Corporate governance, finance, and the real sector*

Paolo Fulghieri (UNC, CEPR and ECGI) and
Matti Suominen (Helsinki School of Economics)

April 20, 2008

*For helpful comments, the authors would like to thank Philip Bond, Michel Habib, Philipp Hartmann, Florian Heider, Gordon Phillips, Roman Inderst, Matthias Kahl, Yrjö Koskinen, Max Maksimovic, Marco Pagano, Michael Roberts, Merih Sevilir, Andrei Schleifer, Raj Singh, Isil Erel, and seminar participants at the University of Zurich, Helsinki School of Economics, the 2nd Corporate Governance conference in Washington University in St. Louis, Wharton School, the University of Maryland, the European Finance Association meetings, the 2nd Banca d'Italia/CEPR Conference on Money, Banking and Finance, the Second Finance Summit and the Workshop on Politics of Corporate Governance at the Copenhagen Business School. Some of the results in this paper were contained in an earlier working paper entitled "Does bad corporate governance lead to too little competition?". All errors are our own.
E-mails: matti.suominen@hse.fi and Paolo_Fulghieri@unc.edu. Tel: +358-50-5245678 (Matti) and +1-919-962.3202 (Paolo).
Matti thanks OP-foundation and the Finnish Securities Markets Foundation for financial support.

Corporate governance, finance, and the real economy

Abstract

This paper presents a stylized model of the linkages between corporate governance, corporate finance and the real sector of an economy that is consistent with several of the observed empirical regularities. We examine a model of industry equilibrium with endogenous entry. 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. We also 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.

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 heavy metal and 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 parsimonious model, we study the relationships that emerge in equilibrium among the corporate governance system of an economy and its industrial and financial structure, and generate empirical predictions that are consistent with observed stylized facts. We examine a model of industry equilibrium with endogenous entry, and we first 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. In addition, we show that poor corporate governance and low level of investor protection affects firms' financing choices and leads 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 with either a very high

[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.

or a very low quality, affecting their incentives to lobby their politicians for good or bad governance.

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 (1990, 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, making outside equity costly to the entrepreneur. We model the agency cost of debt as a traditional risk-shifting problem (see Jensen and Meckling 1976, and Galai and Masulis, 1976). As it is typical in the presence of moral hazard in the debt markets, firms must maintain a certain minimum level of equity to mitigate the moral hazard problem, generating debt capacity.

We show that corporate governance problem in the equity market interacts in an essential way with the moral hazard problem in the debt market and jointly determine an economy's industrial and financial structure. When a firm's insiders have a greater 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. 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.

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 to the moral hazard problem. In this way, by using a parsimonious model we are able to generate predictions that are consistent with several empirical regularities that emerge in cross-country and within country comparisons.

We show that economies characterized by worse corporate governance systems are 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 abil-

ity 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), 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. In particular, 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) and Lemmon, Roberts and Zender (2007).

We show that the corporate governance system of an economy has an impact also on its industrial structure. If the low quality technology is potentially feasible in equilibrium, we show that bad corporate governance system promotes entry of firms using the low quality technology, and that a greater use of the low quality technology has an adverse effect on the number of firms that choose the high quality technology in the economy. This implies that low quality technologies may "crowd out," in equilibrium, superior technologies that are more exposed to the moral hazard problem. Thus, the countries with bad corporate governance systems may be "trapped" in an equilibrium in which their industrial structure is dominated by less profitable and less efficient firms. Our model also implies (similarly to Almeida and Wolfenzon, 2006) that in countries with poor corporate governance entry into new markets is more likely to be undertaken by already established firms, that can finance themselves by using internal resources, rather than by new entrepreneurs, that must raise capital in the equity market. This means that economies characterized by low level of investor protection and corporate governance will tend to be dominated by diversified conglomerates. Our analysis also explains why target companies in cross border mergers, as documented by Rossi and Volpin (2003), are likely to be from countries with poorer corporate governance than acquires, and that foreign direct investments flow from countries with better corporate governance regimes to those with worse corporate governance.

[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.

We extend our results in several directions. First, 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.

Second, we examine the benefits of using convertible debt (and similar instruments produced by financial innovation) as tools to control moral hazard (as suggested in Green, 1986) and therefore to facilitate entry. We show that the agency costs of equity interact with the moral hazard problem in a way that the presence of convertible debt in a firm's capital structure may *increase*, rather than decrease, the insiders' incentives to take risks.[4] This happens because on the one hand, insiders benefit from conversion of convertible debt, since conversion eliminates debt and increases the cash flow to equity (and allows insiders to divert more funds), but on the other hand are hurt by conversion as this dilutes their equity position. When insiders have little equity, as it happens with the less efficient marginal entrepreneurs, the first effect may dominate the second, and convertible debt can have the effect of inducing risk taking rather than discouraging it. In this case, the use of convertible debt does not increase marginal firms' debt capacity and does not facilitate further entry.

Third, we examine the incentives to improve the quality of the governance system both at the level of individual firms and for the overall economy. At firm level, entrepreneurs can improve (at a cost) the quality of corporate governance of their firms as part of their cost minimization strategy. 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).

We then investigate entrepreneurs' preference for good governance and, therefore, their incentives to lobby for good or bad governance. We show that the quality of

[4] This is a result of independent interest, since it shows that the interaction of the agency costs of equity and the risk shifting problem reduces the ability of convertible debt to control the excessive risk taking problem generated by debt financing.

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. Moreover, we argue that entrepreneurs are more likely to prefer good governance when they operate in markets of larger size, such as in more mature economies. Finally, we show that entrepreneurs' payoff is a convex function of the quality of the economy's governance system. This implies that, differently from Perotti and Volpin (2005), entrepreneurs have a preference for "extreme" corporate governance regimes, that is for regimes that have either a very high or a very low quality 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 quality corporate governance systems, and second with low quality systems, with relatively little transition from one group to the other.

Our paper rests at the intersection of several 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), La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000), and Becht, Bolton, and Roell (2002). By explicitly endogenizing the market structure of an industry, 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. John and Kedia (2003) discuss the costs and benefits of alternative corporate governance systems of an economy. 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) in 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, non-strategic 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.[5] 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 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. In section 5, we study the effect of corporate governance on the choice of technology. In section 6, we examine the role of the banking sector and we study the role of financial innovation. In section 7, we endogenize corporate governance, by allowing firms to exert effort to improve the quality of their governance system, and we examine entrepreneurs' preferences for good governance. Section 8 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. Consumers purchase the goods produced by the entrepreneurs, and are characterized by their demand functions (described below). All agents are risk neutral.

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 "superior" or "inferior" quality. Goods of superior quality are valued more by customers and can be sold at a greater price. The high quality technology, H, produces always superior quality goods, but at greater cost. The low quality technology, L, produces superior quality goods only with probability ϕ, while with probability $1 - \phi$ it produces

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

goods of inferior quality. Production is subject to moral hazard in that an entrepreneur's choice of technology is unobservable to both investors and customers.

The total cost of producing q_i units of output with technology τ by entrepreneur i is

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

where c is the (constant) marginal cost and $F_{\tau,i}$ the fixed cost, with $F_{H,i} > F_{L,i} \geq 0$. Thus, the high quality technology has greater fixed cost.[6] In addition, entrepreneurs differ by the efficiency of their technologies. We assume that more efficient entrepreneurs have technologies with lower fixed costs: $F_{\tau,i} = F_\tau + \theta i$, where θ is a measure of the efficiency differences among technologies. Thus, entrepreneurs with lower i are more efficient.

If a firm has produced superior 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 who produce superior quality goods, p_i is firm i's price, and $\widetilde{p}_i$ the average price of the superior quality goods in the market. This means that if the most efficient n firms produce superior quality, $\tilde{p} \equiv \frac{1}{n}\int_0^n p_j dj$. 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.[7]

We assume that, if the firm's products are of inferior 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 superior quality goods can recover their fixed costs. For simplicity, we assume initially 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 characterizes the severity of the moral hazard problem: a greater value of ϕ makes it more likely that a firm using the low quality technology produces superior quality goods, thus increasing its incentive to select such technology. Since the value of the parameter ϕ depends on a firm's technology, which is

[6] 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 "superior" quality.

[7] See, for example, Fujita *et al.* (1999) and Ottavio *et al.* (2002). Our demand function is also similar to that in Salop (1979), with the difference that in his "circular city" model, $\widetilde{p}_i$ is the average price of the two firms located "closest" to i.

presumably similar to all firms in the same industry, we interpret ϕ as representing the exposure of a particular industry to moral hazard.

Entrepreneurs obtain capital 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.[8] 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 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 the fixed costs for the high quality technology, $F_{H,i}$. 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) and Shleifer and Wolfenson (2002) 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.[9] Thus, the parameter β measures the severity of the agency cost of equity. 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 (see also Pagano and Roell, 1998, and Stulz, 2005). For expositional simplicity, we assume that the fixed cost F_H is sufficiently large that, in equilibrium, entrepreneurs equity retention is such that $1 - \kappa_i < \mu$ for all i. This implies that all entrepreneurs have an incentive to divert the fraction β of the cash flow to equity. We interpret the parameters β and μ as characterizing the quality of the corporate governance system and the level of investor protection of the economy in that they determine 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 by issuing equity and debt with value S_i and D_i, respectively, in order to raise from investors the 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

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

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

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 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. Equilibrium

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 superior or inferior quality. Taking as given the average prices of the other firms producing superior quality goods, $\widetilde{p}_i = \{p_j\}_{j \neq i}$, an entrepreneur with superior 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 inferior quality goods, he has no choice other than setting a price $p_i = c$, at which it can sell a fixed quantity $\bar{x}$.

The total cash flow accruing to a firm depends on whether it has produced goods of superior or inferior quality, 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

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

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, $CFE_i(\tau_i)$, as follows

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

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

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

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

selecting

$$\tau_i^* \in \arg \max_{\tau_i \in \{H,L\}} E_1 CFE_i(p^*, \tau_i), \tag{3.6}$$

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 financial structure is determined by entrepreneur i at $t = 0$ by maximizing

$$\max_{S_i, D_i, \kappa_i, B_i} E_0 \; CFE_i(p^*, \tau_i^*) \tag{3.7}$$

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 output, q_i^*, sold at a price, p_i^*, given by

$$q_i^* = \frac{\alpha}{n^*}, \; p_i^* = c + \frac{\alpha}{n^*}. \tag{3.12}$$

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

$$\begin{aligned} S_i^* &= F_H + \theta i - D_i^* = (1-\beta)\eta - \theta(n^* - i), & (3.13)\\ D_i^* &= \bar{D} \equiv \left(\frac{\alpha}{n^*}\right)^2 - \eta > 0, & (3.14) \end{aligned}$$

and issue a fraction

$$\kappa_i^* = 1 - \frac{\theta(n^* - i)}{(1-\beta)\eta} \tag{3.15}$$

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

$$V_i^* = \mu\beta\eta + \theta(n^* - i). \tag{3.16}$$

Proposition 1 characterizes the number of entrepreneurs that enter the market in equilibrium, n^*, and their choice of financing, $\{S_i^*, D_i^*\}_{i=0}^{n^*}$.[10] Entry in the product market is determined by the interaction of the imperfections in both the debt and the equity market, captured by the parameters β and η, as follows.

Absent market imperfections, that is, when $\beta = \eta = 0$, entrepreneurs can raise in the capital markets all the funds necessary to finance profitable projects. Given that, from (3.12), the value of the rents earned in equilibrium in the product market with n firms is $\left(\frac{\alpha}{n}\right)^2$, the equilibrium number of entrepreneurs that enter the market absent capital market imperfections, n^c, is determined by condition that the marginal entrepreneurs earn zero (expected) profits, that is,

$$\left(\frac{\alpha}{n^c}\right)^2 - F_H - \theta n^c = 0, \tag{3.17}$$

Since entrepreneurs have no wealth, condition (3.17) implies that the marginal entrepreneur, n^c, will raise capital, either as debt or equity, until the rents earned on the product market$\left(\frac{\alpha}{n^c}\right)^2$ are equal to his fixed costs, $F_H + \theta n^c$. We will refer to n^c as the "perfectly competitive" outcome. From (3.11), it is easy to see $n^c > n^*$ when $\eta\beta > 0$.

The presence of imperfections in the capital markets reduces entry because it limits the ability of entrepreneurs to raise capital on both the equity and the debt markets. On the one hand, raising funds by issuing equity is costly for the entrepreneur. This happens because the entrepreneur appropriates a fraction β of the residual cash flow, after the repayment of debt. This is costly, since the entrepreneur enjoys only a fraction μ per dollar of diverted cash flow, while the remainder $1 - \mu$ is dissipated. This deadweight loss represents the agency cost of equity. Since the entrepreneur ultimately bears the cost of this inefficiency (because investors rationally anticipate the cash flow diversions), raising outside equity is expensive and the entrepreneur will prefer to raise as much capital as possible in the debt market.

The amount of funds that the entrepreneur can raise in the debt market, on the other hand, is limited by the moral hazard problem. 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 superior quality goods. Therefore the low quality technology is riskier than the high quality one, exposing creditors to a "risk shifting" problem. Since (by assumption) the low quality technology is not sustainable, an entrepreneur can in equilibrium obtain financing 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 with face value B_i^* that satisfies the incentive-compatibility condition

$$\left(\frac{\alpha}{n^*}\right)^2 - B_i^* \geq \phi\left[\left(\frac{\alpha}{n^*}\right)^2 - B_i^* + F_H - F_L\right]. \tag{3.18}$$

[10] Note that in our setting S_i and κ_i can be negative for the most efficient firms, where a negative value of S_i corresponds to a share repurchase by the entrepreneur.

This implies that

$$D_i^* = B_i^* \leq \bar{D} \equiv \left(\frac{\alpha}{n^*}\right)^2 - \eta, \tag{3.19}$$

where $\eta \equiv \frac{\phi(F_H - F_L)}{(1-\phi)}$, and $\bar{D}$ represents the firm's debt capacity. Note that 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. Thus, in this sense, η is a measure of the severity of the moral hazard problem and, therefore, of the agency costs of debt. Note also that debt capacity $\bar{D}$ depends on both on the severity of the moral hazard problem, η, and on the level of industry concentration, n^*. A 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, reducing its debt capacity. Conversely, greater industry concentration raises a firm's economic profits, increasing its value and, thus, its debt capacity.[11]

In equilibrium, entrepreneurs issue debt up to debt capacity, $\overline{D}$, and then sell equity to outside investors 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 (3.18) and that the entrepreneur appropriates a fraction β of it, the amount of equity that the marginal entrepreneur, n^*, can issue is $S_{n^*}^* = (1-\beta)\eta$. Thus, the marginal entrepreneur, n^*, that can obtain financing is determined by

$$\overline{D} + S_{n^*}^* = \left(\frac{\alpha}{n^*}\right)^2 - \beta\eta = F_{H,n^*} = F_H + \theta n^*. \tag{3.20}$$

This condition requires that 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 costs, F_{H,n^*}. Inframarginal entrepreneurs issue to outside shareholders only the amount of equity that is strictly necessary to raise $F_{H,i}$, leading to (3.13). Since firms' equity has a market value $E^{M*} = (1-\beta)\eta$, the fraction of equity sold by entrepreneur i is S_i^*/E^{M*}, giving (3.15). 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 (3.16).

Finally, from (3.14), 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 $n^* = n^c$. Similarly, 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 (8.3), entry would occur until $n^* = n^c$.

[11] 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.

It is the interaction of the imperfections in both the equity and debt markets, *i.e.* when $\beta\eta > 0$, that limits the ability of entrepreneurs to raise capital, reducing the equilibrium number of firms that can enter a new market.

4. Governance, Finance, and Industry Concentration

The quality of the corporate governance system (measured by β) and industry characteristics (that is, the severity of the moral hazard problem, measured by η) interact in an essential way and they jointly determine industry concentration and corporate financial structure of our economy. Define ownership concentration as $\omega_i = 1 - \kappa_i$.

Proposition 2 *(Corporate governance, industry concentration and financial structure): Economies with worse corporate governance are characterized by greater industry concentration, greater debt level, lower book and market value of equity and greater ownership concentration for the more efficient entrepreneurs*

$$\frac{\partial n^*}{\partial \beta} < 0 \ , \quad \frac{\partial \bar{D}}{\partial \beta} > 0, \quad \frac{\partial S_i^*}{\partial \beta} < 0, \quad \frac{\partial E_i^{M*}}{\partial \beta} < 0, \ \frac{\partial \omega_i^*}{\partial \beta} > 0 \quad \textit{iff} \quad i < i_c(\beta, \eta) \tag{4.1}$$

(where $i_c(\beta, \eta)$ is defined in the Appendix). Furthermore, defining the elasticity of entry to corporate governance as $\varepsilon(n^*, \beta|\eta) = \frac{\partial n^*}{\partial \beta}\frac{\beta}{n^*} < 0$, we have that

$$\frac{\partial \varepsilon(n^*, \beta|\eta)}{\partial \eta} < 0. \tag{4.2}$$

Economies characterized by worse corporate governance regimes and lower levels of investor protection (higher β) have greater industry concentration. This happens because worse corporate governance limit the entrepreneurs' ability to raise equity from outside shareholders, reducing entry. 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 more important, leading to (4.2).

Corporate governance of lower quality leads also to greater debt capacity. 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. Greater profits, in turn, relax the incentive compatibility constraint, (3.18), 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, that is, S_i^* and E_i^{M*}, respectively. 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) rely relatively more on equity financing. For these firms, worse corporate governance (that is, a greater value of β) means that they must sell a greater fraction of their equity to outsiders, decreasing ownership concentration. Conversely, more efficient firms must sell less equity and, thus, rely relatively more on debt financing. This means that the increase in debt capacity due to the worse corporate governance regime allows these firms to issue relatively less equity to outsiders investors, 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, lower corporate debt level, greater book and market value of equity, and lower ownership concentration*

$$\frac{\partial n^*}{\partial \eta} < 0, \quad \frac{\partial \bar{D}}{\partial \eta} < 0, \quad \frac{\partial S_i^*}{\partial \eta} > 0, \quad \frac{\partial E_i^{M*}}{\partial \eta} > 0, \quad \frac{\partial \omega_i^*}{\partial \eta} < 0. \tag{4.3}$$

Industries exposed to more severe moral hazard (greater η) are characterized by greater concentration. This happens because greater exposure to moral hazard reduces a firm's debt capacity. 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). These predictions are consistent with the available empirical evidence on the cross-sectional variation of industry and financial structure within an economy and across legal jurisdictions.

In our model, firms' heterogeneity originates from three different sources. First, within a given industry, firms differ by their level of efficiency i, with more efficient firms needing 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. We now consider the effect of the three parameters $\{i, \eta, \beta\}$ on several key ratios that are determined endogenously in the model.

First, for each individual firm $i \in [0, n^*]$ within an industry, we consider: *i)* the *debt-to-equity* ratio, D_i^*/S_i^*; *ii)* the *book-to-market* ratio of equity S_i^*/E_i^{M*} ; iii) the degree of

ownership concentration, $\omega_i^* = 1 - \kappa_i^*$, and *iv)* the *return on assets*: $ROA_i^* = CF_i^*/F_{H,i}$. Second, we make comparisons across industries and legal jurisdictions by determining at the industry level the same key ratios we have identified above. For simplicity, we considered the relevant ratios for the total industry, rather than looking at the averages of the ratios for all firms in an industry. Tables 1-a and 1-b present the sign of the partial derivatives of the ratios with respect to the relevant parameters.[12]

Table 1-a: Within industry cross-sectional variations

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

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

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

A plus (negative) sign indicates a positive (negative) partial derivative of the ratio or variable with respect to i, η or β, respectively. Parameter i represents firm efficiency, with a greater i corresponding to a less efficient firm; parameter η represents a technology's exposure to moral hazard, with a greater η corresponding to higher moral hazard; parameter β represents the quality of a country's corporate governance framework, with a greater β corresponding to a lower level of investor protection.

a) Cross-sessional variations within an economy. By contrasting tables 1-a and 1-b, it is easy to see 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. This result is consistent with the finding in Mackay and Phillips (2005) that entrants (corresponding to our marginal firms) have less leverage and are less profitable than incumbent firms within industries.

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

[12] The proofs are omitted, and they are available from the authors upon request.

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), Demirguc-Kunt and Maksimovic (1988) among others. Our results suggest also that the sectors characterized by greater moral hazard problems have less concentrated ownership and lower market to book value of equity.

b) Cross-sessional variations across economies. 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 again 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), and Doidge, Karolyi, and Stulzv(2007), which shows that country specific factors are as important as other firm-specific factors in determining a firm's capital structure decision. 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. Empirical evidence that legal protection affects entry is also present in Wurgler (2000). 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. Governance and Industry Structure

5.1. Governance and Technology Choice

The quality of the corporate governance system can also affect a firm's choice of technology and thus, through this second channel, the economy's industrial structure. We investigate this possibility in this section by considering the parameter region where the low quality technology is sustainable and will be chosen by some firms in equilibrium.[13] We maintain the assumption that the high quality technology is more efficient that the low quality one.

Proposition 4 *(Corporate governance and technology choice): There are threshold values* $\widetilde{\beta} \in (0,1]$ *and* $\tilde{\eta}(\widetilde{\beta})$ *such that if* $\eta > \widetilde{\eta}$ *and* $\widetilde{\beta} \leq \beta \leq 1$ *in equilibrium* $n^{'} > n^{*}$ *entrepreneurs enter the market and:*

i) *the first* $n^{''} < n'$ *of these choose the high quality technology, and raise* $\overline{D}$ *of debt and* $F_{H,i} - \overline{D}$ *of equity, where* n'' *is a decreasing function of* β *and* η*;*

ii) *the remaining* $n' - n'' > 0$ *entrepreneurs choose the low quality technology and finance their fixed costs entirely with debt by borrowing* $D_i^* = F_L + \theta n'$*.*

In equilibrium, both low quality and high quality technology may coexist. Entrepreneurs that choose the low quality technology, that is $i \in (n^{''}, n']$, can finance their fixed cost $F_{L,i}$ entirely by debt. This happens because their investors are not exposed to moral hazard and the entrepreneurs optimally choose debt to avoid the dissipative cost of equity. The number of entrepreneurs that enter the market with the low quality technology is then determined by the condition that the marginal entrepreneur is just able to raise the fixed cost $F_{L,n'}$.

[13] This will happen when $\phi\left(\frac{\alpha}{n^*}\right)^2 - F_L - \theta n^* > 0$.

Entrepreneurs that choose the high quality technology, $i \leq n''$, issue first debt up to debt capacity, and then issue all the equity necessary to cover the fixed costs, $F_{H,i}$. Their number n'' is determined by the condition that the marginal entrepreneur is able to obtain financing,

$$\left(\frac{\alpha}{n'' + \phi(n' - n'')}\right)^2 - \left(F_H + \theta n''\right) - \beta\eta \geq 0, \tag{5.1}$$

and that he prefers 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

$$(1-\phi)\left(\frac{\alpha}{n'' + \phi(n' - n'')}\right)^2 - (F_H - F_L) - (1-\mu)\,\beta\eta \geq 0. \tag{5.2}$$

Entrepreneurs' incentives to choose the high quality technology rather than the low quality one can be seen by examining the three terms in (5.2). The first term reflects the fact that the high quality technology produces superior quality goods with certainty, while the low quality technology produces superior 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 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 $(1-\mu)\,\beta\eta$.

From the financing constraint (5.1) it is easy to see that, all else equal, an increase of the number of low quality firms that enter the market, that is a larger n', has the effect of reducing the number of entrepreneurs with high quality technology that can be sustained in equilibrium, n''. Conversely, a decrease of the number of high quality firms that enter 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 "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.

Proposition 4 shows that the number of firms that choose the high quality technology is lower in economies where the quality of the corporate governance system is of worse quality. This happens because an increase in β makes the incentive constraint (5.2) and the financing constraint (5.1) 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 firms with high quality technology. Furthermore, when quality of the

corporate governance system is sufficiently low, it is possible that either (5.1) or (5.2) are not satisfied for any $i \leq n'$, which implies that the high quality technology cannot be sustained in equilibrium, and the less efficient low quality technology completely crowds out the more efficient one.

Proposition 5 *(Technology crowding out): The high quality technology cannot be sustained in equilibrium if*

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

These observations imply that the quality of a country's corporate governance system has an impact on the choices of technology made by firms operating in its jurisdiction and thus on industrial structure of its economy. In particular, our model suggests that countries with a low quality of corporate governance system may not be able to sustain more efficient firms in capital intensive industries that are more exposed to moral hazard, such as, for example, the high-technology and pharmaceutical sectors. Thus, these countries will be at a competitive disadvantage in developing such more advanced sectors.

5.2. Corporate Structure, Cross-Border M&A, and Regulation

The quality of the corporate governance system of an economy can also have 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 have an advantage in entering new markets and exploiting new profit opportunities. This implies that these economies will tend to be dominated by diversified 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.[14]

The quality of the corporate governance system will also affect the direction of a country's foreign direct investments and cross-border merger activity. Our analysis suggests that foreign firms incorporated in countries with a better corporate governance system will have a comparative advantage in exploiting new market opportunities that emerge in countries with a poor corporate governance. In these cases, firms will enter a new foreign market either by establishing local subsidiaries, that is through foreign direct investment, or by acquiring a local company. These observations imply that in cross border mergers target companies are likely to be from countries with poorer corporate

[14] A similar prediction, but in the context of a different model, is in Almeida and Wolfenzon (2006).

governance than acquires - a prediction consistent with the findings of Rossi and Volpin (2003). Similarly, foreign direct investment is more likely to flow from countries with better corporate governance regimes to those with worse corporate governance.

An additional implication of our model derives from the effect of entry barriers (for example due to regulation) on corporate financial structure.[15] Assume that entry in an industry requires firms to sustain a certain regulatory cost, 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 leads to higher level of debt financing, greater debt-to-equity ratio at market values, and ownership concentration. 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.

6. Governance and the Structure of Financial Systems

The quality of the corporate governance system also affects the structure of an economy's financial system. This happens because the presence of a corporate governance system of poor quality will promote the development of institutions and financial tools that facilitate firms' capital raising process and, thus, more firm entry. These possibilities are explored in this section.

6.1. Governance and Bank Financing

By monitoring firms, banks can reduce the agency costs of debt by mitigating the entrepreneur's incentives to take excessive risks (see, for example, Diamond , 1991, 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 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

$$c_b < (1-\mu)(1-\lambda)\beta\eta. \tag{6.1}$$

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

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 (8.3), it is easy to see that if

$$\beta\eta > \lambda\beta\eta + c_b, \tag{6.2}$$

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 (6.1) 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 (6.1) and (6.2) 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.[16]

Our paper helps explaining the findings in Allen, Bartiloro and Kowalewski (2006), which document the presence of significant structural differences in the industry compositions of countries with market oriented financial systems (roughly corresponding to countries with better investor protection) and bank oriented financial systems. In particular, they show that the ratio of intangible to tangible assets is higher in countries with market oriented financial systems, and argue that the financial systems adapt to the industry structures of the countries. In this paper we suggests the reverse causality may hold, in that the corporate governance regime of a country affects both the proportion of intermediated financing of an economy and its industry structure. Our model predicts that countries characterized by bad corporate governance have a larger banking sector and a smaller development of industries more exposed to moral hazard, that is, in industries with a greater proportion of intangible assets.

6.2. Financial Innovations and Entry

A firm's incentives to take excessive risks that arise from debt financing can be curbed by the use of convertible securities, such as convertible debt or warrants (see, *e.g.*, Green, 1986). Thus, the possibility of using innovative financial instruments, *i.e.,* by clever design of financial instruments with embedded options, firms may limit the extent of the risk shifting problem. In this case, financial innovation, by facilitating a firm's ability to raise capital, would allow more entry, reducing industry's concentration and spurring competition.

[16] 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).

In this section we argue that the interaction of the agency costs of equity with the risk shifting problem limits the ability of convertible securities to curb the risk shifting problem. In fact, we show that the use of convertible instruments may exacerbate both the risk shifting problem and the agency cost of equity. Recall that in our paper debt is a vehicle of corporate governance in that it allows a reduction of the wealth expropriation by the manager, who is also entrepreneur, at the expense of outside shareholders. In our model, corporate insiders capture a fraction of their firm's cash flow, net of payments to bondholders. Thus, conversion of debt into equity, by increasing the cash flow to equity, eliminates the original restrain offered by debt against insider's looting their company. In this case, convertible debt may in fact *increase*, rather than decrease, the insider's incentives to take risks, exacerbating the risk shifting problem. Thus, the interaction of the risk shifting problem and the agency cost of equity may make the use of convertible securities ineffective, if not counterproductive.

Proposition 6. *(Financial innovation and industry structure):There exists a* $\underline{\beta} < 1$ *such that if* $\underline{\beta} < \beta \leq 1$ *in equilibrium the high quality technology is chosen by all firms and the number of firms entering the industry is* n^**. In this equilibrium, the least efficient firms, with indices close enough to* n^**, use only straight debt. Furthermore, there exists* $\underline{\mu}$*, such that when* $\mu > \underline{\mu}$*,* $\underline{\beta} \leq 0$*, so that this equilibrium prevails for all possible values of* β*.*

The proposition states that if β (or μ) is sufficiently large, the number of firms, and thus market concentration, is unaffected by this financial innovation. The effectiveness of convertible debt as a tool to deter insiders from excessive risk taking depends on the fraction of equity owned by insiders. In our model, firms insiders first appropriate a fraction β of the cash flow to equity, that is the firm's cash flow net of payments to creditors, and then receive a fraction of the residual cash flow in proportion to the fraction of equity they own. The possibility of conversion of the convertible bonds affects insiders incentives as follows. On the one hand, conversion eliminates debt, increases the cash flow to equity, and allows the insiders to appropriate a greater fraction of the firms' cash flow. Therefore, conversion of convertible debt voids the disciplinary role of debt. On the other hand, conversion of the bonds requires the firm to issue new shares and dilutes existing shareholders, including the insiders, providing the usual deterrent to excessive risk taking (see, again, Green 1986). Thus, if the cash flow effect dominates the dilution effect, the presence of convertible debt in a firm's capital structure promotes risk taking, if instead the dilution effect dominates the cash flow effect, convertible debt discourages risk taking (as traditionally suggested).

In our model, very efficient entrepreneurs sell very little equity to outside investors, retaining a large fraction of equity, and therefore are exposed to the potential of dilution from convertible debt. For these entrepreneurs, convertible debt is an effective tool to reduce the potential of risk shifting, and it allows them to increase debt capacity,

substitute debt financing for equity financing, and thus reduce the agency cost of equity they incur into. In contrast, the most inefficient entrepreneurs obtaining entry must issue a large amount of equity and insiders retain very little equity. Thus, for these entrepreneurs, when β is sufficiently large the cash flow effect dominates the dilution effect and for them convertible debt is worthless as a tool to reduce or eliminate the risk shifting problem. On the contrary, the use of convertible debt would induce them to take more risk. Thus, in equilibrium, entrepreneurs with sufficiently inefficient technologies (large i) do not issue any convertible debt, but use only straight debt. These observations imply that contrary to firm specific efforts to improve governance and bank financing, which promote entry, the availability of convertible debt (and other option like instruments) does not induce any additional entry in countries with poor corporate governance regimes (high β).[17]

7. The Choice of Governance Systems

The quality of the corporate governance system and the level of investor protection in an economy is not fixed, as we have assumed so far, but is determined endogenously. In this section we examine the incentives for an economy to improve the quality of its governance system at the level of individual firms as well as for the overall economic system.

7.1. Governance as a Competitive Tool

Companies can use the corporate governance system as a competitive tool and choose the quality of their 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 sustaining additional costs, can improve the quality of its own governance system beyond the level determined by a firm's legal environment, that is its legal jurisdiction. Examples of this type of firm specific activities include improving corporate disclosures, hiring highly reputable (and, presumably, more expensive) independent directors or changing corporate charters in ways that protect minority shareholders.

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. Furthermore, if effort is costly, the ability of firms to improve their own corporate governance promotes 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

[17] It is easy to show that in this case issuing warrants does not allow more entry either. It therefore seems that to a large extent our earlier results are robust to introduction of new securities, such as warrants and convertibles.

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.

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

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

where $k \geq 0$.[18] Thus, we can still 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 $\beta(1-e_i)$.
Proposition 7 *(Endogenous governance): If $k \leq k_1$ (defined in the Appendix), there exists an equilibrium where the first n^{**} entrepreneurs enter the market, with $n^* < n^{**} < n^c$. In this case, the optimal effort level exerted by each entrepreneur is*

$$e^{**} = 1 - \sqrt{\frac{k}{\beta(1-\mu)\eta}}, \tag{7.1}$$

and the optimal governance that thus emerges in an industry is

$$\hat{\beta}^* \equiv (1 - e^{**})\beta = \sqrt{\frac{k\beta}{(1-\mu)\eta}}. \tag{7.2}$$

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

Exerting effort to improve the quality of a firm's governance system reduces the agency cost of equity and allows entrepreneurs to raise more capital in the equity markets. Thus, by producing better governance, firms relax their financing constraint, promoting entry.

If the cost of producing better governance is not too high, that is, when $k \leq k_1$, all entrepreneurs exert the optimal effort, e^{**}. Industry concentration, n^{**}, is determined by the condition that entry will occur until expected profits in the industry, net of the dissipative costs μ, are sufficient to recover the entrepreneurs's cost of producing good governance. Thus, in equilibrium, entrepreneurs earns a "governance rent" that rewards them for the cost of improving the quality governance system of their firm.

[18] 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.

Furthermore, better corporate governance allows marginal entrepreneurs to raise more capital, leading to additional entry, $n^{**} > n^*$.

In equilibrium, all entrepreneurs in the same industry exert the same level of effort, e^{**}, and choose the same level of corporate governance quality, $\hat{\beta}^*$. Direct examination of (7.1) 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). 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 looking at the equilibrium level of "effective governance," $\hat{\beta}^*$, 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 3.1) that these industries are also characterized by lower leverage and greater profitability (due to 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.

If the cost of effort k is relatively large (that is, when $k > k_1$), some marginal entrepreneurs may not be able to raise the necessary capital to enter the market if they exert the optimal effort e^{**}. In this case, marginal entrepreneurs are willing to increase their level of effort beyond e^{**} to relax the financing constraint and, thus, to secure entry in the market.

Proposition 8 *(Competitive governance): Let $k > k_1$. There exists an equilibrium where the first $\hat{n} > n^*$ entrepreneurs enter the market and the marginal entrepreneurs exert greater effort level, $\hat{e}_i > e^{**}$. Furthermore, $\frac{\partial \hat{e}_i}{\partial \beta} > 0$ and $\frac{\partial \hat{e}_i}{\partial \eta} > 0$, for all $i \leq \hat{n}$.*

In the equilibrium of Proposition 7 entrepreneurs with different efficiency levels, i, exert a different level of effort, $\hat{e}_i$. 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. These differences generate heterogenous levels of corporate governance quality also within an industry. This prediction is consistent with the findings in Bruno and Claessens (2007), which finds that companies that rely more heavily on external financing have better corporate governance.

7.2. The Politics of Corporate Governance

A change in a country's corporate governance legislation affects in different ways agents in the economy. Potential entrants, $i \in (n^*, n^c]$, always (weakly) prefer better corporate governance, as this may allow some of them to enter the market and earn positive returns. Investors always prefer (ex-post) better corporate governance as this raises the value of their claims, as in Shleifer and Wolfenson (2002).

The quality of the corporate governance system has, instead, an ambiguous impact (in equilibrium) on the firms that are able to enter the market (that is, for $i \in [0, n^*]$), and therefore on their controlling shareholders' incentives to lobby in favour (or against) an improvement of legal environment of the economy. Substituting from (3.20) into (3.16), we obtain that entrepreneur i's equilibrium payoff, V_i^*, $i \leq n^*$, is equal to

$$V_i^* \equiv \left(\frac{\alpha}{n^*}\right)^2 - F_H - \theta i - \beta(1-\mu)\eta, \quad \text{for} \quad i \leq n^*. \tag{7.3}$$

From (7.3) it is easy to see that the quality of the governance system has two opposing effects on the these entrepreneurs' welfare. First, corporate governance affects the amount of private benefits, β, that an entrepreneur can extract from his firm. 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 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.[19]

Proposition 9 *(Entrepreneurs' preferences for good governance): For $i \in [0, n^*)$, we have that $sign\,(\partial V_i^*/\partial\beta) = sign\,(\mu - \overline{\mu})$, where*

$$\overline{\mu} = \frac{\theta}{\frac{2\alpha^2}{n^{*3}} + \theta} \tag{7.4}$$

Furthermore, $\frac{\partial\bar{\mu}}{\partial\beta} < 0$ and $\frac{\partial\bar{\mu}}{\partial\alpha} > 0$.

[19] Note that 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 (7.3), 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).

The proposition 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.[20] 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).

It is also interesting that according to Proposition 8, the entrepreneurs' (equilibrium) utility, V_i^*, is a convex function of the quality of the corporate governance system. This 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 means 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.[21]

The preference for good corporate governance is also affected by the distribution of wealth in the economy. This can be seen as follows. Until now we have assumed that entrepreneurs have no initial wealth, $W_0 = 0$. It is easy, however to extend the model to the case where entrepreneurs are endowed at the beginning of the game with some wealth, W_0. It is easy to see that if entrepreneur's wealth is not too large, that is, if $W_0 < \mu\beta\eta$, the resulting equilibrium is the same as in the basic model, with the exception that that $F'_H = F_H - W_0$ should replace F_H in all equations.

[20] This can be seen by verifying that the elasticity of entry, $\varepsilon(n^*, \beta|\eta)$, is decreasing in α.

[21] This result reflects the endogenous level of debt financing, and thus the endogenous level of efficiency losses from bad corporate governance: In countries with bad corporate governance firms are more debt financed, and thus the efficiency losses from further reducing the level of corporate governce are lower.

Wealth affects entrepreneurs' preference for good governance in different ways. First, entrepreneurs with sufficient wealth will need to raise less capital from outside investors and, for these firms, it may be the case that $1 - \kappa_i > \mu$. This implies that the entrepreneurs do not have the incentive to divert cash flow to equity, avoiding the efficiency loss from cash flow diversion. This means that the controlling shareholders always prefer corporate governance of poorer quality in order to deter entry, as suggested by Rajan and Zingales (2003). Since wealthy family have an large role of in many countries, see *e.g.*, Morck, Wolfenson and Yeung (2005), these family may form an important interest group in shaping their country's corporate governance system.[22]

Second, it is easy to see from (7.4) that an increase in wealth increases $\overline{\mu}$, which makes investors more likely to prefer good corporate governance. The intuition is that greater entrepreneurial wealth promotes entry, reducing the impact of corporate governance on entry decision. This means that the efficiency gains from good governance are more likely to dominate the benefits from deterring entry. This also implies that an exogenous reduction in entrepreneurial wealth in an economy may cause a shift in the entrepreneurs' preference in favor of bad corporate governance. This observation is consistent with the finding in Perotti and von Thadden (2006), who argue that the middle class wealth seems to have played a large role in shaping the financial systems and corporate governance regimes adopted by various developed countries in Europe and North America. They provide evidence that the countries where the financial holdings of the middle class were devastated by hyperinflation after First World War later moved away from market governance toward bank, family or state control. The countries that avoided this destruction of middle class wealth, on the other hand, coincide with those that we today classify as market oriented economies.

8. 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 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

[22] An interesting extension of our model is to analyze the parameter region where μ is small and thus include some inframarginal entrepreneurs for whom $(1 - \kappa_i) > \mu$ into the analysis. The number of such entrepreneurs would be determined endogenously and, from Propositions 2 and 3, we it would presumably be greater in countries characterized by corporate governance of low quality.

governance have more developed industries in capital intensive sectors and in those more exposed to moral hazard. 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 also be favoured 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-enforce the international specialization in different sectors with varying degrees of moral hazard that the adoption of different corporate governance regimes generates.

References

[1] Aggarwal, R. I. Erel, R. Stulz, and R. Williamson, 2007, Differences in Governance Practices between U.S. and Foreign Firms: Measurement, Causes, and Consequences, ECGI wp 2007.

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

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

[4] Allen, F., L. Bartiloro and O. Kowalewski, Does Economic Structure Determine Financial Structure? Mimeo, Wharton School, University of Pennsylvania.

[5] Almeida. H. and D. Wolfenzon, 2006, A Theory of Pyramidal Ownership and Family Business Groups, Journal of Finance, 61:6, 2637-2680.

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

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

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

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

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

[11] Bruno, V. and S. Claessens, 2007, Corporate governance and regulation: Can there be too much of a good thing? Working Paper #WPS 4140, World Bank Policy Research.

[12] 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.

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

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

[15] Doidge, C., A. Karolyi, and R. Stulz, 2007, Why do countries matter so much for corporate governance? Journal of Financial Economics, forthcoming.

[16] 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.

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

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

[19] 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.

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

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

[22] 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.

[23] Hyytinen, A., I. Kuosa and T. Takalo, 2002, Law or finance: Evidence from Finland, Bank of Finland discussion papers, 8, 2002.

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

[25] 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.

[26] John, K. and S. Kedia, 2003, Institutions, Markets and Growth: A Study of Comparative Corporate Governance, wp, NYU.

[27] Karhunen, J., Keloharju, M., 2001, Shareownership in Finland 2000, Finnish Journal of Business Economics 50, 188-226.

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

[29] 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.

[30] 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.

[31] La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. W. Vishny, 2000, Investor protection and corporate governance, Journal of Financial Economics, 58:1-2, 3-27.

[32] Lemmon, M., M. Roberts, and J. Zender, 2007, "Back to the Beginning: Persistence and the Cross-Sectional Distribution of Capital Structure, " forthcoming, Journal of Finance.

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

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

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

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

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

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

[39] Morck, R., D. Wolfenson and B. Yeung, Corporate governance, economic entrenchment and growth, Journal of Economic Literature, September 2005, VXLIII, No 3.

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

[41] 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.

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

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

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

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

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

[47] 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.

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

[49] Rossi, S. and P. Volpin, 2003, Cross-country determinants of mergers and acquisitions, ECGI w.p. 25/2003.

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

[51] Shleifer, A., and D. Wolfenzon, 2002, Investor protection and equity markets, Journal of Financial Economics, 66:1, 3-27.

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

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

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

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

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

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

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

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

[60] Wurgler, J., 2000, Financial markets and the allocation of capital, Journal of Financial Economics 58:1-2. pp. 187-214.

Appendix

Proof of Proposition 1: Taking as given n^* and $\widetilde{p}_i^*$, the first order condition to (3.1) leads to (3.12). This implies that the equilibrium level of cash flow to a firm i is

$$CF_i^* = CF^* = (p_i^* - c_i)\, q_i^* = \left(\frac{\alpha}{n^*}\right)^2. \tag{8.1}$$

Substituting the constraints (3.8), (3.9) and (3.10) into (3.7), we obtain that (3.7) can be written as

$$\max_{B_i} E_0 \left[CF_i\left(p^*, \tau_i(B_i)\right) - F_{H,i} - \beta(1-\mu)\max\{CF_i\left(p^*, \tau_i(B_i)\right) - B_i; 0\}\right] \tag{8.2}$$

$$s.t. \qquad \tau_i(B_i) = \arg\max_{\tau_i \in \{H,L\}} E_1\ CFN_i(p^*, \tau_i, \kappa_i).$$

Since the low quality technology is not sustainable, in equilibrium only entrepreneurs that are expected (and have the incentive) to choose the high quality technolgy can obtain financing in equilibrium. This implies that the incentive compatibility condition is (3.18) implying (3.19). From (8.2) it is easy to see that entrepreneurs first issue debt up to debt capacity $\bar{D}$, after which will issue equity. Given (3.19) the maximum amount of equity that the marginal entrepreneur with cash flow CF^* can issue is $S_{n^*}^* = (1-\beta)\eta$. This implies that n^* is determined by

$$\overline{D} + S_{n^*}^* = \left(\frac{\alpha}{n^*}\right)^2 - \beta\eta = F_{H,n^*} = F_H + \theta n^*, \tag{8.3}$$

giving (3.11). Inframarginal entrepreneurs will issue an amount of equity that is just sufficient to cover the fixed cost $F_{H,i}$ giving (3.13). Thus, the fraction of equity sold to outside investors, κ_i, is $S_i^*/(1-\beta)\eta$, giving (3.15). The payoff to the marginal entrepreneur, who given (8.3) sells all his shares to obtain entry, is $\mu\beta\eta$. The payoff to inframarginal entrepreneurs is thus (3.16).

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

$$\frac{\partial n^*}{\partial \beta} = -\frac{\eta}{\frac{2\alpha^2}{n^{*3}} + \theta} < 0. \tag{8.4}$$

The sign of $\frac{\partial \bar{D}}{\partial \beta}$ follows from direct differentiation of $\bar{D}$ in (3.19) and from (8.4). The sign of $\frac{\partial S_i^*}{\partial \beta}$ follows from the first inequality in (3.13), (3.14) and from the previous result that $\frac{\partial \bar{D}}{\partial \beta} > 0$. The sign of $\frac{\partial E_i^{M*}}{\partial \beta}$ follows from direct differentiation of $E_i^{M*} = (1-\beta)\,\eta$. By differentiation of

$$\omega_i = 1 - \frac{S_i^*}{E_i^{M*}} = \frac{\theta(n^* - i)}{(1-\beta)\,\eta}, \tag{8.5}$$

using (8.4), we obtain that

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

iff $i < i_c(\beta, \eta) \equiv n^* - \frac{(1-\beta)\eta}{\frac{2\alpha^2}{n^{*3}} + \theta}$. 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

$$\frac{2\alpha^2}{n^{*2}} = 2\left(F_H + \theta n^* + \eta\beta\right) > F_L > \frac{\phi\left(F_H - F_L\right)}{(1-\phi)} = \eta. \tag{8.6}$$

Finally, (4.2) is obtained by substituting (8.4) into

$$\varepsilon = \frac{\beta}{n^*} \frac{\partial n^*}{\partial \beta}$$

giving

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

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: The first result that $\frac{\partial n^*}{\partial \eta} < 0$ follows immediately from Proposition 1 and implicit function differentiation of (3.11). The sign of $\frac{\partial S_i^*}{\partial \eta}$ follows from direct differentiation of S_i^* in (3.13) and the result that $\frac{\partial n^*}{\partial \eta} < 0$. The sign of $\frac{\partial \bar{D}}{\partial \eta}$ then follows from the first inequality in (3.13) and (3.14). The sign of $\frac{\partial E_i^{M*}}{\partial \eta}$ follows from direct differentiation of $E_i^{M*} = (1-\beta)\eta$. The result that $\frac{\partial \omega_i}{\partial \eta} > 0$ follows from (8.5) and $\frac{\partial n^*}{\partial \eta} < 0$.

Proof of Proposition 4: 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

$$\phi\left(\frac{\alpha}{n^*}\right)^2 - F_L - \theta n^* > 0. \tag{8.7}$$

This condition requires that equilibrium profits $\left(\frac{\alpha}{n^*}\right)^2$are sufficiently large that a producer adopting a low quality technology, who obtains these profits only with probability

ϕ, can cover his fixed costs, $F_L + \theta n^*$. Note that condition (8.7) 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).

Substituting for $\left(\frac{\alpha}{n^*}\right)^2$ from (3.11), we can rewrite condition (8.7) as

$$\phi F_H - F_L + \phi\eta\beta > (1-\phi)\,\theta n^*. \tag{8.8}$$

Since, by assumption (that low quality technology is inefficient), we have that $\phi F_H < F_L$, condition (8.8) fails when η is small. Let $\beta = \widetilde{\beta} > 0$. Since n^* is a decreasing function of η, given Proposition 3, and the right hand side of (8.8) approaches zero as $\eta \to \infty$, there exists a $\widetilde{\eta}(\widetilde{\beta})$ such that (8.7) holds as an equality if $\eta = \widetilde{\eta}(\widetilde{\beta})$. From (8.8), $\widetilde{\eta}(\widetilde{\beta})$ 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 (8.7) 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 (8.7) 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 technology produce

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

and sell their production at a price

$$p_i^* = c + \frac{\alpha}{n'' + \phi(n' - n'')}. \tag{8.9}$$

This results in cash flow

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

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

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

Therefore firms selecting the high quality technology 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 superior quality goods only with probability ϕ. To maximize their payoff (8.2), 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 repurchase shares for the amount $D_i^* - F_{L,i}$.

The conditions determining firms entry and technology choice are now as follows: Since not all firms produce with the high quality technology when (8.7) 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

$$\phi \left(\frac{\alpha}{n'' + \phi(n' - n'')} \right)^2 = F_L + \theta n^{'}, \tag{8.10}$$

where $n^{''}$ is the largest number that satisfies (5.1) and (5.2). From (5.1) and (5.2) it is apparent that n'' decreases and from (8.10) that n' increases in β and η.

Proof of Proposition 5: When (5.1) and (5.2) do not hold for any $n'' \geq 0$, with n' determined by (8.10), we have that $n'' = 0$. Substituting (5.1) to (5.2) 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

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

Proof of Proposition 6: To maximize incentives to select the safe technology, convertible debt should be structured so that it is converted if and only if the entrepreneur chooses the risky technology, and the output is of high quality. Below we show that if β is large enough such convertible debt will not be adopted by the marginal entrepreneur. With convertible debt the incentive compatibility constraint for entrepreneur i can be written as

$$\mu\beta \left[\left(\frac{\alpha}{n^*} \right)^2 - B_i \right] + (1 - \kappa_i)(1 - \beta) \left[\left(\frac{\alpha}{n^*} \right)^2 - B_i \right] \geq$$

$$\phi\left(\mu\beta+\left(1-\kappa_i\right)\left(1-\gamma_i\right)\left(1-\beta\right)\right)\left[\left(\frac{\alpha}{n^*}\right)^2+F_H-F_L\right], \tag{8.11}$$

where $\gamma_i \in [0,1]$ is the fraction of shares obtained by convertible debt holders through conversion.

Next, we show that the maximal incentives to select the safe, high quality technology, are obtained if $\kappa_i = 0$ and $B_i = F_{H,i}$. First, note that the incentives are maximized by making γ_i as large as possible. To prevent debt holders from converting, if safe technology is chosen, and selecting γ_i as large as possible (given B_i), gives

$$\gamma_i^* = \min\left(1, \frac{B_i}{\left(\frac{\alpha}{n^*}\right)^2\left(1-\beta\right)}\right) > 0.$$

Next note that firms' financing constraint gives

$$\kappa_i = \frac{F_{H,i}-B_i}{\left[\left(\frac{\alpha}{n^*}\right)^2-B_i\right]\left(1-\beta\right)}. \tag{8.12}$$

Now, substituting for κ_i, the left hand side of equation (8.11) becomes

$$\mu\beta\left[\left(\frac{\alpha}{n^*}\right)^2-B_i\right]+\left(1-\beta\right)\left[\left(\frac{\alpha}{n^*}\right)^2-B_i\right]-\kappa_i\left(1-\beta\right)\left[\left(\frac{\alpha}{n^*}\right)^2-B_i\right]=$$

$$\left[\mu\beta+\left(1-\beta\right)\right]\left(\frac{\alpha}{n^*}\right)^2-F_{H,i}+B_i\beta\left(1-\mu\right),$$

which is an increasing function of B_i. Consider next the right hand side of equation (8.11). First, if $\gamma_i^* = 1$, it is independent of B_i. Second, if $\gamma_i^* < 1$, it can be written as

$$\phi\left[\mu\beta+\left(1-\kappa_i\right)\left(1-\frac{B_i}{\left(\frac{\alpha}{n^*}\right)^2\left(1-\beta\right)}\right)\left(1-\beta\right)\right]\left[\left(\frac{\alpha}{n^*}\right)^2+F_H-F_L\right]=$$

$$\left(\mu\beta+\frac{\left(1-\kappa_i\right)\left(\left(\frac{\alpha}{n^*}\right)^2\left(1-\beta\right)-B_i\right)}{\left(\frac{\alpha}{n^*}\right)^2}\right)\phi\left[\left(\frac{\alpha}{n^*}\right)^2+F_H-F_L\right].$$

This reaches its minimum at $B_i = F_{H,i}$ as, substituting for κ_i, we have that

$$\left(1-\kappa_i\right)\left(\left(\frac{\alpha}{n^*}\right)^2\left(1-\beta\right)-B_i\right)= \tag{8.13}$$

$$\frac{\left(\frac{\alpha}{n^*}\right)^2\left(1-\beta\right)-F_{H,i}+\beta B_i}{\left(\left(\frac{\alpha}{n^*}\right)^2-B_i\right)\left(1-\beta\right)}\left(\left(\frac{\alpha}{n^*}\right)^2\left(1-\beta\right)-\left(1-\beta\right)B_i-\beta B_i\right)$$

$$= \left(\frac{\alpha}{n^*}\right)^2 (1-\beta) - F_{H,i} + \beta B_i \frac{F_{H,i} - B_i}{\left(\left(\frac{\alpha}{n^*}\right)^2 - B_i\right)(1-\beta)}.$$

Now, we only have to consider the case where $B_i = F_{H,i}$ and $\kappa_i = 0$. Assuming this, firm i's incentive to select safe technology with convertible debt is satisfied when

$$(\mu\beta + (1-\beta)) \left[\left(\frac{\alpha}{n^*}\right)^2 - F_{H,i}\right] \geq$$

$$\phi\left(\mu\beta + (1-\boldsymbol{\gamma}_i)(1-\beta)\right) \left[\left(\frac{\alpha}{n^*}\right)^2 + F_H - F_L\right].$$

Substituting for $\gamma_i^* = \min\left(1, \frac{F_{H,i}}{\left(\frac{\alpha}{n^*}\right)^2(1-\beta)}\right)$ gives

$$(\mu\beta + (1-\beta)) \left[\left(\frac{\alpha}{n^*}\right)^2 - F_{H,i}\right] \geq$$

$$\geq \left[\mu\beta + (1-\beta)\max\left(0, \frac{\left(\frac{\alpha}{n^*}\right)^2(1-\beta) - F_{H,i}}{\left(\frac{\alpha}{n^*}\right)^2(1-\beta)}\right)\right] \phi\left[\left(\frac{\alpha}{n^*}\right)^2 + F_H - F_L\right]. \qquad (8.14)$$

We now show that for the n^*th firm this condition cannot hold for large β. Note that for the n^*th firm, from (8.3), we have that $\left(\frac{\alpha}{n^*}\right)^2 - F_{H,n^*} = \beta\eta$, and, from (3.19) and (3.18), we have

$$\phi\left[\left(\frac{\alpha}{n^*}\right)^2 + F_H - F_L\right] > \phi\left[\left(\frac{\alpha}{n^*}\right)^2 - \overline{D} + F_H - F_L\right] = \eta. \qquad (8.15)$$

Using again (8.3) and the assumption that $F_H > \eta$, noting that $\gamma_{n^*} = 1$, the incentive compatibility constraint (8.14) for the marginal entrepreneur n^* becomes

$$[\mu\beta + (1-\beta)]\beta\eta \geq \mu\beta\phi\left[\left(\frac{\alpha}{n^*}\right)^2 + F_H - F_L\right]$$

or

$$\beta \leq \underline{\beta} \equiv \frac{1 - \mu\frac{\phi\left[\left(\frac{\alpha}{n^*}\right)^2 + F_H - F_L\right]}{\eta}}{1-\mu} = \frac{1 - \mu\left(\frac{\eta + \phi\overline{D}}{\eta}\right)}{1-\mu} < 1.$$

By continuity of i, if $\beta > \underline{\beta}$, the incentive compatibility condition (8.14) fails also for firms with indices close enough to n^*. Finally, as $\left(\frac{\eta+\phi\overline{D}}{\eta}\right) > 0$, for large enough μ, *i.e.*, $\mu \geq \underline{\mu}$, $\underline{\beta} \leq 0$.

Proof of Proposition 7: Entrepreneurs maximize their expected profits, which now are given by

$$\max_{B_i,\tau_i,e_i} E_0\left[CF_i^*(\tau_i) - F_{H,i} - (1-e_i)\beta(1-\mu)\max\{CF_i^*(\tau_i) - B_i; 0\}\right] - C\left(k, e_i\right) \quad (8.16)$$

subject to

$$\tau_i = \arg\max_{\tau_i \in \{H,L\}} E_1[\mu\beta + (1-\kappa_i)(1-\beta)]\max\{CF_i^*(\tau_i) - B_i; 0\}. \quad (8.17)$$

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:

$$\left(\frac{\alpha}{n^{**}}\right)^2 - F_H - \theta n^{**} - (1-e_i^{**})\beta(1-\mu)\eta - ke_i^{**}\left(1-e_i^{**}\right)^{-1} = 0, \quad (8.18)$$

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

With the given cost function for effort, we can rewrite the entrepreneurs objective function, (8.16), using our previous results, regarding B_i^*, as:

$$\max_{e_i} E_0\left[\left(\frac{\alpha}{n}\right)^2 - F_H - \theta i - (1-e_i)\beta(1-\mu)\eta - ke\left(1-e_i\right)^{-1}\right]. \quad (8.19)$$

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:

$$e_i^{**} = 1 - \sqrt{\frac{k}{\beta(1-\mu)\eta}}. \quad (8.20)$$

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

$$\left(\frac{\alpha}{n^{**}}\right)^2 - F_H - \theta n^{**} - (1-e_i^{**})\beta(1-\mu)\eta - ke_i^{**}\left(1-e_i^{**}\right)^{-1} = \quad (8.21)$$

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

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

$$\left(\frac{\alpha}{n^{**}}\right)^2 - F_H - \theta n^{**} - (1 - e^{**})\beta\eta \geq 0. \tag{8.22}$$

Using (8.21), it is easy to check that (8.22) is verified when

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

that is, from (8.20), when

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

Proof of Proposition 8: In this case, the financing constraint (8.22) fails with n^{**} firms in the market. Hence, less firms enter and at the effort level e^{**} all entering firms would have strictly positive payoffs. This implies that for some marginal firms (who otherwise would be left out) it pays to exert an amount of effort $\hat{e}_i > e^{**}$ in order to obtain entry. For these firms, $\hat{e}_i$ is set sufficiently high to raise the necessary funds to successfully enter the market, that is

$$\left(\frac{\alpha}{\widehat{n}}\right)^2 - F_H - \theta i - (1 - \hat{e}_i)\beta\eta = 0. \tag{8.23}$$

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

$$\left(\frac{\alpha}{\hat{n}}\right)^2 - F_H - \theta\hat{n} - (1 - \hat{e}_{\hat{n}})(1 - \mu)\beta\eta - k\hat{e}_{\hat{n}}(1 - \hat{e}_{\hat{n}})^{-1} = 0. \tag{8.24}$$

Substituting (8.23) to (8.24) gives

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

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

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

From (8.23) and the first order condition for effort (8.20) it is easy to see that for other firms

$$\hat{e}_i = \max\{\hat{e}_{\hat{n}} - \frac{\theta(\hat{n}-i)}{\beta\eta}, e^{**}\}. \tag{8.25}$$

Taking the derivatives with respect to β and η gives

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

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

which implies, given our previous results for e^{**}, and the fact that $\frac{\partial \hat{n}}{\partial \beta} < 0$ and $\frac{\partial \hat{n}}{\partial \eta} < 0$, as can be verified using (8.24), that these derivatives are negative also for other firms.

Proof of proposition 9: For $i < n^*$, the derivative of entrepreneur i's payoff (3.16) with respect to β is

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

implying (7.4). Furthermore, using (3.11) we get

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

and

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