are hurt by good governance, because it facilitates entry exposing them to more competition. Marginal entrepreneurs, that is, those unable to enter the market because they cannot raise sufficient funds, are always hurt from bad governance (because it prevents them from exploiting potentially profitable investment opportunities). Moreover, entrepreneurs are more likely to prefer

[3] An example of a concentrated industry characterized by low leverage and potential moral hazard problems is given by the pharmaceuticals industry. In this industry, fims invest a large amount of capital for the development and production of potentially hazardous goods that expose them to product liability.

good governance when they operate in markets of larger size, such as in more mature economies, or in young and growing industries, that is in sectors that require firms to access the equity markets repeatedly. Finally, we show that entrepreneurs' payoff is a convex function of the quality of the economy's governance system. This implies that entrepreneurs have a preference for "extreme" corporate governance regimes, that is for regimes that have either a very high or a very low quality of the corporate governance system. This observation suggests that entrepreneurs operating in economies characterized by bad corporate governance have little or no incentive to lobby for an improvement of their corporate governance system. It also suggests that countries would "segment" themselves into two groups, one with high a quality of corporate governance system, and a second with a low quality system, with relatively little transition from one group to the other.

We extend our results in several directions. First, we examine the possibility that, by exerting effort, entrepreneurs can improve the quality of the corporate governance of their firms, as part of their cost minimization strategy, and thus use corporate governance as a competitive tool. We show that this possibility facilitates entry (i.e. it allows more entrepreneurs to enter a given market), but it does not restore the "perfectly competitive" outcome. This reflects the property that, as long as improving corporate governance is costly, in equilibrium marginal entrepreneurs must recover, in addition to their initial fixed costs, also the costs of improving the governance system of their firms. Thus, in equilibrium, firms must earn a "governance rent" that compensate them for their efforts to produce "good governance." We also find that, in equilibrium, firms in industries more exposed to moral hazard will invest more to improve their corporate governance system, generating a negative correlation between the quality of a firm's governance system and its leverage - a prediction is consistent with the findings of Litov (2005).

Second, we examine the role of the banking sector. We introduce competitive banks that, at a cost, can reduce the extent of the moral hazard problem. In this way, entrepreneurs now can borrow more and obtain funds in cases where they would not be able to raise capital from individual investors. We find that firms are more likely to borrow from banks in countries characterized by a bad corporate governance system, or in industries more exposed to moral hazard. We also find that more efficient firms use direct financing, while marginal, less efficient firms, borrow from banks.

Finally, we study the impact of the corporate governance system on an economy's industrial structure. We do so by allowing the low quality technology to be potentially feasible in equilibrium. We show a greater use of the low quality technology in the economy has an adverse effect on the number of firms that in equilibrium choose the high quality technology. This implies that low quality technologies may "crowd out," in equilibrium, superior technologies that are more exposed to the moral hazard problem. Thus, these countries may be "trapped" in an equilibrium in which their industrial

structure is dominated by less profitable and less efficient firms. Furthermore, we argue that in countries with poor corporate governance entry in new markets is more likely to take place via expansion of already established firm, that is, by firms that can finance themselves by using internal resources (rather than by new firms that must raise capital in the equity market. This implies that economies characterized by low level of investor protection and corporate governance will tend to be denominated by diversified conglomerates.

Our paper rests at the intersection of three broad strands of literature. The first one is the rapidly emerging literature on corporate governance and its effect on an economy's growth rate. For excellent surveys of the literature, see Shleifer and Vishny (1997) and Becht, Bolton, and Roell (2002). By explicitly endogenizing the market structure of an industry, in this paper we argue that corporate governance and capital structure considerations interact in an essential way to determine the competitive conditions in the industry. Our paper contributes to this literature by suggesting a reverse causality between competition and corporate governance: we show that corporate governance considerations may have a direct impact on the competitive conditions in an economy. In this way, our paper is consistent with the idea that the degree of financial development in an economy may affect its competitiveness, as suggested in Rajan and Zingales (2003). Closely related is also Stulz (2005), which argues that the agency cost of equity limits a firm's ability to raise capital and, therefore, to take advantage of the benefits of globalization. Thus, our paper is also related to the growth and finance literature (see, for example, Rajan and Zingales, 1998, and Levine, 1997, for a comprehensive survey). Our paper implies that better corporate governance can increase an economy's growth by facilitating firm's capital raising and the adoption of superior technologies. The second strand of literature is the one on the interaction between financial and market structure (see e.g., Brander and Lewis, 1986, and Maksimovic, 1988, among others). These papers show that a firms's financial structure can be used strategically to induce a more aggressive behavior in the output market. In our paper, we rely on a different connection between market structure and firms' capital structure. In our model, the moral hazard problem in the debt market limits a firm's debt capacity, and thus limits the ability of firms to raise the capital necessary to enter a new industry. In this sense, our paper is close to Maksimovic and Zechner (1991) and Williams (1995), which focus on the effects of agency costs on intra-industry variation of technology choice and capital structure.[4] The third strand of literature is the one on industrial organization and the determinants of market structure (see, for example, Vives, 1999, among many others). In our paper we show that the presence of moral hazard in the debt market and imperfect corporate governance contribute to determine an industry's market structure. Moreover, our paper extends in a (general) market equilibrium setting

[4] See also Riordan (2003) for a discussion of this literature.

earlier literature that examines the impact of capital market imperfections on product market competition (see, for example, Poitevin, 1989, Bolton and Scharfstein, 1990, and Suominen, 2004).

Our paper is organized as follows. In section 2, we present our basic model. In section 3 we present the main results of the paper. In section 4, we discuss our model's predictions for the financial structure and industry concentration of an economy. We also examine the implications for the correlations between industry and ownership concentration, leverage, profitability and corporate governance that would be observed within an economy and across economies. In section 5, we examine the entrepreneurs' preferences for good governance. In section 6, we endogenize corporate governance, by allowing firms to exert effort to improve their governance. In section 7, we examine the role of the banking sector. In section 8, we study the effect of corporate governance on the choice of technology. Section 9 concludes the paper. All proofs are collected in the Appendix.

2. The basic model

We examine an economy endowed with three types of agents: potential entrepreneurs, consumers and a large number of small investors. Entrepreneurs, with no initial wealth, are endowed with production technologies described below. Production requires investment of capital, which entrepreneurs obtain from investors. Investors are endowed with one unit of cash each. Agents are risk neutral and their utility is linear in wealth. Consumers, who purchase the goods produced by the entrepreneurs, are characterized by their demand functions described below.

Entrepreneurs, indexed by i, are distributed continuously over the real line, $i \in [0, \infty)$, and have access to two different production technologies. Technologies, indexed by $\tau \in \{H, L\}$, differ by their production costs and produce goods that can be of either "high" or "low" quality. Goods of better quality are valued more by customers and can be sold at a greater price. The high quality technology H produces always high quality goods but is more costly. The low quality technology L produces high quality goods only with probability ϕ, while with probability $1 - \phi$ it produces goods that are considered by customers as being of lower quality. Production is subject to moral hazard in that an entrepreneur's choice of technology is unobservable to both investors and customers.

The high quality technology has greater fixed cost.[5] More precisely, the total cost of producing q_i units of output with technology τ by entrepreneur i is given by

$$C_{\tau,i}(q) = F_{\tau,i} + cq_i, \tag{2.1}$$

[5] We can interpret the greater fixed cost of high quality technologies as the additional R&D expenditures required to produce goods with superior features, and thus of "better" quality.

where c is the (constant) marginal cost and $F_{\tau,i}$ the fixed cost, with $F_{H,i} > F_{L,i} \geq 0$. Entrepreneurs differ by the efficiency of their technologies: more efficient entrepreneurs have technologies with lower fixed costs. We assume that $F_{\tau,i} = F_\tau + \theta i$, where θ is a measure of the efficiency differences among technologies. Thus, entrepreneurs with lower i are more efficient.

If a firm has produced high quality goods, it can sell its products to consumers in the output market, where the demand for its output, x_i, is

$$x_i = \frac{\alpha}{n} - p_i + \widetilde{p}_i, \tag{2.2}$$

where α is a positive constant that reflects the size of the market, n is the total number of firms in the industry that produce high quality goods, p_i is firm i's price, and $\widetilde{p}_i$ the average price of the high quality producers in the market, i.e., $\tilde{p} \equiv \frac{1}{n}\int_0^n p_j dj$. As customary in the case of monopolistic competition, we assume that firms are small and therefore treat n as a continuous variable (but we will still refer to n as indicating the number of firms). Note that the demand schedule (2.2) is similar to that in monopolistic competition, where a firm takes the other firms' prices as given and acts as a monopolist on the residual demand curve.[6]

If the firm's products are of low quality, consumers are willing to pay only the marginal cost c for the goods, obliging the firm to set $p = c$. This implies that only firms that produce high quality goods can recover their fixed costs. For simplicity, we assume for moment that F_L is sufficiently large (or ϕ sufficiently small) that the low quality technology is not sustainable. This implies that only entrepreneurs expected to choose (in equilibrium) the high quality technology can obtain financing for their firms. Thus, the parameter ϕ represents the severity of the moral hazard problem for a firm: a greater value of ϕ makes it more likely that firms using the low quality technology produce high quality goods, increasing investors' exposure to the moral hazard problem. Since the value of the parameter ϕ depends on a firm's technology, which is presumably similar to all firms in the same industry, we interpret ϕ as representing the exposure of a particular industry to moral hazard.

Entrepreneurs (firms) obtain capital to invest in their technologies by issuing securities to investors. For simplicity, we restrict the space of feasible contracts by assuming that firms can issue only debt and new equity.[7] In particular, firm i seeks to raise $F_{H,i}$ by selling to investors a fraction $\kappa_i \in [0, 1]$ of its shares, valued at $S_i(\kappa_i)$, and zero

[6] Other papers that use continuous versions of monopolistic competition include e.g. Fujita et. al. (1999) and Ottavio et. al. (2002). Our demand function is also similar to that in Salop (1979). One difference, however, is that in his "circular city" model $\widetilde{p}_i$ is the average price of the two firms located "closest" to i.

[7] Debt and equity represent "standard" securities (for a discussion of the advantages of using "standard" financial contracts see Gale, 1992).

coupon debt with a face value B_i and a market value D_i. Since the low quality technology is not sustainable, for a credible entry entrepreneur i must raise $F_{H,i} = S_i + D_i$ units of cash from investors to cover its fixed costs for using the high quality technology, $F_{H,i}$. Entrepreneurs are protected by limited liability, so the payoff to equity (and thus to entrepreneurs) cannot be negative. Financial markets operate competitively, and all agents have access to a safe storage technology that offers zero return.

Outside investors are atomistic. After issuing equity, entrepreneurs maintain control of their firms, which they manage in their own interest. Entrepreneurial control of firms generates a conflict with outside shareholders who are exposed to (partial) wealth expropriation from the entrepreneur, who is the firm's insider. In the spirit of Jensen (1986) we model this "agency cost of equity" by assuming that entrepreneurs may divert to themselves a fraction β of the residual cash flow of their firms, after debt is repaid.[8] Thus, the parameter β measures the severity of the agency cost of equity, and we interpret it as characterizing the quality of the corporate governance system and the level of investor protection of the economy. Following Pagano and Roell (1998) and Stulz (2005), we assume that diversion of firm's cash flow is inefficient, and a unit of diverted cash flow is worth only $\mu < 1$ to the entrepreneur. Note that also the parameter μ depends on the degree of investor protection and the quality of the general legal environment of an economy in that it determines how efficiently entrepreneurs can divert their firms' cash flow into private benefits.

The timing of events is as follows. At $t = 0$, entrepreneurs arrive to the capital market sequentially, in the order of their index i, with the more efficient ones arriving first. Entrepreneurs announce the target amounts of funds that they wish to raise in the capital markets by issuing equity and debt with value S_i and D_i, respectively, in order to raise from investors the total amount $F_{H,i} = D_i + S_i$. If an entrepreneur succeeds in raising its desired amount of capital, the next entrepreneur enters the capital market and seeks financing for his firm. The capital market closes when a firm fails to raise the financing it requested.

At $t = 1$, all $n \geq 0$ entrepreneurs that have been successful in raising $F_{H,i}$ of capital, $i \in [0, n]$, select their production technology, $\tau \in \{H, L\}$, and production takes place.

At $t = 2$, entrepreneurs pay back or default on their loans. Entrepreneurs divert to themselves a fraction β of the cash-flow that is left after lenders have been repaid. The residual fraction $1 - \beta$ is distributed to shareholders. Investors and entrepreneurs consume their wealth.

An *equilibrium* in our model is characterized by the number of entrepreneurs entering the market, n^*, and their optimal strategies, $\{p_i^*, \tau_i^*, S_i^*, D_i^*, \kappa_i^*, B_i^*\}$, for $i \in [0, n^*]$, such that (a) the strategy of each entrepreneur maximizes his payoff given the strategies of the

[8] This assumption implies that debt is a "hard" claim that can impose discipline on entrepreneurs (see, for example, Hart and Moore, 1995).

other players, (b) the goods markets clear, $q_i = x_i$, $\forall i$, and (c) the firms' capital structure and the number of entrepreneurs entering the market are such that no additional entry can occur with entrants earning non-negative profits.

3. Governance and Competition

We solve the model by backward induction. In period $t = 1$, entrepreneurs that have been successful in raising $F_{H,i}$ units of cash, choose their pricing strategy depending on whether they have produced goods of high or low quality. Taking as given the average prices of the other $n-1$ firms producing high quality goods, $\widetilde{p}_i = \{p_j\}_{j \neq i}$, an entrepreneur with high quality goods faces a residual demand curve (2.2) and maximizes his firm's total cash flow by selecting

$$p_i^* \in \arg\max_{p_i} \; CF_i = (p_i - c)\left(\frac{\alpha}{n} - p_i + \widetilde{p}_i\right). \tag{3.1}$$

If, instead, the entrepreneur has produced low quality goods, he has no choice other than setting a price $p_i = c$, at which it can sell the fixed quantity $\bar{x}$.

The total cash flow accruing to an entrepreneur depends on whether it has produced high or low quality goods, and therefore, on the choice of technology. Given the entrepreneurs' optimal pricing strategy $p^* \equiv \{p_j^*\}_{j=0}^n$, the total cash flow generated (or retained) by firm i, CF_i, is given by

$$CF_i(p^*, \tau_i) = \begin{cases} (p_i^* - c)\left(\frac{\alpha}{n} - p_i^* + \tilde{p}_i^*\right) + I_{\tau_i}(F_H - F_L) & \text{with pr. } 1 - I_{\tau_i}(1-\phi) \\ I_{\tau_i}(F_H - F_L) & \text{with pr. } I_{\tau_i}(1-\phi), \end{cases} \tag{3.2}$$

where I_{τ_i} is an indicator function that takes the value of one if $\tau_i = L$, and zero otherwise. Firm i's cash flow is divided between its creditors, $CFD_i(\tau_i)$, outside shareholders, $CFS_i(\tau_i)$, and the entrepreneur, $CFN_i(\tau_i)$, as follows

$$CFD_i(\tau_i, B_i) \equiv \min\{B_i; CF_i(p^*, \tau_i)\}, \tag{3.3}$$

$$CFS_i(\tau_i, B_i) \equiv \kappa_i(1-\beta)\max\{CF_i(p^*, \tau_i) - B_i; 0\}, \tag{3.4}$$

$$CFN_i(\tau_i, B_i) \equiv [\mu\beta + (1-\kappa_i)(1-\beta)]\max\{CF_i(p^*, \tau_i) - B_i; 0\}. \tag{3.5}$$

Proceeding backward, at the beginning of period $t = 1$, after having obtained financing, entrepreneurs choose their technology by maximizing their own expected payoff, selecting

$$\tau_i^* \in \arg\max_{\tau_i \in \{H,L\}} E_1[\mu\beta + (1-\kappa_i)(1-\beta)]\max\{CF_i(p^*, \tau_i) - B_i; 0\}, \tag{3.6}$$

where E_t represents the expectation at t on future cash flows. As it will become apparent below, the optimal choice of technology depends of the face value of the outstanding debt, B_i.

The optimal capital structure is determined by entrepreneur i at $t = 0$ by maximizing

$$\max_{S_i, D_i, \kappa_i, B_i} E_0 \left[\mu\beta + (1-\kappa_i)(1-\beta)\right] \max\{CF_i(p^*, \tau_i^*) - B_i; 0\} \tag{3.7}$$

subject to

$$\begin{aligned} S_i &\leq E_0 \kappa_i (1-\beta) \max\{CF_i(p^*, \tau_i^*) - B_i; 0\}, & (3.8)\\ D_i &\leq E_0 \min\{B_i; CF_i(p^*, \tau_i^*)\}, & (3.9)\\ S_i + D_i &= F_{H,i}, & (3.10) \end{aligned}$$

where (3.8) and (3.9) are, respectively, the shareholders' and debt holders' participation constraints, (3.10) is the entrepreneur's financing constraint.

Proposition 1 *(Equilibrium): In equilibrium, the first $n^* > 0$ entrepreneurs enter the market, where n^* is implicitly determined by*

$$n^* = \frac{\alpha}{\sqrt{F_H + \theta n^* + \eta\beta}}, \tag{3.11}$$

and where $\eta \equiv \frac{\phi(F_H - F_L)}{(1-\phi)}$. All $i \leq n^*$ entrepreneurs choose the high quality technology, and produce a quantity of output

$$q_i^* = \frac{\alpha}{n^*}, \tag{3.12}$$

sold at a price

$$p_i^* = c + \frac{\alpha}{n^*}. \tag{3.13}$$

These entrepreneurs finance their fixed costs, $F_{H,i}$, by raising an amount of equity and debt equal to

$$\begin{aligned} S_i^* &= F_H + \theta i - D_i^* = (1-\beta)\eta - \theta(n^* - i), & (3.14)\\ D_i^* &= \bar{D} \equiv \left(\frac{\alpha}{n^*}\right)^2 - \eta > 0, & (3.15) \end{aligned}$$

by issuing a fraction

$$\kappa_i^* = 1 - \frac{\theta(n^* - i)}{(1-\beta)\eta} \tag{3.16}$$

of their shares to outside investors. In equilibrium, the payoff to entrepreneur $i \in [0, n^*]$ is

$$V_i^* = \mu\beta\eta + \theta(n^* - i). \tag{3.17}$$

We now discuss the main properties of the equilibrium. Taking as given n^* and $\widetilde{p}_i^*$, the first order condition of the cash flow maximization problem (3.1) implies that the

optimal quantity produced and output price are given by (3.12), and (3.13), respectively, as stated in Proposition 1. The equilibrium level of cash flow is

$$CF_i^* = \left(\frac{\alpha}{n^*}\right)^2. \tag{3.18}$$

Note that, at an optimum, the financing and the investors' participation constraints, (3.8) - (3.10) will be binding. Substituting these constraints into the objective function (3.7), we obtain that the entrepreneur's maximization problem at $t = 0$ can be re-stated as

$$\max_{B_i} E_0\left[CF_i(p^*, \tau_i(B_i)) - F_{H,i} - \beta(1-\mu)\max\{CF_i(p^*, \tau_i(B_i) - B_i; 0\}\right] \tag{3.19}$$

subject to

$$\tau_i(B_i) = \arg\max_{\tau_i \in \{H,L\}} E_1[\mu\beta + (1-\kappa_i)(1-\beta)]\max\{CF_i(p^*, \tau_i) - B_i; 0\}. \tag{3.20}$$

Inspection of (3.19) reveals the nature of the trade-offs in the entrepreneur's financing problem. Note that fair pricing of the securities issued by the firm implies that the entrepreneur internalizes all the costs and benefits of the alternative sources of financing. The entrepreneur can raise the capital he needs either in the equity or in the debt market.

Raising funds by issuing equity allows the entrepreneur to appropriate a fraction β of the residual cash flow of the firm, after repayment of debt. The appropriation of firm's resources is, however, inefficient, since the entrepreneur enjoys only a fraction μ per dollar of diverted cash flow. Therefore, a fraction $(1-\mu)$ of the diverted cash flow, i.e., the last term in (3.19), is a dissipative costs and represents an agency cost of equity. Since the entrepreneur ultimately bears the cost of this inefficiency, he will find it preferable to raise as much capital as possible in the debt market.

The amount of funds that the entrepreneur can raise in the debt market is limited by the moral hazard problem generated by the unobservable choice of technology. By choosing low quality technology, rather than the high quality one, entrepreneurs save the amount $F_H - F_L$ in fixed costs and, with probability ϕ, nevertheless obtain high quality goods. Therefore the low quality technology is riskier than the high quality one, and the creditors are exposed to a "risk shifting" problem. Since, by assumption, the low quality technology is not sustainable, the entrepreneur can in equilibrium obtain financing for his firm only if he has the incentive to choose the high quality technology. Thus, at the financing stage the entrepreneur can only issue an amount of debt that induces him to choose the high quality technology, that is for which $E_0\left[CFN_i(H, B_i)\right] \geq E_0\left[CFN_i(L, B_i)\right]$. Hence, from (3.5), B_i^* must satisfy the following incentive-compatibility condition

$$E_0\left[CFN_i(H, B_i)\right] = \left(\frac{\alpha}{n^*}\right)^2 - B_i^* \geq$$

$$\phi\left[\left(\frac{\alpha}{n^*}\right)^2 - B_i^* + F_H - F_L\right] = E_0\left[CFN_i(L, B_i)\right], \tag{3.21}$$

which requires that

$$\left(\frac{\alpha}{n^*}\right)^2 - B_i^* \geq \eta. \tag{3.22}$$

Thus, η represents the minimum value of the cash flow to equity (that is, the residual cash flow after debt is paid) that a firm must maintain to ensure that the high quality technology is optimally chosen. In this sense, η is a measure of the severity of the moral hazard problem and, therefore, of the agency costs of debt.

The incentive compatibility condition (3.22) requires that a firm can at most issue debt with a face value B_i^* and, in equilibrium, also a market value D_i^* equal to

$$D_i^* = B_i^* \leq \bar{D} \equiv \left(\frac{\alpha}{n^*}\right)^2 - \eta, \tag{3.23}$$

which provides a firm's debt capacity. Note that $\bar{D}$ depends on both on the severity of the moral hazard problem, η, and on the level of industry concentration, n^*. Greater exposure to the moral hazard problem increases the minimum equity that a firm must maintain (to induce its insiders to choose the high quality technology) and reduces debt capacity. Conversely, greater industry concentration raises a firm's economic profits, increasing its value and, thus, debt capacity.[9]

Entrepreneurs enter the market as long as they are able to obtain financing by issuing debt until they reach debt capacity, and then by selling equity to outside equity holders until $\kappa_i = 1$ for the last entrant. Given that η represents the minimum equity that all firms must maintain to satisfy the incentive-compatibility condition (3.22) (and thus obtain financing), and that the entrepreneur appropriates a fraction β of it, the amount of equity that the marginal entrepreneur, n^*, can issue is

$$S_{n^*}^* = (1 - \beta)\eta. \tag{3.24}$$

Thus, given that the marginal firm also issues debt until it reaches its debt capacity, $\overline{D}$, the total number of entrepreneurs, n^*, that can obtain financing is determined by

$$\overline{D} + S_{n^*}^* = \left(\frac{\alpha}{n^*}\right)^2 - \beta\eta = F_{H,n^*} = F_H + \theta n^*. \tag{3.25}$$

This condition requires that for the marginal entrepreneur, n^*, the total value of the firm's cash flow, $\left(\frac{\alpha}{n^*}\right)^2$, after the diversion to the entrepreneur, $\beta\eta$, is equal to its fixed

[9] Note that in our stylized model debt capacity is the same for all firms in the same industry since, from the incentive compatibility conditions, the potential gain from deviating to low quality technology, $F_H - F_L$, is independent of i. This assumption can be easily relaxed by assuming, for example, that more efficient firms have also lower variable costs, which would lead to greater debt capacity.

costs, F_{H,n^*}. Inframarginal entrepreneurs issue debt up to debt capacity as well, and issue to outside shareholders only the amount of equity that is strictly necessary to raise $F_{H,i}$, leading to (3.14).

In equilibrium, the marginal entrepreneur earns an economic profit which is equal to the value of the cash flow diversions, $\mu\beta\eta$. Inframarginal entrepreneurs benefit from their greater efficiency by issuing less equity, and thus by earning, in equilibrium, greater economic profit given by (3.17).

In the equilibrium characterized in Proposition 1, the number of entrepreneurs that enter a market, n^*, is limited by the ability of the marginal firm to raise sufficient capital to pay for its fixed cost. Firms's ability to raise capital is constrained both in the debt and in the equity market. The ability to raise funds in the debt market is limited by the moral hazard problem, which requires firms to maintain a certain minimum equity, η, reducing debt capacity. In turn, the ability to raise funds in the equity market is limited by the entrepreneur's cash flow diversion, β, which represents the fraction of the cash flow to equity that the entrepreneur cannot commit to pay to outside investors, reducing a firm's "equity capacity." Thus, the corporate governance problem in the equity market interacts with the moral hazard problem in the debt market and they jointly determine the level of industry concentration, n^*.

In the absence of capital market imperfections, the equilibrium number of firms, n^c, is (implicitly) given by

$$n^c = \frac{\alpha}{\sqrt{F_H + \theta n^c}}. \tag{3.26}$$

We will refer to n^c as the "perfectly competitive" outcome. From (3.15) it easy to see that, absent moral hazard (that is, with $\eta = 0$), all firms would be entirely debt financed and entry would occur until $n^* = n^c$.[10] Similarly, it is easy to see that absent the agency cost of equity (that is, with $\beta = 0$) all firms would have costless access to a sufficient amount of equity and again, from (3.25), entry would occur until $n^* = n^c$. It is only when both imperfections exist, i.e., when $\beta\eta > 0$, that the equilibrium number of firms that can enter a new market is less than that in the perfectly competitive markets outcome: $n^* < n^c$.

4. Corporate Governance, Industry Concentration, and Financial Structure

We have shown that the quality of the corporate governance system of an economy (measured by β) and industry characteristics (that is, the severity of the moral hazard

[10] Note that, in this case, all but the marginal firm would repurchase some equity, that is $S_i^* < 0$ (from 3.14, this happens when $\theta(n^* - i) > (1 - \beta)\eta$).

problem, measured by η) interact in an essential way and determine both industry concentration and corporate financial structure. In this section, we examine the impact of these parameters on the equilibrium levels of industry concentration, n^*, firms' financing choices, $\{D_i^*, S_i^*\}$, and ownership concentration, measured by the fraction of equity retained by the entrepreneur, $\omega_i^* \equiv 1 - \kappa_i^*$ (since outside shareholders are atomistic).

Proposition 2 *(Corporate governance, industry concentration and financial structure): Economies with worse corporate governance are characterized by greater industry concentration*

$$\frac{\partial n^*}{\partial \beta} < 0, \tag{4.1}$$

greater debt level, lower book and market value of equity

$$\frac{\partial \bar{D}}{\partial \beta} > 0, \frac{\partial S_i^*}{\partial \beta} < 0, \frac{\partial E_i^{M*}}{\partial \beta} < 0, \tag{4.2}$$

and greater ownership concentration for small i

$$\frac{\partial \omega_i^*}{\partial \beta} > 0 \text{ iff } i < i_c(\beta, \eta) \tag{4.3}$$

(where $i_c(\beta, \eta)$ is defined in the Appendix). Furthermore, defining the elasticity of entry to corporate governance as

$$\varepsilon(n^*, \beta|\eta) = \frac{\partial n^*}{\partial \beta} \frac{\beta}{n^*} < 0, \tag{4.4}$$

we have that

$$\frac{\partial \varepsilon(n^*, \beta|\eta)}{\partial \eta} < 0. \tag{4.5}$$

Economies characterized by worse corporate governance regimes and lower levels of investor protection (higher β) have greater industry concentration: Bad corporate governance reduces the value of equity that entrepreneurs can issue and, therefore, limit their ability to raise equity from outside shareholders, reducing entry. This happens even though, as we discuss below, corporate governance of lower quality leads to greater debt capacity. In addition, the effect of the quality of the corporate governance system on entry is more pronounced in sectors more exposed to high moral hazard, where equity financing is important, leading to (4.5). Firms in these industries have lower debt capacity and must rely more than others on the equity market to raise funds, making corporate governance considerations particularly important to them.

An implication of our model is that worse corporate governance regimes increases firms' debt capacity, as shown in (4.2). This property is a direct consequence of the

endogeneity of industry concentration in our model. A worse corporate governance regime and a lower level of investor protection lead to greater industry concentration and, therefore, to greater firms' profits, as shown in (3.18). Greater profits, in turn, relax the incentive compatibility constraint, (3.22), and increase firms' debt capacity.

In our model, worse corporate governance reduces the value of firms' cash flow to equity to outside shareholders, lowering both the book and the market values of equity. The effect of lowering the quality of corporate governance on ownership concentration, ω_i^*, depends on a firm's position within an industry. Less efficient firms (greater i) are those that rely relatively more on equity financing and thus must sell a greater fraction of their equity to outsiders, decreasing ownership concentration. Conversely, the greater debt capacity that is due to the worse corporate governance regime allows the more efficient firms to rely even more on debt financing and, thus, to sell even less equity to outsiders, increasing ownership concentration.

Proposition 3 *(Moral hazard, industry concentration, and financial structure): Sectors exposed to more severe agency costs of debt are characterized by greater industry concentration*

$$\frac{\partial n^*}{\partial \eta} < 0, \tag{4.6}$$

lower corporate debt level, greater book and market value of equity, and lower ownership concentration

$$\frac{\partial \bar{D}}{\partial \eta} < 0, \quad \frac{\partial S_i^*}{\partial \eta} > 0, \quad \frac{\partial E_i^{M*}}{\partial \eta} > 0, \quad \frac{\partial \omega_i^*}{\partial \eta} < 0. \tag{4.7}$$

As expected, industries exposed to more severe moral hazard (high η), and thus to greater agency costs of debt, have lower debt capacity. This implies that firms will shift their financing toward equity, leading to financial structures with greater book and the market value of equity. Firms, however, can only partially offset the reduction in their debt financing with a corresponding increase in equity. This happens because a reduction of a dollar in cash flow paid out to creditors results only in $1 - \beta$ dollars of added "equity capacity," since a fraction β of the firm's cash flow is diverted to the entrepreneur. Therefore, a reduction in debt capacity impairs the firm's overall ability to raise funds, leading to less entry and greater industry concentration. Furthermore, as the entrepreneurs in equilibrium substitute debt financing with equity financing, they must issue more equity, leading to a lower ownership concentration.

Propositions 1 - 3 enable us to make predictions on the cross sectional variation that would be observed within a country (that is, within the same legal jurisdiction), and across countries (that is, in different legal jurisdictions with corporate governance regimes and levels of investor protection that are potentially different). Note that firms' heterogeneity comes from three different sources in our model. First, within a given industry, firms differ by their level of efficiency i, with more efficient firms needing, in

our model, less capital. Second, across industries in the same economy, different sectors have different exposure to the moral hazard problem, and thus different values of η. Third, across countries, different economies are characterized by different quality of their corporate governance system, and therefore have different values of β. Below, we consider the effect of the parameters $\{i, \eta, \beta\}$ on several key ratios that are determined endogenously in the model.

A) Cross Sectional Variation within Industries: For each individual firm $i \in [0, n^*]$ within an industry, we consider the following ratios:

i) The *debt-to-equity* ratios:

$$\frac{D_i^*}{S_i^*} = \frac{(\alpha/n^*)^2 - \eta}{(1-\beta)\,\eta - (n^* - i)\,\theta}, \qquad \frac{D_i^*}{E_i^{M*}} = \frac{(\alpha/n^*)^2 - \eta}{(1-\beta)\,\eta} \tag{4.8}$$

where the value of debt, D_i^*, is given by (3.15), and the value of equity can be expressed either at its book value, S_i^*, or at its market value, E_i^{M*}.

ii) The *book-to-market* ratio of equity:

$$\frac{S_i^*}{E_i^{M*}} = \frac{(1-\beta)\eta - \theta(n^* - i)}{(1-\beta)\eta}. \tag{4.9}$$

Note that this ratio is also equal to the fraction of equity issued by the entrepreneur, $\kappa_i^* = \frac{S_i^*}{E_i^{M*}}$, and therefore it also characterizes the degree of ownership concentration, $\omega_i^* = 1 - \kappa_i^*$.

iii) The *return on assets*:

$$ROA_i^* = \frac{\left(\frac{\alpha}{n^*}\right)^2}{F_H + \theta i}. \tag{4.10}$$

B) Cross sectional variation across industries and legal jurisdictions: We make comparisons across industries and legal jurisdictions by determining at the industry level the same key ratios we have identified above.[11]

i) industry debt-to-equity ratios:

$$\left(\frac{D^*}{S^*}\right)^{ind} = \frac{(\alpha/n^*)^2 - \eta}{(1-\beta)\,\eta - \frac{\theta n^*}{2}}, \qquad \left(\frac{D^*}{E^{M^*}}\right)^{ind} = \frac{(\alpha/n^*)^2 - \eta}{(1-\beta)\,\eta}, \tag{4.11}$$

where D^* is the total amount of corporate debt issued by all firms in the same industry, and the total amount of equity issued by all firms in the same industry is measured, again, using either book or market values.

[11] Note that, for simplicity, we consider the relevant ratios for the total industry, rather than the average of the ratios for all firms in that industry.

ii) industry book-to-market ratio of equity:

$$\left(\frac{S^*}{E^{M*}}\right)^{ind} = 1 - \frac{\frac{\theta n^*}{2}}{(1-\beta)\,\eta} = 1 - (\omega^*)^{ind}. \tag{4.12}$$

iii) industry return on assets:

$$ROA^{*\,ind} = \frac{\left(\frac{\alpha}{n^*}\right)^2}{F_H + \frac{\theta n^*}{2}}. \tag{4.13}$$

Our results are summarized in Tables 1-a and 1-b (where a plus (negative) sign indicates a positive (negative) partial derivative).

Table 1-a: Within industry cross-sectional variations

	$\frac{D_i^*}{S_i^*}$	$\frac{D_i^*}{E_i^{M*}}$	$\frac{S_i^*}{E_i^{M*}}$	ω_i^*	ROA_i^*
i	$-$	0	$+$	$-$	$-$

1-b:Cross sectional variation across industries and legal jurisdictions

	$\left(\frac{D^*}{S^*}\right)^{ind.}$	$\left(\frac{D^*}{E^{M*}}\right)^{ind.}$	$\left(\frac{S^*}{E^{M*}}\right)^{ind.}$	$(\omega^*)^{ind}$	$(ROA^*)^{ind}$	n^*
η	$-$	$-$	$+$	$-$	$+$	$-$
β	$+$	$+$	$-$	$+$	$+$	$-$

These results have several implications. First, by contrasting Table 1 and 2, note that the correlation between leverage and firm profitability within an economy differs when measured across different industries or within the same industry. In our model, firms in the same sector differ only by the efficiency of their technology, while firms in different sectors of the economy differ also by the severity of the moral hazard problem. Within a given sector, more efficient firms require less capital and need to issue less equity than more inefficient ones. Thus, more efficient firms, have greater return on assets and issue relatively less equity, which determines a positive relationship between leverage and profitability for firms within the same sector. The relationship between profitability and leverage is reversed when we compare averages across sectors. Sectors more exposed to moral hazard require that firms maintain a greater equity base and therefore have lower leverage. In addition, industries with greater moral hazard have in equilibrium greater industry concentration and therefore can sustain firms with greater profits and better return on assets. Thus, greater moral hazard leads to less levered and more profitable firms and greater industry concentration, generating a negative relationship between leverage and profitability, and between leverage and industry concentration.

Note that the negative correlation between leverage and profitability across sectors is a direct outcome of the endogeneity of industry concentration of our model. This implies that a static trade-off model of the determination of a firm's capital structure (such as the one discussed here) can generate a negative correlation between leverage and profitability, when measured across industries. Thus, our model helps to explain the observed negative relationship between profitability and leverage documented in Titman and Wessels, 1988, Rajan and Zingales, 1995, Fama and French, 2002, and more recently in Mackay and Phillips, 2005, among others.

Second, note that, within an economy leverage is negatively correlated with industry concentration (since, from Proposition 3, n^* is a decreasing function of η), and positively with ownership concentration. Greater exposure to moral hazard reduces leverage, limits entry, and induces firms to issue more equity, which increases industry concentration and decreases ownership concentration. It implies that sectors characterized by greater moral hazard problems have also lower debt ratios, less concentrated ownership, lower market to book value of equity, but greater returns on assets and industry concentration.

Finally, our model predicts that economies characterized by better corporate governance systems (that is, by lower β) are also characterized by lower industry concentration, lower debt to equity ratios (when equity is measured either at book or market value), less concentrated ownership, and lower returns on assets. These results imply that in cross country comparisons we would observe a positive correlation between leverage and both industry and ownership concentration. Note that these results are the direct consequence of the endogeneity in our model of industry concentration and debt capacity: worse corporate governance reduces a firm's ability to raise capital, which limits entry and, in turn, leads to greater debt capacity (and, leverage) and greater ownership concentration. Thus, by endogenizing industry concentration and debt capacity our model establishes a link between the quality of the corporate governance system, ownership concentration and leverage.

These results are consistent with some of the stylized facts that emerge from cross countries studies. For example, La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997 and 1998) find that countries with worse corporate governance have more debt relative to equity financing, lower market values of firms (compared to GDP), and larger ownership by insiders. More recently, Stulz (2005) finds that countries with worse corporate governance are characterized by a smaller fraction of widely held firms. Furthermore, Demirguc-Kunt and Maksimovic (1998) find that countries endowed with a better legal environment are characterized by a lower return on capital. A further implication of our paper is that country specific factors, such as the quality of its corporate governance system, have an independent impact on financial structure choices of firms residing in a country. This implication is consistent with the findings of Booth, Aivazian, Demirguc-Kunt, and Maksimovic (2001), which shows that country specific factors are as important as other firm-specific factors in determining a firm's capital structure de-

cision. Also, our results are consistent with the findings in Klapper, Laeven and Rajan (2004). That paper documents the beneficial effect that regulation, aimed at a better development of financial markets, has on entry of new firms, especially in industries with high R&D intensity or industries that have greater capital needs. Finally, our results are consistent with the findings of Fan, Titman and Twite (2003), documenting a negative correlation between leverage and the strength of a country's legal system. In a similar vein, that paper shows that the presence of high quality auditors (as measured by the market share of the Big-five accounting firms) is negatively related to leverage, especially in developing countries.

5. Lobbying for Good Governance

The quality of the corporate governance system and level of investor protection have an ambiguous impact (in equilibrium) on entrepreneurs' welfare and, therefore, on their incentives to lobby in favour (or against) an improvement of legal environment of the economy.

More efficient entrepreneurs, namely those able in equilibrium to enter the market (that is, for $i \leq n^*$), are affected by the quality of the corporate governance system of the economy in two opposing ways. Substituting from (3.18) and (3.22) into (3.19), we obtain that entrepreneur i's equilibrium payoff, V_i^*, $i \leq n^*$, is equal to

$$V_i^* \equiv \left(\frac{\alpha}{n^*}\right)^2 - F_H - \theta i - \beta(1-\mu)\eta, \quad \text{for} \quad i \leq n^*. \tag{5.1}$$

First, corporate governance affects the amount of private benefits that entrepreneurs can extract from their firms. However, since the extraction of private benefits is inefficient ($\mu < 1$), and securities are fairly priced, entrepreneurs fully internalize this inefficiency and, thus, suffer in equilibrium from bad governance. This can easily be seen by noting that, holding n^*constant, V_i^* is decreasing in the quality of corporate governance β. Second, from (3.8), the quality of corporate governance limits the amount of capital that an entrepreneur can raise, and thus affects entry. In this way, by limiting competition, bad corporate governance increases the equilibrium payoff of the entrepreneurs who can raise financing and enter the market. Thus, for those entrepreneurs that in equilibrium can enter the market ($i \leq n^*$), the net effect of the quality of the corporate governance system is ambiguous.[12]

[12] Thus, the ambiguity of β on entrepreneurs' preferences for good governance is the result of the presence of efficiency difference between technologies. To see this, note that if entrepreneurs are endowed with equally efficient technologies (that is, $\theta = 0$), from (3.25) and (5.1), we have that

$$V_i^* \equiv \beta\mu\eta, \quad \text{for} \quad i \leq n^*,$$

and all entrepreneurs, in equilibrium, have a strict preference for a corporate governance system of lower quality, as in Perotti and Volpin (2005).

Less efficient entrepreneurs that have a positive NPV project but cannot raise sufficient funds to enter the market (that is, $i \in (n^*, n^c]$) always suffer from bad corporate governance. A low level of corporate governance quality is bad for these "marginal" entrepreneurs because it prevents them from exploiting a profitable investment project. An improvement of the economy's corporate governance system would allow them to raise sufficient funds to enter the market and earn their projects' payoff.

Proposition 4 *(Entrepreneurs' preferences for good governance): For $i \in [0, n^*]$, an entrepreneur's payoff (weakly) increases in β, $\frac{\partial V_i^*}{\partial \beta} \geq 0$, if and only if:*

$$\mu \geq \overline{\mu}(\beta) \equiv \frac{\theta}{\frac{2\alpha^2}{n^{*3}} + \theta}, \tag{5.2}$$

with $\frac{\partial \bar{\mu}}{\partial \alpha} > 0$. Furthermore:

$$\frac{\partial^2 V_i^*}{\partial \beta^2} > 0 \ . \tag{5.3}$$

Entrepreneurs that cannot enter the market always (weakly) prefer better governance.

Proposition 4 shows that the more efficient entrepreneurs, $i \in [0, n^*]$, benefit from poor corporate governance as long as the extraction of private benefits is not too costly, that is, when $\mu > \overline{\mu}$. If the extraction of private benefits is sufficiently inefficient, $\mu < \overline{\mu}$, the benefits of poor corporate governance that are due to reduced entry are not sufficient to compensate entrepreneurs for the efficiency losses of private benefits extraction. Note also that entrepreneurs are more likely to have a preference for good governance (that is, the threshold level $\bar{\mu}$ is greater) when the size of the product market, α, is larger. This happens because markets of larger size induce (for a given level of corporate governance quality) more firms to enter a market, reducing the impact of corporate governance on industry concentration.[13] Thus, in equilibrium, entrepreneurs earn greater profits and benefit less from the greater industry concentration that comes with worse corporate governance. These observations imply that entrepreneurs are more likely to prefer good governance either when they operate in larger economies (greater α), or when the legal system of their economy makes the appropriation of firms' cash flow more difficult and, thus, less efficient (lower μ).

More generally, our model also suggests that entrepreneurs that operate in young and growing industries, have a preference for good governance. This happens because firms in sectors that at early stage of development must access the capital markets more frequently to raise the resources needed to finance their asset acquisition. In this case, incumbent entrepreneurs are concerned about the quality of corporate governance and investor protection because these factors will determine the conditions at which they will be able to raise equity in the future.

[13] This can be seen by veryfing that the elasticity of entry (4.4) is decreasing in α.

Finally, note that entrepreneurs' (equilibrium) utility, V_i^*, is a convex function of the quality of the corporate governance system, which implies that entrepreneurs may have a preference for "extreme" corporate governance regimes. In other words, entrepreneurs' equilibrium expected utility may show a local maximum for regimes that have either a very high or a very low quality of the corporate governance system, β. This observation suggests that entrepreneurs operating in economies endowed with a corporate governance system of low quality may have little or no incentive to seek, or to lobby for, an improvement of the governance system of their economy. Thus, such economies may be "trapped" in a low quality governance state. Conversely, entrepreneurs operating in economies endowed with a corporate governance system of high quality may have a strong incentive to maintain, or even improve, the quality of the governance system of their economy. This implies that countries would "segment" themselves two groups: those with a high quality of corporate governance and those with low quality, with relatively little transition from one group to the other.

6. Governance as Competitive Tool

We have so far assumed that the quality of the corporate governance system is exogenously determined by a firm's legal environment, that is its legal jurisdiction. Companies, however, may use their corporate governance system as a competitive tool, and choose the quality of corporate governance as part of their cost minimization efforts (see, for example, Allen and Gale, 2000).

In this section we examine the possibility that a firm, by exerting effort, can improve the quality of its governance system. Such costly activities may affect either the corporate governance system of the individual firm (and, thus, be specific to the firm), or the overall quality of the governance system of the legal jurisdiction where the firm operates. Examples of the first type of activities include improving corporate disclosures, hiring highly reputable (and, presumably, more expensive) independent directors or changing corporate charters in ways that protect minority shareholders. Examples of the second type of activities include lobbying to regulators for an improved general legal environment or for a better supervisory activity of monitoring agencies.

We show that, if effort is costly, the ability of firms to improve their corporate governance does promote entry, and thus takes the equilibrium closer to the competitive one, but it cannot fully restore the perfectly competitive outcome. This happens because, in equilibrium, entrepreneurs must be compensated for their effort to improve the corporate governance system of their firm. Thus, entrepreneurs enter the market until the rents they expect to earn in equilibrium exactly compensate them for the effort to improve their governance system. Moreover, we show that the incentives to exert effort to improve corporate governance are greater in industries with high moral hazard and in economies with poor overall corporate governance.

Assume now that the entrepreneur i can, at $t = 0$, by exerting a level of effort $e_i \geq 0$, reduce the fraction of cash flow to equity that he can appropriate to $\beta(1 - e_i)$, but at a cost equal to

$$C(k, e_i) = \frac{k e_i}{1 - e_i},$$

where $k \geq 0$.[14] Thus, we can interpret the parameter β as representing the overall quality of the corporate governance system of the legal jurisdiction where the firm operates. In addition, entrepreneurs can exert effort and improve the quality of the governance system of their firms so as to further reduce the diversion factor to $\beta(1-e_i)$.

The main results of our paper are modified as follows. Entrepreneurs maximize their expected profits, which now are given by

$$\max_{B_i, \tau_i, e_i} E_0 \left[CF_i^*(\tau_i) - F_{H,i} - (1 - e_i)\beta(1 - \mu) \max\{CF_i^*(\tau_i) - B_i; 0\} \right] - C(k, e_i) \quad (6.1)$$

subject to

$$\tau_i = \arg \max_{\tau_i \in \{H,L\}} E_1[\mu\beta + (1 - \kappa_i)(1 - \beta)] \max\{CF_i^*(\tau_i) - B_i; 0\}. \quad (6.2)$$

Entrepreneurs will enter an industry until the marginal entrepreneur's expected profit, net of the governance costs, equals zero. Hence, the equilibrium number of entrepreneurs, n^{**}, now satisfies:

$$\left(\frac{\alpha}{n^{**}}\right)^2 - F_H - \theta n^{**} - (1 - e_i^{**})\beta(1 - \mu)\eta - k e_i^{**} (1 - e_i^{**})^{-1} = 0, \quad (6.3)$$

where e_i^{**} is the level of effort exerted by entrepreneur i in equilibrium.

Proposition 5 *(Competitive governance): Assume that entrepreneurs can improve the quality of their governance system by exerting effort, e_i, at a cost $C(k, e_i)$. If $k \leq k_1$ (defined in the Appendix), there exists an equilibrium where the first $n^{**} > n^*$ entrepreneurs enter the market, where n^{**} is implicitly determined by*

$$n^{**} = \frac{\alpha}{\sqrt{F_H + \theta n^{**} + 2\sqrt{k\beta(1 - \mu)\eta} - k}}. \quad (6.4)$$

In this case, the optimal effort level exerted by each entrepreneur is

$$e^{**} = 1 - \sqrt{\frac{k}{\beta(1 - \mu)\eta}}. \quad (6.5)$$

[14] Note that this cost function has the attractive properties that the cost is zero if effort is zero, and that obtaining a "perfect" corporate governance system is prohibitively costly.

*All results stated in Propositions 2 - 3 remain valid in this new equilibrium (with n** replacing n* when relevant).*

When producing "good governance" is costly, entrepreneurs invest in governance and enter an industry until expected profits in the industry, net of the dissipative costs μ, are sufficient to recover the governance costs, obtaining (6.3). Industry concentration is therefore determined by the need to reward in equilibrium entrepreneurs with a "governance rent" that compensates them for the cost of improving the governance system of their firm. Allowing for improvements in corporate governance allows marginal entrepreneurs to raise more capital in the equity market and therefore generates additional entry, $n^{**} > n^*$. Better corporate governance reduces the agency costs of equity and lowers industry concentration.

Direct examination of (6.5) reveals that effort to improve a firm's corporate governance is greatest in industries with high moral hazard (greater η), and in economies characterized by worse corporate governance (greater β). These results follow from the fact that e^{**} is an increasing function of both β and η. Thus, by endogenizing the level of corporate governance, our model has predictions for the observed variation of the quality of corporate governance across both industries and legal jurisdictions (discussed in the previous section). By defining the equilibrium level of "effective" governance that emerges in an industry, $\hat{\beta}^*$, as

$$\hat{\beta}^* \equiv (1 - e^{**})\beta = \sqrt{\frac{k\beta}{(1-\mu)\eta}}, \tag{6.6}$$

it is easy to see that industries more exposed to moral hazard (greater η) are also characterized by better governance in equilibrium (lower, $\hat{\beta}^*$). Moreover, it is easy to show (by following a procedure similar to the one discussed in Section 4) that these industries are also characterized by lower leverage and greater profitability (due to the greater industry concentration). These properties imply a positive correlation between the quality of a firm's corporate governance and its profitability, and a negative correlation between the quality of a firm's governance system and its leverage: more profitable firms have a better corporate governance system, have a less concentrated ownership structure and a lower leverage. These predictions are consistent with the findings of Litov (2005), which shows a negative relation between firm's leverage and the quality of its corporate governance.

Proposition 5 characterizes the equilibrium in the case the cost of effort k is sufficiently low (that is, $k \leq k_1$). In this equilibrium, by exerting the level of effort e^{**}, all entrepreneurs that are willing to enter the market are able to so. If the cost of effort k is larger (that is, when $k > k_1$) the level of effort e^{**} is not sufficient to allow marginal entrepreneurs to raise the capital necessary to enter the market. In this case, marginal entrepreneurs must exert an amount of effort $\hat{e}_i \geq e^{**}$ that is sufficient to raise the

necessary funds to successfully enter the market, that is

$$\left(\frac{\alpha}{\widehat{n}}\right)^2 - F_H - \theta i - (1-\hat{e}_i)\beta\eta = 0, \tag{6.7}$$

where the number of firms in this equilibrium, $\hat{n}$, is determined by the condition that the marginal entrepreneur earns zero expected profits. That is, by

$$\left(\frac{\alpha}{\hat{n}}\right)^2 - F_H - \theta\hat{n} - (1-\hat{e}_{\widehat{n}})(1-\mu)\beta\eta - k\hat{e}_{\widehat{n}})(1-\hat{e}_{\widehat{n}})^{-1} = 0. \tag{6.8}$$

We have the following:

Proposition 6 *Let $k > k_1$. There exists an equilibrium where the first $\hat{n} > n^*$ entrepreneurs enter the market, where $\hat{n}$ is determined by (6.8). In this case, the optimal effort level exerted by each entrepreneur is*

$$\hat{e}_i = \max\{\hat{e}_{\hat{n}} - \frac{\theta(\hat{n}-i)}{\beta\eta}, e^{**}\}, \tag{6.9}$$

$$\textit{where } \hat{e}_{\hat{n}} = \frac{1 + 2\mu\beta\eta/k - \sqrt{4\mu\beta\eta/k + 1}}{2\mu\beta\eta/k} < 1. \tag{6.10}$$

Furthermore, $\frac{\partial\hat{e}_i}{\partial\beta} > 0$ and $\frac{\partial\hat{e}_i}{\partial\eta} > 0$, for all $i \leq \hat{n}$.

Note that in the case of the equilibrium characterized in Proposition 5, all the entrepreneurs in the same industry exert the same level of effort, e_i^{**}, and thus have the same level of governance, $\hat{\beta}^*$. In contrast, in the equilibrium of proposition 6 entrepreneurs with different efficiency level, i, exert a different level of effort, $\hat{e}_i$. These differences generate heterogenous levels of corporate governance quality also within an industry. Our model predicts that marginal entrepreneurs, that is, those who need more capital to enter the market, will adopt a better corporate governance system than the more efficient ones. This happens because marginal entrepreneurs must produce better governance to reduce the agency costs of equity and, thus, raise more capital in the equity market to be able to enter.

7. Governance, Regulation, and Financial System Architecture

Finance literature has suggested that banks, by monitoring firms, can reduce the agency costs of debt by mitigating the entrepreneur's incentives to take excessive risks (see, for example, Diamond , 1989, among others). Assume now that the economy is endowed also by competitive banks and that, by incurring a fixed monitoring cost, c_b, a bank can decrease the extent of entrepreneurial moral hazard from η to $\lambda\eta$. In this way, the benefit of bank financing is to reduce the minimum equity that a firm must maintain

(to satisfy the incentive compatibility condition), increasing its debt capacity. The monitoring cost is charged up front to the entrepreneur when he borrows from the bank, increasing the cost of entering a market. Firms may seek financing either from investors, as before in the form of publicly traded debt or equity, or by borrowing from a bank. Since entrepreneurs are residual claimants to their firms' cash flow, it is easy to see from (3.19) that in this case they prefer to borrow from a bank (rather than using publicly traded debt) when the reduction in the agency costs of equity due to bank 's monitoring is greater than the monitoring cost, c_b, that is

$$c_b < (1-\mu)(1-\lambda)\beta\eta. \tag{7.1}$$

Note also that the use of bank debt, by reducing the moral hazard problem, may allow entry of firms that otherwise would not obtain financing and be excluded from the market. By direct examination of the entry condition (3.25), it is easy to see that if

$$\beta\eta > \lambda\beta\eta + c_b, \tag{7.2}$$

that is, if $c_b < (1-\lambda)\beta\eta$, some marginal firms will now be able to raise required capital by using bank financing and enter the market.

These observations have a number of implications. Since condition (7.1) is more likely to be satisfied when β is large, firms operating in countries characterized by bad corporate governance are more likely to be bank financed. This also implies that the financial system in such countries is likely to be dominated by (or to make a greater us of) banks. Similarly, firms in industries characterized by greater moral hazard are more likely to use bank financing rather than publicly traded debt. Moreover, comparing (7.1) and (7.2) it is easy to see that in countries with better corporate governance (lower β) more efficient firms are more likely to be financed by traded debt, while less efficient ones (the marginal firms) use bank financing.[15]

Another implication of our model derives from the effect of entry barriers on corporate financial structure.[16] Suppose now that entry in an industry requires firms to sustain a certain regulatory cost, c_r, which is paid by firms upon entry. The presence of such regulatory cost is equivalent, in our model, to an increase of the fired costs F_H, and it has the effect of reducing entry. It is easy to verify that, in our setting, a greater regulatory cost, c_r, would lead to higher level of debt financing (3.15), greater debt-to-equity ratio at market values (4.11), and ownership concentration (4.12). These considerations also suggest that deregulation, by reducing regulatory costs and increasing entry, would lead to new equity issues and a lower reliance on debt financing.

[15] Thus, our model provides an explanation for the choice between bank and publicly traded debt different from the one discussed, for example, in Diamond (1991) and Chemmanur and Fulghieri (1994).

[16] We are grateful to Marco Pagano for pointing this out to us.

8. Governance and Industry Structure

The quality of the corporate governance system has an impact on firms' choice of technology, and thus on an economy's industrial structure. We show this possibility by considering the parameter region where the low quality technology is sustainable, so that it will be chosen by some firms in equilibrium. We maintain the assumption that the high quality technology is more efficient method of production, that is, $\phi F_H < F_L$. Even if the high quality technology is more efficient than the low quality one, the presence of moral hazard makes it possible for some firms in equilibrium to select the inefficient low quality technology. This happens when the low quality technology is sustainable (i.e., it has a positive NPV) when n^* firms producing with high quality technology are present in the market, that is, when

$$\phi \left(\frac{\alpha}{n^*}\right)^2 - F_L - \theta n^* > 0. \tag{8.1}$$

This condition requires that equilibrium profits $\left(\frac{\alpha}{n^*}\right)^2$are sufficiently large that a low quality producer, who obtains these profits only with probability ϕ, can cover his fixed costs, $F_L + \theta n^*$. Note that condition (8.1) is more likely to be satisfied when the quality of corporate governance is particularly low, or when the moral hazard problem is severe, that is, when η and β are relatively large (which implies that n^* is small). These observations lead to the following proposition.

Proposition 7 *(Equilibrium with low quality technology)***:** *There exist threshold values $\tilde{\eta}$ and $\widetilde{\beta}(\tilde{\eta})$ such that if $\eta > \tilde{\eta}$ and $\widetilde{\beta} \leq \beta \leq 1$ some firms select in equilibrium the low quality technology. Specifically, in equilibrium $n^{'} > n^*$ entrepreneurs enter the market. The first $n^{''} \in [0, n')$ of these choose the high quality technology, and finance $\overline{D}$ of their fixed costs with debt and $F_{H,i} - \overline{D}$ with equity. The remaining $n' - n'' > 0$ entrepreneurs choose the low quality technology and finance their fixed costs entirely with debt by borrowing $D_i^* = F_L + \theta n'$. Furthermore, n'' is a decreasing function of β and η.*

The number of entrepreneurs that enter the market with high quality technology, n'', and those that enter with the low quality one, $n^{'} - n''$, are determined by the following three conditions.

First, given n'', the marginal entrepreneur choosing the low quality technology, firm n', must be able to raise the necessary capital, that is

$$\phi \left(\frac{\alpha}{n'' + \phi(n' - n'')}\right)^2 = F_L + \theta n^{'}. \tag{8.2}$$

Note that now the number of firms producing a high quality good is $n^{''} + \phi(n' - n'')$, since low quality producers produce a high quality good only with probability ϕ.

Second, given n', the least efficient entrepreneur choosing the high quality technology, that is, firm $i = n''$, is implicitly determined as the largest n'' such that the following two conditions are satisfied:

i) entrepreneur n'' is able to raise the necessary capital $F_H + \theta n''$, that is

$$\left(\frac{\alpha}{n'' + \phi(n' - n'')}\right)^2 - \left(F_H + \theta n''\right) - \beta\eta \geq 0, \quad \text{and} \tag{8.3}$$

ii) entrepreneurs $i \leq n''$ prefer to raise $F_{H,n''}$ and select the high quality technology, rather than to raise $F_{L,n''}$ and select the low quality technology, that is

$$(1-\phi)\left(\frac{\alpha}{n'' + \phi(n' - n'')}\right)^2 - (F_H - F_L) - (1-\mu)\,\beta\eta \geq 0, \tag{8.4}$$

(note that the incentive compatibility condition is satisfied if the entrepreneur is financed by debt up to debt capacity, $\overline{D}$).

The financing constraint (8.3) implies that, holding ϕ, α, θ and F_H constant, greater entry of firms in the market, a larger n', has the effect of reducing the number of entrepreneurs with high quality technology that can be sustained in equilibrium, n''. Conversely, from (8.2) it is easy to see that, holding ϕ, α, θ and F_L constant, a smaller entry of high quality firms in the market, that is a smaller n'', has the effect of increasing the number of entrepreneurs with low quality technology that can be sustained in equilibrium, n'. Thus, in equilibrium, the two technologies are "strategic substitutes" in that a more frequent adoption of one type of technology has the effect of making it more difficult for entrepreneurs to adopt the other type of technology.

Entrepreneurs' incentives to choose the high quality technology can be seen from examination of the three terms in (8.4). The first term reflects the fact that the high quality technology produces high quality goods with certainty, while the low quality technology produces high quality goods only with probability ϕ. The second term represents the difference in the fixed costs of the two technologies, $F_H - F_L$. The third term represents a governance cost, and is due to the fact that the high quality technology is sustainable in equilibrium only if the entrepreneur is financed by equity in the amount of η (so that the incentive compatibility condition (3.22) is satisfied), while the low quality technology can be financed entirely by debt. Since equity financing is costly (because the entrepreneur's cash-flow appropriation is inefficient) the adoption of the high quality technology is costly to the entrepreneur and leads to a loss of value equal to $(1-\mu)\,\beta\eta$.[17]

[17]Note that Proposition 7 implies that when the two technology coexist in equilibrium, there is a marginal group of less profitable firms which are more risky and use more debt financing. This prediction is consistent with the empirical findings of MacKay and Phillips (2005).

Proposition 7 implies that the number of firms that choose the high quality technology is lower when the quality of the corporate governance system is of worse quality. This happens because an increase in β makes the incentive constraint (8.4) and the financing constraint (8.3) tighter, leading to a lower n''. Similarly, sectors more exposed to the moral hazard problem, that is, with a greater η, are characterized by a smaller number of firm with high quality technology. Furthermore, when quality of the corporate governance system is sufficiently low, it is possible that either (8.3) or (8.4) are not satisfied for any $i \leq n'$, which implies that the less efficient low quality technology completely crowds out the more efficient one. This occurs when

$$\beta\eta \geq \frac{F_L - \phi F_H}{\phi - \mu}$$

These observations suggest that the quality of a country's corporate governance system has an impact on the choice of technology made by firms operating in its jurisdiction and thus on an economy's industrial structure. Our model implies that countries with a low quality of corporate governance system may be not be able to sustain firms that adopt capital intensive technologies that are more exposed to moral hazard, such as, for example, such as the high-technology and pharmaceutical sectors. It also implies that these countries may be "trapped" in an equilibrium dominated by less efficient firms adopting inferior technologies, that they will be at a competitive disadvantage in developing advanced sectors more exposed to moral hazard.

Finally, note that the quality of the corporate governance system has also an impact on an economy's industrial structure by affecting the channel through which firms entry a new industry. In countries with poor corporate governance new firms find it difficult to raise the capital necessary to entry a new market. Thus, in these economies, established firms that already have sufficient capital from internal funds may have an advantage in entering new markets and exploiting new profit opportunities. This implies that these economies will tend to be dominated by diversifying conglomerates. Conversely, new firms operating in economies endowed with a good level of corporate governance and investor protection will find it easier to raise the necessary capital and enter a new industry. Thus, these economies are more likely to be dominated by many independent and focused firms.

9. Conclusions

The main message of our paper is that the quality of the corporate governance system of an economy is an important determinant of its industrial and financial structure. We suggest that the quality of corporate governance affects both industry concentration and the firms' financial structure. We show that countries characterized by poor corporate governance and low levels of investor protection have less competitive economies

and have firms with greater leverage and more concentrated equity ownership. We also argue that corporate governance may also affect firms' technology choices. Our model suggests that the different costs of equity financing implied by the different governance regimes lead to different industry compositions in any given economy: Countries with good corporate governance have more developed industries in capital intensive sectors and in those more exposed to moral hazard. Interestingly, our results suggest also that entrepreneurs may locally prefer worse corporate governance in countries already characterized by bad corporate governance, and better corporate governance in countries already endowed with good corporate governance. These results suggest that the different legal systems that support different economic structures may be sustained by entrepreneurs, providing a reason for why such differences in corporate governance regimes across countries may persist over time.

Our results raise several important questions for future research. For instance, the different industry compositions across economies may imply that different countries in equilibrium adopt different bankruptcy rules that reflect the difference in the asset structure of their firms. This feature could further re-enforces the international specialization in different sectors with varying degrees of moral hazard that the adoption of different corporate governance regimes generates.

We also examined the role of competition in the production of good corporate governance. Although we show that competition improves governance, we argue that, in equilibrium, marginal entrepreneurs must earn sufficient rents that compensate them for their effort of producing good governance, limiting product market competition. Thus, our main results are robust to competition for better governance. We show, however, that competition for good governance may lead to variations in the level of governance practices across industries and within an industry.

References

[1] Alchian, A., 1950, Uncertainty, evolution, and economic theory, Journal of Political Economy, 58, 211 - 221.

[2] Allen, F. and D. Gale, 2000, Corporate governance and competition, in X. Vives (ed.), Corporate Governance, Cambridge University Press, Cambridge, UK.

[3] Becht, M., P. Bolton, and A. Roell, 2002, Corporate governance and control, ECGI working paper N. 02.

[4] Bolton, P. and D. Scharfstein, 1990, A theory of predation based on agency problems in financial contracting, American Economic Review, 80:1, 93-106.

[5] Booth, L., V. Aivazian, A. Demirguc-Kunt, and V. Maksimovic, 2001, Capital structure in developing countries, Journal of Finance, 56, 87-130.

[6] Brander, J. A., and T. R. Lewis, 1986, Oligopoly and financial structure: The limited liability effect, American Economic Review, 76, 956-970.

[7] Brennan, M. and A. Kraus, 1987, Efficient financing under asymmetric information, Journal of Finance 42:5, 1225-44.

[8] Chemmanur, T. and P. Fulghieri, 1994, Reputation, Renegotiation, and the Choice between Bank Loans and Privately Placed Debt," Review of Financial Studies 7:3, 475-506.

[9] Diamond, D. , 1991, Monitoring and Reputation: The Choice Between Bank Loans and Directly Placed Debt," Journal of Political Economy, 99:4, 689-721.

[10] Fama, E. and K. French, 2002, Testing trade-off and pecking order predictions about dividends and debt, Review of Financial Studies, 15:1, 1-33.

[11] Fan, J., S. Titman and G. Twite, 2003, An international comparison of capital structure and debt market choice, w.p., June 2003.

[12] Fujita, M., P. Krugman and A. Venables, 1999, *The Spatial Economy. Cities, Regions and International trade,* Cambridge (Mass.): MIT Press.

[13] Galai, D. and R. Masulis, 1976, The option pricing model and the risk factor of stock, Journal of Financial Economics, 3:1-2, 53-81.

[14] Gale, D., 1992, Standard Securities, Review of Economic Studies 4:59, 731-755.

[15] Green, R.C., 1984, Investment incentives, debt and warrants, Journal of Financial Economics, 13:1, 115-136.

[16] Hart, O. and J. Moore, 1995, Debt and seniority: An analysis of the role of hard claims in constraining management. American Economic Review, 85:3, 567-585.

[17] Jensen, M. C., 1986, The agency costs of free cash flow: Corporate finance and takeovers, American Economic Review, 76: 2, 323-329.

[18] Jensen, M. C. and W. H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs and ownership structure, Journal of Financial Economics, 3, 305-360.

[19] Klapper, L., L. Laeven and R. Rajan, 2004, Business environment and firm entry: Evidence from international data, CEPR w.p. N. 4366, April 2004.

[20] Demirguc-Kunt, A. and V. Maksimovic, 1998, Law, finance, and firm growth, Journal of Finance, 53, 2107-2137.

[21] La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. W. Vishny, 1998, Law and finance, Journal of Political Economy, 106:6, 1113-1155.

[22] La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. W. Vishny, 1997, Legal determinants of external finance, Journal of Finance, 52:3, 1131-1150.

[23] Levine, R., 1997, Financial development and economic growth: Views and agenda, Journal of economic litearture, 35, 688-726.

[24] Litov, L., 2005, Corporate governance and financing policy: New evidence, working paper, w.p.

[25] MacKay, P., G. M. Phillips, 2005, Is there an optimal industry financial structure? Review of Financial Studies, 18, 1433-1466.

[26] Maksimovic, V., 1988, Capital structure in a repeated oligopoly, Rand Journal of Economics, 19, 389-407.

[27] Maksimovic, V., and J. Zechner, 1991, Debt, agency costs and industry equilibrium, Journal of Finance, 1619-1645.

[28] Morck, R., A. Shleifer and R. Vishny, 1988, Management ownership and market valuation: An empirical analysis, Journal of Financial Economics, 20, 293-315.

[29] Ottaviano, G., T. Tabuchi and J-F. Thisse, 2002, Agglomeration and Trade Revisited, International Economic Review, 42, 409-435.

[30] Pagano, M. and A. Roell, 1998, The choice of stock ownership structure: Agency costs, monitoring and the decision to go public, Quarterly Journal of Economics, 113:1, 187-226.

[31] Perotti, E. and P. Volpin, 2005, Lobbying on entry, w.p., University of Amsterdam.

[32] Poitevin, M., 1989, Financial signalling and the deep pocket argument, Rand Journal of Economics, 20:1, 26-40.

[33] Titman, S. and R. Wessels, 1988, The determinants of capital structure choice, Journal of Finance, 43, no 1, 1-19.

[34] Rajan, R. and L. Zingales, 1995, What do we know about capital structure: Some evidence from international data, Journal of Finance, 50, 1-19.

[35] Rajan, R. and L. Zingales, 1998, Financial dependence and growth, American Economic Review, 88, 559-586.

[36] Rajan, R. and L. Zingales, 2003, The great reversals: The politics of financial development in the twentieth century, Journal of Financial Economics, 69:1, 5-50.

[37] Riordan, M., 2003, How do capital markets influence product market competition?, Review of Industrial Organization, 23, 179-191.

[38] Salop, S., 1979, "Monopolistic competition with outside goods," Bell Journal of Economics, 10, 141-156.

[39] Shleifer, A. and R. Vishny, 1997, Survey of corporate governance, Journal of Finance, 52:2, 737-783.

[40] Stigler G., 1958, The economies of scale, Journal of Law and Economics, 54-71.

[41] Stultz, R., 1990, Managerial discretion and optimal financing policies, Journal of Financial Economics, 26, 3-27.

[42] Stulz, R., 2005, The limits of financial globalization, Journal of Finance, 60, 1595-1638.

[43] Suominen, M., 2004, Industry Equilibrium with Moral Hazard and Outside Financing: Implications for Market Integration, European Economic Review 48, 1227-1241.

[44] Vives, X., 2000, Corporate governance: Does it matter?, in X. Vives (ed.), Corporate Governance, Cambridge Univer

[45] Vives, X., 1999, *Oligopoly Pricing,* The MIT Press, Cambridge, MA, USA.sity Press, Cambridge, UK.

[46] Williams, J., 1995, Financial and industrial structure with agency, Review of Financial Studies, 8, 431-474,

Appendix

Proof of Proposition 1: This proof is outlined in the text, and is therefore omitted.

Proof of Proposition 2: (4.1) follows immediately from Proposition 1 and implicit function differentiation (3.11), obtaining

$$\frac{\partial n^*}{\partial \beta} = -\frac{\eta}{\frac{2\alpha^2}{n^{*3}} + \theta} < 0. \tag{9.1}$$

The sign of $\frac{\partial \bar{D}}{\partial \beta}$ follows from direct differentiation of $\bar{D}$ in (3.23) and from (9.1). The sign of $\frac{\partial S_i^*}{\partial \beta}$ can be obtained by noting that, using (3.15), S_i^* can be rewritten as

$$S_i^* = \eta + \theta i + F_H - \left(\frac{\alpha}{n^*}\right)^2,$$

which, from (9.1), is decreasing in β. The sign of $\frac{\partial E_i^{M*}}{\partial \beta}$ follows from direct differentiation of E_i^{M*}. By differentiation of

$$\omega_i = 1 - \frac{S_i^*}{E_i^{M*}} = \frac{\theta(n^* - i)}{(1-\beta)\,\eta},$$

using (9.1), we obtain that

$$\frac{\partial \omega_i^*}{\partial \beta} = \theta \frac{\left[\left(\frac{2\alpha^2}{n^{*3}} + \theta\right)(n^* - i) - (1-\beta)\eta\right]}{\left(\frac{2\alpha^2}{n^{*3}} + \theta\right)(1-\beta)^2 \eta} > 0$$

for $i < i_c(\beta, \eta) \equiv n^* - \frac{(1-\beta)\eta}{\frac{2\alpha^2}{n^{*3}} + \theta}$, giving (4.3). The inefficiency of low quality technology implies that $n^* > i_c(\beta, \eta) > 0$. To see this note that $\phi F_H < F_L$ implies

$$\frac{2\alpha^2}{n^{*2}} = 2\left(F_H + \theta n^* + \eta\beta\right) > F_L > \frac{\phi\left(F_H - F_L\right)}{(1-\phi)} = \eta. \tag{9.2}$$

Finally, (4.5) is obtained by substituting (9.1) into (4.4) giving

$$\varepsilon = \frac{\beta}{n^*}\frac{\partial n^*}{\partial \beta} = -\frac{\eta\beta}{\frac{2\alpha^2}{n^{*2}} + \theta n^*} = -\frac{\eta\beta}{2\left(F_H + \theta n^* + \eta\beta\right) + \theta n^*} = -\frac{1}{\frac{2F_H + 3\theta n^*}{\eta\beta} + 2},$$

which is decreasing in η (since, in the proof of Proposition 3, we will show that n^* is decreasing in η).

Proof of Proposition 3: (4.6) follows immediately from Proposition 1 and implicit function differentiation (3.11). The sign of $\frac{\partial \bar{D}}{\partial \eta}$ can be obtained by noting that, using (3.24) and (3.25), $\bar{D}$ can be rewritten as

$$\bar{D} = F_H + \theta n^* - (1-\beta)\eta,$$

which, from (4.6), is decreasing in η. The sign of $\frac{\partial S_i^*}{\partial \eta}$ follows from direct differentiation of S_i^* in (3.14) and from (4.6). The sign of $\frac{\partial E_i^{M*}}{\partial \eta}$ follows from direct differentiation of E_i^{M*}.

Proof of proposition 4: For $i < n^*$, the derivative of entrepreneur i's payoff (3.17) with respect to β is

$$\frac{\partial V_i^*}{\partial \beta} = \mu\eta - \frac{\theta\eta}{\frac{2\alpha^2}{n^{*3}} + \theta},$$

implying (5.2). Furthermore, we obtain

$$\frac{\partial V_i^*}{\partial \beta^2} = -\frac{\theta\eta \frac{6\alpha^2}{n^4}\frac{\partial n^*}{\partial \beta}}{\left(\frac{2\alpha^2}{n^{*3}} + \theta\right)^2} > 0$$

and using (3.11) we get

$$\overline{\mu} = \frac{\theta\eta}{\frac{2\alpha^2}{n^{*3}} + \theta} = \frac{\theta\eta}{\frac{2}{n^*}\left(F_H + \theta n^* + \beta\eta\right) + \theta} = \frac{\theta\eta}{\frac{2}{n^*}\left(F_H + \beta\eta\right) + 3\theta},$$

$$\frac{\partial \overline{\mu}(\beta)}{\partial \alpha} = \frac{\frac{2\theta\eta}{n^{*2}}\left(F_H + \beta\eta\right)\frac{\partial n}{\partial \alpha}}{\left(\frac{2}{n^*}\left(F_H + \beta\eta\right) + 3\theta\right)^2} > 0.$$

Proof of Proposition 5 : With the given cost function for effort, we can rewrite the entrepreneurs objective function, (3.19), as:

$$\max_{B_i, e_i \in [0,1]} E_0\left[CF_i(B_i) - F_{H,i} - (1-e_i)\beta(1-\mu)\max\{CF_i(B_i) - B_i; 0\}\right] - C(k, e_i). \quad (9.3)$$

Using our previous results, regarding B_i^*, we can rewrite (9.3) as:

$$\max_{e_i} E_0\left[\left(\frac{\alpha}{n}\right)^2 - F_H - \theta i - (1-e_i)\beta(1-\mu)\eta - ke\left(1-e_i\right)^{-1}\right]. \quad (9.4)$$

Let $k_1 \equiv \frac{(1-2\mu)^2}{1-\mu}\beta\eta$. Under our assumption that $k \leq k_1$, the first order condition with respect to e_i gives:

$$e_i^{**} = 1 - \sqrt{\frac{k}{\beta(1-\mu)\eta}}. \tag{9.5}$$

Entry to an industry occurs until the inframarginal entrepreneur's payoff equals zero. Hence, n^{**} satisfies:

$$\left(\frac{\alpha}{n^{**}}\right)^2 - F_H - \theta n^{**} - (1-e_i^{**})\beta(1-\mu)\eta - ke_i^{**}(1-e_i^{**})^{-1} = \tag{9.6}$$

$$\left(\frac{\alpha}{n^{**}}\right)^2 - F_H - \theta n^{**} - 2\sqrt{k\beta(1-\mu)\eta} + k = 0,$$

implying that n^{**} is implicitly determined by

$$n^{**} = \frac{\alpha}{\sqrt{F_H + \theta n^{**} + 2\sqrt{k\beta(1-\mu)\eta} - k}} > n^*.$$

To see that $n^{**} > n^*$, note that

$$\beta\eta > 2\sqrt{k\beta\eta} - k > 2\sqrt{k\beta(1-\mu)\eta} - k$$

as

$$\beta\eta - 2\sqrt{k\beta\eta} + k = \left(\sqrt{k} - \sqrt{\beta\eta}\right)^2 > 0.$$

The proof is concluded by showing that, by exerting effort e^{**}, the entrepreneur is able to raise financing, that is

$$\left(\frac{\alpha}{n^{**}}\right)^2 - F_H - \theta n^{**} - (1-e^{**})\beta\eta \geq 0. \tag{9.7}$$

Using (9.6), it is easy to check that (9.7) is verified when

$$ke^{**}(1-e^{**})^{-1} \geq (1-e^{**})\beta\mu\eta,$$

that is, from (9.5), when

$$k \leq k_1 \equiv \frac{(1-2\mu)^2}{1-\mu}\beta\eta \leq (1-\mu)\beta\eta.$$

Proof of Proposition 6: Condition (6.9) is obtained directly from (6.7). Substituting (6.7) to (6.8) gives

$$(1-\hat{e}_{\hat{n}})^2\mu\beta\eta - k\hat{e}_{\hat{n}} = 0$$

$$1 + \hat{e}_{\hat{n}}^2 - \left(2 + \frac{k}{\mu\beta\eta}\right)\hat{e}_{\hat{n}} = 0$$

$$or\ \hat{e}_{\hat{n}} = \frac{1 + 2\mu\beta\eta/k - \sqrt{4\mu\beta\eta/k + 1}}{2\mu\beta\eta/k} < 1.$$

Taking the derivatives with respect to β and η gives

$$\frac{\partial \hat{e}}{\partial \beta} = \left(\sqrt{1 + \frac{1}{\left(\frac{k}{\mu\beta\eta}\right) + \left(\frac{k}{2\mu\beta\eta}\right)^2}} - \frac{1}{2} \right) \frac{k}{\mu\eta\beta^2} > 0,$$

$$\frac{\partial \hat{e}}{\partial \eta} = \left(\sqrt{1 + \frac{1}{\left(\frac{k}{\mu\beta\eta}\right) + \left(\frac{k}{2\mu\beta\eta}\right)^2}} - \frac{1}{2} \right) \frac{k}{\mu\beta\eta^2} > 0.$$

Proof of Proposition 7: Substituting for $\left(\frac{\alpha}{n^*}\right)^2$ from (3.11), we can rewrite condition (8.1) as

$$\phi F_H - F_L + \phi\eta\beta \geq (1 - \phi)\,\theta n^*. \tag{9.8}$$

Since, by assumption (that low quality technology is inefficient), we have that $\phi F_H < F_L$, condition (9.8) fails when η is small. Let now $\beta = \widetilde{\beta} > 0$. Since n^* is a decreasing function of η, given (4.6), and the right hand side of (9.8) approaches zero as $\eta \to \infty$, there exists a $\widetilde{\eta}(\widetilde{\beta})$ such that (8.1) holds as an equality if $\eta = \widetilde{\eta}(\widetilde{\beta})$. From (9.8), $\widetilde{\eta}(\widetilde{\beta})$ is implicitly defined by the following two conditions

$$\widetilde{\eta} = \frac{(1 - \phi)\,\theta n^* + F_L - \phi F_H}{\phi\widetilde{\beta}},$$

where

$$n^* = \frac{\alpha}{\sqrt{F_H + \theta n^* + \widetilde{\eta}\widetilde{\beta}}}.$$

Note that (8.1) is more likely to be satisfied when $\eta\beta$ is high, which implies that it holds also for all $\beta \geq \widetilde{\beta}$ and all $\eta > \widetilde{\eta}$. When (8.1) holds, in equilibrium at least some firms must produce with low quality technology. Let $n' > 0$ be the total number of firms and $n'' \in [0, n')$ be the number of firms using the high quality technology. It is easy to see that now firms with high quality produce

$$q_i^* = \frac{\alpha}{n'' + \phi(n' - n'')},$$

and sell their production at a price

$$p_i^* = c + \frac{\alpha}{n'' + \phi(n' - n'')}. \tag{9.9}$$

This results in cash flow

$$CF_i = \left(\frac{\alpha}{n'' + \phi(n' - n'')} \right)^2 .$$

Also, debt capacity for firms selecting high quality is equal to

$$\overline{D} = \left(\frac{\alpha}{n'' + \phi(n' - n'')} \right)^2 - \eta.$$

Therefore firms selecting high quality finance $\overline{D}$ with debt and $F_{H,i} - \overline{D}$ with equity.

The remaining $n' - n'' > 0$ entrepreneurs that enter and produce with the low quality technology produce the same amount of high quality goods only with probability ϕ. To maximize their payoff (3.19), they finance their entry entirely with debt, and borrow

$$D_i^* = F_L + \theta n'$$

of debt with a face value

$$B_i = \frac{F_L + \theta n'}{\phi},$$

and by repurchasing shares for the amount $D_i^* - F_{L,i}$.

The conditions determining firms entry and technology choice are now as follows: First, note that an entrepreneur j prefers to raise $F_{H,j}$ and select the high quality technology, rather than to raise $F_{L,j}$ and select the low quality technology, when:

$$\left(\frac{\alpha}{n'' + \phi(n' - n'')} \right)^2 - F_H - \theta j - (1 - \mu)\beta\eta \geq \phi \left(\frac{\alpha}{n'' + \phi(n' - n'')} \right)^2 - F_L - \theta j$$

or

$$(1 - \phi) \left(\frac{\alpha}{n'' + \phi(n' - n'')} \right)^2 - (F_H - F_L) - (1 - \mu)\beta\eta \geq 0. \tag{9.10}$$

Since not all firms produce with high quality when (8.1) holds, the least efficient firms must produce with low quality technology. Hence n' is determined by the marginal firm's ability to raise the necessary capital for producing with low quality technology

$$\phi \left(\frac{\alpha}{n'' + \phi(n' - n'')} \right)^2 = F_L + \theta n^{'}. \tag{9.11}$$

Firms $i \leq n''$ select the high quality technology, where n'' satisfies the condition for firms access to financing of $F_{H,i}$ with an equality

$$\left(\frac{\alpha}{n'' + \phi(n' - n'')} \right)^2 = F_H + \theta n'' + \beta\eta. \tag{9.12}$$

From (9.12), it is apparent that n'' decreases in β and η. When (9.10) and (9.12) do not hold for any $n'' \geq 0$, with n' determined by (8.2), we have that $n'' = 0$. Substituting (9.12) to (9.10) and setting $n'' = 0$ we obtain that this occurs when

$$(1 - \phi)(F_H + \beta\eta) - (F_H - F_L) - (1 - \mu)\beta\eta \geq 0,$$

that is when

$$\beta\eta \geq \frac{F_L - \phi F_H}{\phi - \mu}.$$