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# BANK OF FINLAND DISCUSSION PAPERS

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17 • 2003

Ari Hyytinen – Tuomas Takalo  
Research Department  
12.8.2003

## Investor protection and business creation

Suomen Pankin keskustelualoitteita  
Finlands Banks diskussionsunderlag

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The views expressed are those of the authors and do not necessarily reflect the views of the Bank of Finland.

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# Investor protection and business creation

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## Abstract

We study the effects of investor protection on the availability of external finance, entrepreneurship, and creation of new firms in an equilibrium search model of private capital markets. In addition to search frictions, we examine contract frictions, specifically interim and ex post moral hazard problems stemming from entrepreneurs' possibilities to expropriate financiers. In our model, the government chooses the level of investor protection that determines the transferability of match surplus between entrepreneurs and financiers. The results indicate that anything that increases (decreases) entrepreneurship also increases (decreases) the creation of start-ups. The effect of investor protection on the creation of start-ups thus hinges on the relative importance of various search and contract frictions. Only when investor protection has a sufficiently large impact on the ex post moral hazard problem relative to the interim moral hazard does strengthening investor protection enhance start-up creation. We also find that search frictions dilute the beneficial effect of investor protection and that contract frictions modify the standard Hosios condition for efficiency.

Key words: investor protection, start-up financing, private equity market, entrepreneurship, corporate finance

JEL classification numbers: E50, G21, G24

# Sijoittajan suoja ja uusien yritysten perustaminen

## Suomen Pankin keskustelualoitteita 17/2003

Ari Hyytinen – Tuomas Takalo  
Tutkimusosasto

### Tiivistelmä

Koska rahoituksen saatavuus on keskeisiä yrittäjyyden esteitä Euroopassa, viime aikaisessa kirjallisuudessa on esitetty, että sijoittajansuojan vahvistaminen edistäisi yrittäjyyttä parantamalla pienten yritysten ulkoisen rahoituksen saatavuutta. Tässä tutkimuksessa tarkastellaan tätä kysymystä, eli etsintäteoreettisen mallin avulla yritetään arvioida, mitkä ovat sijoittajansuojan vaikutukset pienten yritysten ulkoisen rahoituksen saatavuuteen, yrittäjyyteen ja uusien yritysten perustamiseen. Mallissamme sijoittajansuojan parannus vähentää tilintarkastuskustannuksia, mutta rajoittaa yrittäjän vapautta valita haluamiaan projekteja. Osoitamme, että tilintarkastuskustannusten pieneneminen edistää yrittäjyyttä ja lisää uusien yritysten lukumäärää, mutta yrittäjien toimintavapauden kapeneminen vähentää yrittäjyyden houkuttelevuutta uravaihtoehtona. Tästä seuraa se, että jos politiikan tavoitteena on yrittäjyyden edistäminen ja uusien yritysten luominen, sijoittajansuojaa sääntelevää lainsäädäntöä uudistettaessa on syytä kiinnittää huomio siihen, että pienten ja suurten yritysten tarpeet voivat olla erilaisia. Pienten yritysten toiminnan joustavuus tulisi säilyttää jopa vähemmistöomistajien suojan kustannuksella, mutta sitä vastoin kirjanpito-, tilintarkastus- ja tiedonantovelvollisuussäännösten kohdalla poikkeuksia pienten yritysten kohdalla ei ole tarpeen tehdä. Osoitamme myös, että rahoitusmarkkinoilla valitsevien etsintäkustannusten vuoksi optimaalinen politiikka ei kuitenkaan yleensä maksimoi uusien yritysten lukumäärää. Mallin avulla voidaan arvioida viimeaikaisia ehdotuksia Suomen osakeyhtiölain uudistamiseksi.

Avainsanat: sijoittajansuoja, uusien yritysten luominen, yksityiset pääomamarkkinat, yrittäjyys, yritysrahoitus.

JEL-luokittelu: E50, G21, G24

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# 1 Introduction

The lack of capital is a recognized impediment to entrepreneurship (eg Evans and Jovanovic 1989, Holtz-Eakin, Joulfaian and Rosen 1994, Blanchflower and Oswald 1998, and Johansson 2000). Blanchflower, Oswald, and Stutzer (2001, p. 690) go so far as to claim that the “lack of capital holds back millions of potentially entrepreneurial people in the industrial countries.” Empirical findings in emergent law and finance literature, including the contributions of La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, 1998, 2000, 2002) and Glaeser, Johnson, and Shleifer (2001), further suggest that improving the legal protection of investors may enhance the development of financial markets and thereby promote the creation of new firms. Strong investor protection, however, means that the freedom of entrepreneurs to run their own firms is constrained. Such reduced entrepreneurial freedom can severely discourage entrepreneurship, which has important non-pecuniary benefits such as “being one’s own boss” (Hamilton 2000, Hundley 2001, and Moskowitz and Vissing-Jørgensen 2002). This potential trade-off raises the central question of our study: How does investor protection affect entrepreneurship and business creation?

Policymakers increasingly emphasize the need to promote entrepreneurship and improve the availability of risk capital to small and medium-sized firms.<sup>1</sup> In the aftermath of emerging market crisis of 1997–1998 and well-publicized stories of outside investors expropriated by corporate insiders (eg the Enron and WorldCom scandals), the need to protect investors has become equally prominent.<sup>2</sup> On-going reforms of corporate laws in several countries nominally seek to rebalance the trade-off between investor protection and the freedom of entrepreneurial decision-making in firms.<sup>3</sup> What is not clear, however, is whether such a trade-off actually exists, and if it does exist, where the balance should shift.

The theoretical literature offers surprisingly little guidance. Traditional analyses of public policy on entrepreneurship focus on the effects of taxation, subsidies, and governmental services such as entrepreneurial training and

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<sup>1</sup> Storey and Tether (1998) describe a range of government activities intended to create high-technology firms in the European Union, and Lerner (1999). Wallsten (2000) evaluates recent experiences where the government acted as venture capitalist in the US. See also European Commission (1999, 2001), and Economic Report of the President (2001).

<sup>2</sup> See Johnson, Boone, Breach, and Friedman (2000) on the major role weak investor protection played in the emerging market crisis, and Johnson, La Porta, Lopez-de-Silanes, and Shleifer (2000) on other well-known cases of expropriation of investors.

<sup>3</sup> Reform of corporation laws are under planning or have been recently implemented in Australia, Canada, Finland, France, Denmark, Ireland, Italy, the Netherlands, and the UK. We briefly evaluate the planned reforms in Finland and the UK in the light of our analysis in the concluding section.

provision of social insurance, on risk taking and occupational choice (eg Poterba 1989, Boadway, Marchand, and Pestiau 1991 and, Black and de Meza 1997). A large body of literature considers impacts of public policy on capital market equilibrium in the presence of asymmetric information (eg de Meza and Webb 1987, 1988, 1999, and Innes 1991). The recent studies of Inderst and Müller (2002), Michelacci and Suarez (2002), and Keuschnigg and Nielsen (2003) seek to clarify the effects of public policy measures on venture capital finance and entrepreneurship, but notably do not address investor protection.

Investor protection and decisions of entrepreneurs to go public is considered by Shleifer and Wolfenzon (2002). Following them, we construct an equilibrium model of corporate finance and investor protection but, instead of frictionless equity markets and firms going public, we focus on private capital markets where search frictions impede the financing of start-ups. Search frictions of capital markets are also emphasized in Inderst and Müller (2002) and Michelacci and Suarez (2002). Much as in labor market search models (Mortensen and Pissarides 1999, and Pissarides 2000), the central problem of capital market search is the creation of cooperating coalitions of entrepreneurs without financial resources and financiers with idle capital. A basic property of the search models is that, when an entrepreneur and a financier meet, they will find a way to exploit gains from trade, if the match surplus is fully transferable and positive.

Our model goes one step further by also considering the contract frictions arising from the entrepreneur's opportunities to expropriate financiers (interim and ex post moral hazard) that constrain the transferable match surplus. Interim moral hazard limits the "pledgeable" income of entrepreneurs (Holmström and Tirole 1997), which reduces the transferability of utility between entrepreneurs and financiers. Ex post moral hazard may make monitoring or auditing costly. The costs of monitoring reduce the gross match surplus even where the interim moral hazard problem is precluded by the initial financing contract.

We assert that the government influences the transferability of the match surplus in two ways when it selects a level of investor protection, ie the stronger the investor protection, the smaller the entrepreneurs' private benefits and the lower the monitoring costs. It turns out that the two effects of the investor protection on the transferability of the match surplus lead to the trade-off between investor protection and entrepreneurship suggested in recent empirical literature. The reduction in monitoring costs expands the gross match surplus, which encourages entrepreneurship, whereas the reduction in the entrepreneur's private benefits improves transferability of utility by increasing the pledgeable income of entrepreneurs. The increase in pledgeable income diminishes advantage of becoming an entrepreneur. Moreover, search frictions appear to exacerbate the adverse consequences of strengthened investor protection on entrepreneurship.

Because entrepreneurship is latent in search equilibrium, the effects of investor protection on entrepreneurship and business creation are not necessarily

equivalent. The creation of a firm requires an individual to seek external project finance. The greater the number of latent entrepreneurs, the tighter the capital market and the more difficult it is to find financiers. We also find, however, that anything that increases (decreases) entrepreneurship also increases (decreases) business creation. Our main finding may thus be re-expressed as follows: If investor protection has a sufficiently large impact on the ex post moral hazard relative to the interim moral hazard, strengthening investor protection enhances business creation. This finding complements the finding of Glaeser et al (2001), who show that transparency regulation forms the core of investor protection by making private corporate governance and enforcement of laws more effective.

In the next section, we describe the basic model. In section 3, we consider equilibrium search market activity. In sections 4 and 5, we present our main results concerning the effects of investor protection on equilibrium interest rates, entrepreneurship, and business creation. In section 6, we consider the design of optimal policy, showing first how investor protection can be designed to maximize business creation. Since a policy that maximizes business creation does not necessarily maximize social welfare, we also consider the socially optimal level of investor protection. We give concluding remarks in section 7.

## 2 The model

The economy consists of entrepreneurs and financiers. They are infinitely lived, risk neutral, and seek to maximize the expected present value of their net income stream. The entrepreneurs lack funds, but are endowed with projects requiring a fixed start-up investment  $I$ . The money can be raised from financiers with capital, but without projects. The allocation of funds to entrepreneurs, ie the creation of new firms, is constrained by search and contract frictions.

### 2.1 Frictions

Heterogeneities and frictions hamper trade in a private capital market. In modeling their effects on the trade, we follow the labor market literature on search and matching (eg Mortensen and Pissarides 1999, and Pissarides 2000). As we are interested in the creation of new firms, we work with measures of entrepreneurs seeking finance and financiers with idle capital rather than the entire community of entrepreneurs and financiers. We denote the measures  $e$  and  $f$ , respectively. The matching of entrepreneurs and financiers takes place according to a continuous time search governed by an aggregate matching function with constant returns to scale. From the perspective of an entrepreneur, the arrival rate of a financing deal

is given by a decreasing and continuously differentiable function  $q(\theta)$ , where ratio  $\theta = e/f$  measures the tightness of capital market. Since the mass of financing deals per unit of time is  $eq(\theta)$ , the arrival rate of financing deals from the perspective of a financier is  $\theta q(\theta)$ , which is increasing in  $\theta$ . The arrival rates satisfy the usual limiting properties:  $\lim_{\theta \rightarrow 0} q(\theta) = \lim_{\theta \rightarrow \infty} \theta q(\theta) = \infty$  and  $\lim_{\theta \rightarrow \infty} q(\theta) = \lim_{\theta \rightarrow 0} \theta q(\theta) = 0$ .

Contract frictions stemming from the possibility entrepreneurs will expropriate financiers also hinder the creation of start-ups. The two common ways entrepreneurs can expropriate financiers may be described as “interim” and “ex post” moral hazard problems. The interim (ie the project choice) moral hazard emerges when, after receiving funds from a financier, the entrepreneur is able to choose between investing in a productive project or diverting the funds to a private “pet” project. The success of the private project is certain and, without investor protection, yields an infinite *non-transferable* stream of private benefits  $b$  per unit of time to the entrepreneur. In contrast, the productive project succeeds according to a Poisson process with intensity  $\gamma$  and yields a *transferable* income stream of  $\pi$  per unit of time.

Entrepreneurs can also divert and hide returns from successful productive projects. Reminiscent of the Townsend-Gale-Hellwig paradigm of costly state verification (Townsend 1979, Gale and Hellwig 1985), we assume financiers can prevent such ex post moral hazard by incurring monitoring cost flow, which has size  $v$  in the absence of investor protection. When there is no monitoring, entrepreneurs divert returns and financiers receive nothing, irrespective of initial financial contracts.

*Investor protection* mitigates both moral hazard problems. In practice, company law regulates the entrepreneurs’ possibilities to divert funds. For example, the antidirector rights index of minority shareholder protection developed by La Porta et al (1997, 1998) and extensions by Pistor (2000) and Glaeser et al (2001) include rules for limiting entrepreneurial freedom – for example, the possibility of outside investors to call an extraordinary shareholders’ meeting, or qualified majority requirements for charter changes and sales of major assets. The rules of accounting, auditing, and disclosure typically govern monitoring costs.

We specify that investor protection reduces the stream of private benefits by  $\alpha b$  and the monitoring cost flow by  $\alpha v$ , where  $\alpha \in [0,1]$  reflects the degree of investor protection in the economy. Thus, the net stream of private benefits from the private project and the total monitoring cost flow of the productive project are  $(1-\alpha)b$  and  $(1-\alpha)v$  per unit of time.

In the chosen specification, investor protection affects the two moral hazard problems proportionally. As we show in section 6, it is straightforward to generalize the model so that investor protection reduces the stream of private

benefits by  $h_b(\alpha)b$  and the monitoring cost flow by  $h_v(\alpha)v$ , where  $h_b(\alpha)$  and  $h_v(\alpha)$  are increasing functions of  $\alpha$ .

We could also assume that a productive project yields a non-transferable stream of private benefits, which is reduced by investor protection. As long as the stream per unit of time is strictly less than  $b$ , we can normalize it to zero without loss of generality. Similarly, the reduction in the monitoring cost flow caused by investor protection may also be partly offset by an increase in the disclosure costs that entrepreneurs must incur. As long as obtaining relevant information for ex post monitoring is less expensive to the entrepreneur than the outside financier, one would expect no change in the basic results.

## 2.2 Financial contracting

We assume that, even in the absence of investor protection, entrepreneurs can directly raise funds for the fixed start-up investment from outside financiers. Following Holmström and Tirole (1997), this requires that the entrepreneur's "pledgeable" income is larger than the financier's investment costs. Denoting the common discount rate by  $\rho > 0$  allows us to formalize the Assumption as

$$\text{Assumption. } \frac{\gamma\pi}{(\gamma + \rho)\rho} - \frac{b}{\rho} - \frac{v}{\gamma + \rho} - I \geq 0.$$

The two first terms in the Assumption reflect the entrepreneur's pledgeable income, ie the maximum amount an entrepreneur can credibly promise to pay back to a financier. The two last terms capture the investment costs. From the financier's point of view, both fixed start-up cost  $I$  and monitoring cost  $v$  are needed get a productive project going. Thus, if there is no interim moral hazard ( $b = 0$ ), the Assumption simply says that the net present value of the productive project should be positive. In the presence of the interim moral hazard, however, a positive net present value is insufficient to guarantee that the entrepreneur will prefer the productive project.

If the Assumption fails to hold, there would be no private capital markets in the economy. The studies of Holmström and Tirole (1997) and Michalecci and Suarez (2002) suggest that, in such circumstances, an agent is needed to mitigate the moral hazard problems. In principle, the government in our model could be such an agent and raise the economy out of autarky by imposing a minimum level of investor protection. For simplicity, we normalize the minimum level of investor protection to zero and state that the Assumption holds even if  $\alpha = 0$ .

Although we assume pledgeable income exceeds investment costs, this does not render financial contracting trivial. In fact, as we see in the next section, moral

hazard problems modify the standard conditions for formation of a match. When an entrepreneur seeking finance and a financier with idle capital meet, bargaining over the terms of finance takes place. Provided that the shares received by each partner exceeds the forgone option of continued search, they write a financial contract stipulating the entrepreneur's repayment obligation,  $\omega$ , which is the amount per unit of time a successful entrepreneur pays back to the financier. The standard conditions for formation of a match are modified, since the moral hazard problems in our model reduce both the gross match surplus and the possibilities to transfer utility using  $\omega$ .

The bargaining takes a simple form, whereby the entrepreneur makes a take-or-leave-it offer with probability  $\beta$ . With complementary probability  $1-\beta$ , the financier makes a similar take-or-leave-it offer on the repayment obligation. In the event of rejection, the parties resume their searches for other partners.

In summary, both search and contracting frictions in our model hamper business creation. In the next section, we show how these frictions are reflected in the endogenous variables measuring the capital market tightness ( $\theta$ ) and the repayment obligation flow ( $\omega$ ).

### 3 Equilibrium

We look for solutions in the class of dynamic stochastic equilibria, so time and uncertainty are explicit, expectations rational, private gains from trade exploited subject to search and contracting frictions, and agents' actions mutually consistent.

Let  $U_E$  and  $U_F$  denote the value of an unfunded project for an entrepreneur and the value of idle capital to a financier. Following Michalecci and Suarez (2002), we focus on an economy with limited available private capital but rich in opportunities for entrepreneurs.<sup>4</sup> Specifically, we normalize the total mass of financiers to unity and assume free entry of entrepreneurs. This implies that the equilibrium measure of entrepreneurs seeking finance,  $e$ , solves the no-profit condition

$$U_E = 0. \tag{3.1}$$

---

<sup>4</sup> This is in line with the standard assumption in labor market literature, which maintains unlimited entry for entrepreneurs, but a fixed labor supply. See Mortensen and Pissarides (1999) and Pissarides (2000).

The value of idle capital to a financier must be non-negative,  $U_F \geq 0$ , because participation is voluntary. To characterize the equilibria, we determine the equilibrium values of  $\theta$ ,  $\omega$ , and  $U_F$ .

For an arbitrary repayment obligation,  $\omega$ , the value of the project with transferable return to an entrepreneur,  $G_E$ , solves the asset pricing equation

$$\rho G_E = \gamma \left( \frac{\pi - \omega}{\rho} - G_E \right). \quad (3.2)$$

Analogously, the value of the private project to the entrepreneur,  $B_E$ , is given by

$$B_E = \frac{(1 - \alpha)b}{\rho}. \quad (3.3)$$

The entrepreneur does not divert the funds to the private project if  $G_E \geq B_E$  which, using (3.2) and (3.3), can be re-expressed as

$$\omega \leq \bar{\omega} \equiv \pi - \frac{(\rho + \gamma)}{\gamma} (1 - \alpha)b. \quad (3.4)$$

Inequality (3.4) is the entrepreneur's incentive compatibility constraint. Note that the discounted value of  $\bar{\omega}$ ,  $\gamma \bar{\omega} / (\rho + \gamma) \rho \equiv \gamma \pi / (\rho + \gamma) \rho - (1 - \alpha)b / \rho$ , equals the entrepreneur's pledgeable income for a given level of investor protection.

If the entrepreneur diverts the funds, either at the outset or after the project has successfully been completed, the value of the project to the financier is zero ( $B_F = 0$ ). Provided that the entrepreneur's incentive compatibility constraint (3.4) is satisfied, the value of a productive project to the financier,  $G_F$ , solves the asset pricing equation

$$\rho G_F = \gamma \left( \frac{\omega}{\rho} + U_F - G_F \right) - v(1 - \alpha) \quad (3.5)$$

Comparing (3.5) with (3.2) shows that, in the event of success, only the financier returns to search (value  $U_F$ ). This follows from our Assumption that financial capital can be recycled, while entrepreneurial talent is specific to each project.

As explained above, once an entrepreneur and a financier meet, they begin negotiating to form a coalition. With fully transferable match surplus, a necessary and sufficient condition for the formation of a coalition is that the gross match surplus,  $G_E + G_F - I$ , exceeds the sum of the forgone options of continued search,  $U_E + U_F$ . In our model, however, moral hazard problems reduce both the gross match surplus and the transferability of utility. To make this clear, let us first

consider an entrepreneur who gets to propose a repayment obligation with probability  $\beta$ . The entrepreneur demands the entire match surplus  $S = G_E + G_F - I - U_E - U_F$  by offering repayment

$$\underline{\omega} = \frac{\rho}{\gamma} [\rho U_F + I(\rho + \gamma) + v(1 - \alpha)] \quad (3.6)$$

which solves  $G_F = U_F + I$ .

With probability  $1 - \beta$ , the financier gets to propose a repayment obligation, but cannot similarly demand the entire match surplus  $S$ . As  $G_E$  decreases in  $\omega$  and  $B_E > U_E = 0$  by (3.1) and (3.3), the entrepreneur's incentive compatibility constraint  $G_E - B_E \geq 0$  binds sooner than the entrepreneur's participation constraint  $G_E - U_E \geq 0$ . The financier therefore demands the maximum repayment,  $\bar{\omega}$ , that satisfies the entrepreneur's incentive compatibility constraint (3.4). We proceed under the assumption that the repayment determined by the financier's participation constraint satisfies the entrepreneur's incentive compatibility constraint, so that  $\underline{\omega} < \bar{\omega}$ .<sup>5</sup>

The two conditions determining repayments (3.4) and (3.6) illustrate how moral hazard problems decrease the transferable match surplus. On one hand, the utility is less transferable because the entrepreneur's private benefits reduce pledgeable income. On the other hand, the gross match surplus shrinks as monitoring increases the financier's investment costs. Because improvements in investor protection lower both the entrepreneur's private benefits and the monitoring costs, they enlarge the transferable match surplus irrespective of the agents' bargaining power.

The solution to the bargaining problem implies that the financier's share of the match surplus is

$$G_F - U_F - I = (1 - \beta)(S - B_E) \quad (3.7)$$

where  $B_E$  equals  $B_G$  evaluated at  $\omega = \bar{\omega}$ . The entrepreneur's share of the match surplus is

$$G_F - U_E = \beta S + (1 - \beta)B_E \quad (3.8)$$

Because  $S = G_E + G_F - I - U_E - U_F$  is a decreasing function of  $v$  by (3.5), equations (3.7) and (3.8) show that the ex post moral hazard problem decreases both parties' shares of the match surplus. The effect of the interim moral hazard

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<sup>5</sup> The assumption is fulfilled in equilibrium, but rather tedious to prove (calculations available upon request). The intuition, on the other hand, is clear. If it were not so, no matches would be formed and capital markets would collapse.



is, however, asymmetric. It increases the entrepreneur's share and decreases the financier's share. The asymmetric effect results from the fact that the interim moral hazard problem plays a role only when entrepreneurs are "competitive," ie when financiers get to propose the repayment obligation. Were there no interim moral hazard,  $B_E$  would be zero and equations (3.7) and (3.8) would collapse to the familiar expressions of the match surpluses.

We complete the characterization of the search equilibrium by determining the conditions for equilibrium free-entry and repayments. The value of an unfunded project for an entrepreneur satisfies

$$\rho U_E = -c + q(\theta)(G_E - U_E), \quad (3.9)$$

where  $c$  represents the flow cost of finding capital or, more generally, the flow start-up cost of a new firm (see Fonseca, Lopez-Garcia, and Pissarides 2001).

Similarly, the value of idle capital for a financier solves

$$\rho U_F = \theta q(\theta)(G_F - U_F - I). \quad (3.10)$$

By substituting (3.1) and (3.2) for (3.9), we can write the equilibrium free-entry condition for entrepreneurs, ie *the latent entrepreneurship condition*, as

$$\frac{c}{q(\theta)} = \frac{\gamma(\pi - \omega)}{\rho(\rho + \gamma)}. \quad (3.11)$$

Entrepreneurship can be regarded as latent, because not all those willing to become entrepreneurs automatically create firms. The creation of a start-up requires securing external finance to initiate the project. The latent entrepreneurship condition therefore determines the dynamic demand for financial capital. Since the expected duration of finding capital for an un-funded project is  $1/q(\theta)$ , the left-hand side of (3.11) captures the expected cost of finding capital. The right-hand side captures the entrepreneur's expected payoff from the productive project. Thus, the latent entrepreneurship condition balances the expected costs and benefits of entrepreneurship.

It is more laborious to determine the condition for equilibrium repayments, since we first need to solve the equilibrium value of idle capital ( $U_F$ ). Inserting  $S = G_E + G_F - I - U_E - U_F$  into (3.8) and rearranging the terms, we obtain

$$G_E - U_E = B_E + \frac{\beta}{1 - \beta}(G_F - I - U_F). \quad (3.12)$$

Substituting (3.1), (3.9) and (3.10) for (3.12) gives

$$U_F = \frac{(1-\beta)\theta}{\rho\beta} [c - q(\theta)B_E]. \quad (3.13)$$

From (3.13), we observe that a necessary condition for the existence of equilibrium is  $\theta \geq \underline{\theta} \equiv q^{-1}(c/B_E)$ .

After a somewhat involved process, wherein we insert (3.13), (3.1), (3.2), (3.5) back into (3.12) and then rearrange the terms, we write the *interest rate equation*, ie the condition for equilibrium repayments, as

$$\frac{\omega}{\rho} = (1-\beta) \left[ \frac{\pi}{\rho} + \frac{\theta c - B_E(\rho + \gamma + \theta q(\theta))}{\gamma} \right] + \beta \left[ \frac{(\rho + \gamma)I + v(1-\alpha)}{\gamma} \right]. \quad (3.14)$$

The search equilibrium is fully described by the capital market tightness and repayment pair  $(\theta, \omega)$  that satisfy (3.11) and (3.14). The two equilibrium conditions have useful descriptive properties as shown in Figure 1. By totally differentiating (3.11) and (3.14), we see that the latent entrepreneurship condition (LE) is a downward-sloping curve in  $(\theta, \omega)$  space and the interest rate equation (IR) slopes upward:

$$\left. \frac{d\omega}{d\theta} \right|_{LE} = \frac{c\rho(\rho + \gamma)}{q(\theta)^2\gamma} q'(\theta) < 0 \quad (3.15a)$$

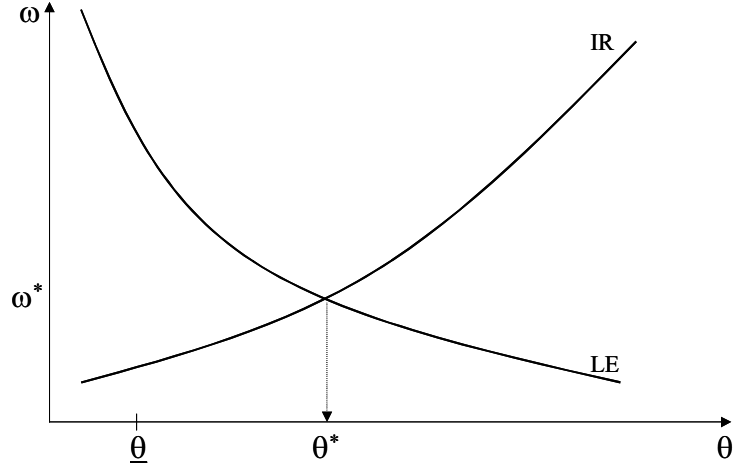
and

$$\left. \frac{d\omega}{d\theta} \right|_{IR} = \frac{(1-\beta)\rho}{\gamma} [c - B_E(q(\theta) + \theta q'(\theta))] > 0. \quad (3.15b)$$

It follows from the condition for  $U_F \geq 0$  (see equation (3.13)) that the term in the brackets in (3.15b) is positive.

Figure 1.

### Equilibrium of $\theta$ and $\omega$



To establish the existence of a unique equilibrium as drawn in Figure 1, we write

**Proposition 1.** There exists a unique equilibrium.

*Proof:* Equations (3.15a) and (3.15b) establish that if an equilibrium exists, it is unique. To guarantee that the existence of equilibrium, we show that the LE curve is above the IR curve when  $\theta$  approaches to  $\underline{\theta} \equiv q^{-1}(c/B_E)$  that solves  $U_F = 0$  in

(3.13). When  $\theta \rightarrow \underline{\theta}$ , (3.11) and (3.14) become  $\frac{\omega}{\rho} = \frac{\pi}{\rho} - \frac{c(\rho + \gamma)}{q(\underline{\theta})\gamma}$  and

$\frac{\omega}{\rho} = (1 - \beta) \left[ \frac{\pi}{\rho} - \frac{B_E(\rho + \gamma)}{\gamma} \right] + \beta \left[ \frac{(\rho + \gamma)I + v(1 - \alpha)}{\gamma} \right]$ . Because  $\frac{c}{q(\underline{\theta})} = B_E$  by definition of  $\underline{\theta}$ , we need to establish that  $\frac{\pi}{\rho} - \frac{B_E(\rho + \gamma)}{\gamma} >$

$(1 - \beta) \left[ \frac{\pi}{\rho} - \frac{B_E(\rho + \gamma)}{\gamma} \right] + \beta \left[ \frac{(\rho + \gamma)I + v(1 - \alpha)}{\gamma} \right]$  or, equivalently, that

$$\frac{\gamma\pi}{(\gamma + \rho)\rho} - \frac{v(1 - \alpha)}{\gamma + \rho} - I - B_E > 0. \quad (3.16)$$

Under our Assumption, (3.16) holds. QED.

As (3.11) and (3.14) show, another property of the equilibrium is that the interest rate equation directly depends on  $b$  and  $v$ , whereas the latent entrepreneurship equation does not. Using this property yields.

**Proposition 2.** Latent entrepreneurship is inversely related to the ratio  $v/b$  while interest rates are directly related.

*Proof:* Totally differentiating (3.14) with respect to  $\omega$ ,  $b$ , and  $v$  shows that  $\left. \frac{d\omega}{db} \right|_{IR} = -\frac{(1-\beta)\rho[\rho+\gamma+\theta q(\theta)](1-\alpha)}{\gamma} < 0$  and  $\left. \frac{d\omega}{dv} \right|_{IR} = \frac{\beta\rho(1-\alpha)}{\gamma} > 0$ , which means that the IR curve shifts up if either  $b$  decreases or  $v$  increases. Because the LE curve remains intact when  $b$  or  $v$  changes,  $\omega$  increases and  $\theta$  decreases if the ratio  $v/b$  increases. QED.

Proposition 2 suggests that interim and ex post moral hazards have counterbalancing effects on each other. The repayment obligation increases and, accordingly, the incentive to become an entrepreneur reduces, if monitoring costs increase or private benefits decrease. An increase in monitoring costs increases the financier's reservation value, which in turn increases the repayment obligation  $\omega$  when the entrepreneur proposes it. A decrease in the private benefit increases pledgeable income, which increases the repayment obligation  $\omega$  when the financier proposes it.

## 4 Entrepreneurship and interest rates

We next investigate whether investor protection increases or decreases latent entrepreneurship. As the model determines the dynamic demand for capital and the repayment obligation, it is meaningful to determine the effect of investor protection on equilibrium interest rates. Because the latent entrepreneurship condition (3.11) is independent of  $\alpha$ , the effect of investor protection on latent entrepreneurship depends on whether the interest rate equation shifts up or down in  $(\theta, \omega)$  space (Figure 2). To address the questions, consider (3.14) as a function of  $\alpha$ .

**Proposition 3.** Only if the ratio  $v/b$  is sufficiently high, strengthening investor protection lowers interest rates and increases latent entrepreneurship. Otherwise, the reverse obtains.

*Proof:* Totally differentiating (3.14) with respect to  $\theta$  and  $\alpha$  shows that

$$\left. \frac{d\theta}{d\alpha} \right|_{IR} = \frac{\beta\rho v - (1-\beta)b[\rho + \gamma + \theta q(\theta)]}{(1-\beta)\rho[c - B_E(q(\theta) + \theta q'(\theta))]} \quad (4.1)$$

Because the nominator of (4.1) is positive, the sign of the denominator determines the sign of  $d\theta/d\alpha$ . We rewrite the denominator so that the sign of  $d\theta/d\alpha$  is given by the sign of

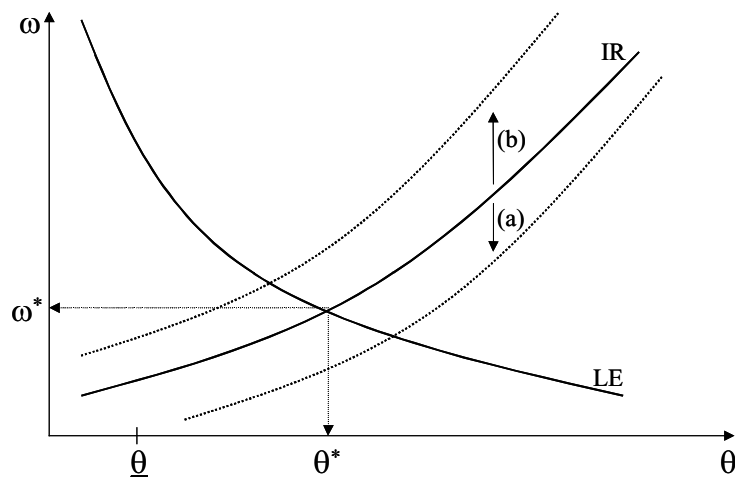
$$\frac{v}{b} - \frac{(1-\beta)[\rho + \gamma + \theta q(\theta)]}{\beta\rho}. \quad (4.2)$$

As  $\theta$  is inversely related to the ratio  $v/b$  by Proposition 2 and as  $\theta q(\theta)$  is an increasing function of  $\theta$ , (4.2) is an increasing function of the ratio  $v/b$ . Consequently, there exists a unique positive threshold level of  $v/b$  such that  $d\theta/d\alpha = 0$ . If the ratio  $v/b$  is larger (smaller) than the threshold,  $d\theta/d\alpha > (<) 0$ . QED.

In Figure 2 we illustrate the two possible outcomes of enhanced investor protection suggested by Proposition 3. If the ratio  $v/b$  is sufficiently high (outcome (a) in Figure 2), an increase in investor protection shifts the interest rate equation (3.14) down. Otherwise the interest rate equation shifts up (outcome (b)). The two potential outcomes have drastically different properties. If the interest rate equation shifts down, the new equilibrium will be characterized by strong incentives to become an entrepreneur and low interest rates. As many entrepreneurs seek finance and interest rates are low, capital markets are correspondingly tight. When the interest rate equation shifts up, interest rates are high. Entrepreneurship is unattractive and capital markets are slack.

Figure 2.

### Effect of investor protection



As an increase in investor protection may have wildly different consequences, we explain Proposition 3 carefully. We rewrite the denominator of (4.1) again to get the following formula that determines the sign of  $d\theta/d\alpha$ :

$$\frac{\beta v}{\rho + \gamma} - \frac{(1 - \beta)b}{\rho} \left[ 1 + \frac{\theta q(\theta)}{\rho + \gamma} \right]. \quad (4.3)$$

Equation (4.3) captures the effect of investor protection on the entrepreneur's share of the match surplus that, under the assumption of free-entry, determines latent entrepreneurship and capital market tightness. Enhancing investor protection decreases monitoring costs, which in turn increases the gross match surplus  $G_E + G_F - I$ . As the first term in (4.3) shows, the entrepreneur benefits from the increase whenever she gets to propose the repayment obligation.

Since an increase in investor protection makes the entrepreneur's threat of expropriating the financier less valuable, there is also a reduction in the entrepreneur's share of the match surplus whenever the financier gets to propose the repayment obligation, as shown by the second term in (4.3). In a static environment, the negative effect on the entrepreneur's share of the match surplus would simply be  $(1 - \beta)b/\rho$ , but search frictions create the multiplier in the brackets. The multiplier strengthens the negative effect, because investor protection improves the financier's reservation value,  $U_F$ .

## 5 Business creation

In the previous section, we proved that if the ratio of the monitoring costs to the private benefits is sufficiently high, improving investor protection increases entrepreneurship. It is tempting to infer that the greater the number of entrepreneurs, the more firms that will be created. Our model indicates this is not necessarily the case. Entrepreneurship is latent and search frictions discourage entrepreneurs from starting up new firms. How investor protection affects business creation is not clear a priori.

To address the question of whether investor protection increases or decreases business creation, we calculate the steady-state flow of new firms. Because the stock of idle capital is  $f$  and a free financier matches an entrepreneur seeking funds at the rate  $\theta q(\theta)$ , the flow of new start-ups at any point in time is

$$n = \theta q(\theta) f. \quad (5.1)$$

The stock of idle-capital evolves according to

$$\dot{f} = \gamma(1 - f) - n, \quad (5.2)$$

where  $\gamma(1-f)$  captures the recycling of financial capital from successful projects. In a steady state,  $\dot{f} = 0$ , which, by (5.1) and (5.2), means that the steady-state rate of business creation is

$$n = \frac{\theta q(\theta)\gamma}{\theta q(\theta) + \gamma}. \quad (5.3)$$

Equation (5.3) shows how capital market tightness has two opposite effects on business creation. The tighter the market, the faster idle capital finds a project,  $\theta q(\theta)$ , but the smaller the steady-state stock of idle capital  $f = \gamma/(\gamma + \theta q(\theta))$ . As can be verified from (5.3), the former effect dominates.

**Proposition 4.** Business creation is directly related to latent entrepreneurship.

*Proof:* From (5.3), we see  $n$  is an increasing function of  $\theta q(\theta)$ , which in turn is an increasing function of  $\theta$ . QED.

Since the steady-state rate of business creation is directly related to latent entrepreneurship and thus capital market tightness, we can combine Proposition 3 and 4 to obtain the main finding of our study.

**Proposition 5.** Only if the ratio  $v/b$  is sufficiently high, strengthening investor protection promotes business creation. Otherwise, the reverse obtains.

Proposition 5 reinforces the main message of Proposition 3: The consequences of the increased investor protection can dramatically vary depending on whether they tilt the interest rate equation up or down. In economies where monitoring costs are relatively high and capital markets relatively loose, improvements in investor protection lower interest rates and stimulate business creation. The reverse prediction applies to economies with serious interim moral hazard problems.

## 6 Designing an optimal policy

### 6.1 Maximizing business creation

The foregoing analysis suggests that, depending on emphasis, a legal reform aimed at improving the position of investors may have wide ranging consequences for business creation. How then should the protection of investors be reformed if policy is appraised, as in fact often happens, solely in terms of the number of start-ups created?<sup>6</sup> We address this question before characterizing the socially optimal level of investor protection.

To obtain practical policy advice, we assume that investor protection reduces the stream of private benefits by  $h_b(\alpha)b$  and the monitoring cost flow by  $h_v(\alpha)v$ , where  $h_b(\alpha)$  and  $h_v(\alpha)$  are increasing and continuously differentiable functions of  $\alpha$  with images  $[0, 1]$ . It is straightforward to show that the effect of investor protection on business creation boils down to the sign of

$$\frac{h_v'(\alpha)v}{h_b'(\alpha)b} - \frac{(1-\beta)[\rho + \gamma + \theta q(\theta)]}{\beta\rho}, \quad (6.1)$$

which corresponds to equation (4.2) in our basic model. Combining equation (6.1) with Propositions 3 and 5 gives

**Proposition 6.** Only when the ratio  $h_v'(\alpha)/h_b'(\alpha)$  is sufficiently high does strengthening investor protection lower interest rates and increase latent entrepreneurship and business creation. Otherwise, the reverse obtains.

Proposition 6 suggests that if a reform mainly reduces monitoring costs, it lowers interest rates and promotes entrepreneurship and business creation. If, however, the reform principally constrains the freedom of entrepreneurs to choose projects, it has the reverse effect of raising interest rates and discouraging entrepreneurship and business creation.

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<sup>6</sup> There are of course numerous other policies that are commonly used by policy makers to promote entrepreneurship besides investor protection. Some of them can be analyzed in our model (see appendix 1).



## 6.2 Maximizing social welfare

The previous sections discussed the objective of maximizing the creation of start-ups. Such an objective is not necessarily socially optimal due to the limited supply of private capital and search costs. Entry of a new entrepreneur causes a positive externality on the other side of the market by increasing the probability that financiers find a match (thin-market externality). Decreasing the probability that other entrepreneurs match it simultaneously causes a negative externality on the same side of the market (congestion externality). In this subsection, we compare the market equilibrium to the constrained social optimum and characterize the conditions under which investor protection can be used to obtain efficiency.

Since (5.3) suggests that, for a given  $\gamma$ , the creation of start-ups in market equilibrium is fully characterized by capital market tightness,  $\theta$ , we derive the condition that explicitly determines  $\theta$ . This can be found by combining the two equilibrium conditions (3.11) and (3.14), whereby

$$\beta \left[ \frac{\gamma\pi}{\rho} - v(1-\alpha) - (\rho + \gamma)I \right] - (1-\beta)[c\theta - B_E(\rho + \gamma + \theta q(\theta))] = \frac{c(\rho + \gamma)}{q(\theta)}. \quad (6.2)$$

Against this benchmark, we evaluate policymakers' actions, assuming policymakers are subject to the same search and contract frictions as market participants. Thus, the evolution of idle capital given by (5.2) also constrains policymakers. The social value of a new firm is  $\gamma\pi/\rho - v(1-\alpha)$  and the flow and fixed start-up costs are  $c$  and  $I$ , so the social welfare function for an infinitely lived economy is

$$SW = \int_0^{\infty} e^{-\rho t} \left\{ (1-f) \left[ \frac{\gamma\pi}{\rho} - v(1-\alpha) \right] - f\theta [c + q(\theta)I] \right\} dt. \quad (6.3)$$

A utilitarian social planner's problem is to choose capital market tightness  $\theta$  to maximize  $SW$  subject to (5.2). The current-value Hamiltonian associated with this dynamic optimization problem can be written as

$$H(\theta, f, \lambda) = (1-f) \left[ \frac{\gamma\pi}{\rho} - v(1-\alpha) \right] - f\theta [c + q(\theta)I] + \lambda [\gamma(1-f) - \theta q(\theta)f], \quad (6.4)$$

where  $\lambda$  is a co-state variable. Maximizing (6.4) with respect to  $\theta$  and  $f$  yields the following first-order conditions:

$$-fc - f[q(\theta) + q'(\theta)](I + \lambda) = 0 \quad (6.5a)$$

and

$$v(1-\alpha) - \frac{\gamma\pi}{\rho} - \theta[c + q(\theta)I] - \lambda[\gamma + \theta q(\theta)] = \lambda\rho - \dot{\lambda}. \quad (6.5b)$$

Evaluating (6.5b) in the steady state and substituting  $\lambda$  from (6.5b) for (6.5a) gives the condition that determines socially optimal  $\theta$  and thereby the socially optimal number of start-ups as

$$[1 - \eta(\theta)] \left[ \frac{\gamma\pi}{\rho} - v(1-\alpha) - (\rho + \gamma)I \right] - c\theta\eta(\theta) = \frac{c(\rho + \gamma)}{q(\theta)}, \quad (6.6)$$

where  $\eta(\theta) \in [0, 1]$  denotes the elasticity of the matching function  $q(\theta)$ .

Comparing the social optimum (6.6) with the market equilibrium (6.2), we see that they coincide if, and only if,

$$\eta(\theta) = (1 - \beta)(1 - \xi), \quad (6.7a)$$

where

$$\xi \equiv \frac{(1 - \alpha)b(\rho + \gamma + \theta q(\theta))}{\gamma\pi - \rho[v(1 - \alpha) + (\rho + \gamma)I + c\theta]} \geq 0. \quad (6.7b)$$

Equation (6.7b) shows that, in the absence of interim moral hazard,  $\xi = 0$ . As a result, equation (6.7a) reduces to  $\eta(\theta) = 1 - \beta$ , ie the Hosios condition (Hosios, 1990), which states that the bargaining power of market participants should reflect their contribution to the creation of net surplus. Contributions are captured by the elasticity of the matching function.

Similar to Michelacci (2003), who extends Hosios' (1990) results to incorporate technological externalities, we use equations (6.7a) and (6.7b) to extend Hosios' (1990) results to a capital market environment where the contract frictions reduce the transferability of utility between market participants.

**Proposition 7.** In the presence of interim moral hazard, market allocation can generate the socially optimal allocation only if the financiers' bargaining power  $1 - \beta$  is larger than  $\eta(\theta)$ .

*Proof:* If  $b > 0$ ,  $\xi > 0$ , and equation (6.7a) only holds if  $1 - \beta > \eta(\theta)$ . QED.

To understand this, recall from section 3 that the interim moral hazard problem plays a role only when entrepreneurs are “competitive,” ie when financiers propose the repayment obligation. When proposing the repayment obligation, the financiers need to allow entrepreneurs a sufficiently high share of the output to avoid expropriation. This link between the interim moral hazard problem and the financiers’ bargaining power is reflected in (6.7a) and (6.7b). Compared to the standard Hosios condition, the opportunity of expropriating financiers makes entrepreneurship overly attractive from the standpoint of social welfare. It makes the negative congestion externality created by the entry of an entrepreneur on the same side of the market overly strong with respect to the positive thin-market externality on the other side of the market. Thus, the market allocation can be efficient only if the effect of the interim moral hazard on the entrepreneurs’ entry decisions is offset by an increase in the financier’s bargaining power.

Can the protection of investors be reformed to obtain efficiency? To address this question, we write  $\xi(\alpha)$  given by (6.7b) as a function of  $\alpha$ . Note that although the direct effect of  $\alpha$  on  $\xi(\alpha)$  is negative, the indirect effect through  $\theta$  determined by (6.2) is quite complicated. This makes it hard to obtain decisive conclusion without imposing further restrictions on parameters. Nonetheless, we can prove that

**Proposition 8.** If  $\frac{\eta(\theta)}{1-\beta} \in [1-\xi(0), 1]$ , there exists  $\alpha^* \in [0, 1]$  such that market allocation and social optimum coincide.

*Proof:* Because  $\xi(\alpha)$  is a continuous function of  $\alpha$  and (6.7b) shows that  $\xi(0) > \xi(1) = 0$ , there exists at least one  $\alpha \in [0, 1]$  such that (6.7a) holds if  $\frac{\eta(\theta)}{1-\beta} \in [1-\xi(0), 1]$ . QED.

It immediately follows from Propositions 7 and 8 that if the financiers’ bargaining power  $1 - \beta$  is smaller than  $\eta(\theta)$ , policymakers can *never* use investor protection to implement efficiency. If  $1 - \beta < \eta(\theta)$ , the congestion externality is relatively strong compared with the thin-market externality. It would thus be desirable to mitigate the congestion externality by discouraging entrepreneurship. However, even imposing the maximal level of investor protection does not sufficiently reduce the entry by entrepreneurs to balance the two externalities. Nevertheless, if the standard Hosios condition holds, the maximal level of investor protection,  $\alpha = 1$ , yields the social optimum. At  $\eta(\theta) = (1 - \beta)$ , the congestion and thin-market externalities without contract frictions counterbalance each other exactly. As contract frictions only tend to enhance the congestion externality, they should be eliminated completely.

## 7 Conclusions

In this study, we built an equilibrium model of private capital markets characterized by search frictions and imperfect investor protection. Search frictions delay the funding of start-ups, while poor legal protection of financiers reduces the transferable match surplus.

Our analysis confirms the existence of the trade-off between investor protection and business creation suggested in recent empirical literature. We show that, depending on the policy emphasis, improving the position of investors can have widely disparate consequences. A reform that mainly reduces monitoring costs lowers interest rates and promotes entrepreneurship and business creation. A reform that principally constrains the freedom of entrepreneurs to choose projects has the reverse effect of raising interest rates and discouraging entrepreneurship and business creation. It also turns out that the search frictions dilute the beneficial effect of investor protection on business creation. In an economy where entrepreneurs have difficulties finding financiers, it is more likely that stronger investor protection discourages entrepreneurship and business creation.

Despite the limitations of our model, we offer several rather concrete policy recommendations. The legislation concerning monitoring costs often consists of various transparency rules such as accounting, auditing, and disclosure. Our analysis suggests that strengthening such transparency rules might stimulate entrepreneurship and business creation. In contrast, a cautious approach is called for with regulations controlling the freedom of entrepreneurs to choose projects. Many laws governing minority-shareholder protection such as low thresholds for calling extraordinary shareholders' meetings, or qualified majority requirements for charter changes and sales of major assets, typically reduce entrepreneurial freedom. In particular, the antidirector rights index of minority shareholder protection developed by La Porta et al (1998) and its extensions by Pistor (2000) and Glaeser et al (2001) include several rules that limit entrepreneurial freedom when applied to small companies. The implication here is that such laws should not be applied to small companies as harshly as to large corporations.

We conclude by briefly assessing the planned major reforms of corporate laws in the UK and Finland in the light of our findings. Both the Final Report of the Company Law Review (2001) by the British Department of Trade and Industry and the Final Report on the Reform of the Finnish Companies Act (2003) by Finland's Ministry of Justice propose that the flexibility of decision-making in small firms should be increased by relaxing the constraints that the current laws impose upon management and controlling shareholders. The reports also seem to recognize that there potentially is a trade-off, ie that the constraints would be relaxed partly at the expense of such investor protection that were originally designed for large businesses. Our findings suggest such a distinction between

small and large companies is justified, particularly in the case of shareholder protection rules restricting entrepreneurial freedom, and perhaps to a lesser extent in the case of rules on accounting, auditing, and disclosure. Here the Finnish and UK reform agendas differ. Whereas the reductions in transparency regulation of small businesses are emphasized in Finland, the goal of the UK reform is quite in line with our analysis, as it even seems to incorporate the distinction between types of investor protection. The Final Report of the Company Law Review (Department of Trade and Industry, UK, 2001, p. xi) observes, “Our law should provide the maximum possible freedom combined with the transparency necessary to ensure the responsible and accountable use of that freedom.”

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# Appendix 1

## Promoting Business Creation: Beyond Investor Protection

Although a proper comparison of investor protection with current applied policies for promoting entrepreneurship and business creation is beyond the scope of this study, we briefly comment on a few common approaches in this appendix. One set of widely used policies consists of various subsidies to entrepreneurs or financiers. In our model, a subsidy may be either an interest rate subsidy or a co-investment by a government venture capitalist. Such a subsidy reduces the required amount of funds,  $I$ , because the investment scale is fixed. A reduction in  $I$ , in terms of Figure 1, shifts the IR curve down, reduces interest rates, and increases latent entrepreneurship and business creation. However, subsidies are typically funded by taxation, which is likely to be distorting.<sup>7</sup> Subsidies also lead to rent seeking and they can be misused.

Another set of the common policies aims at reducing search or start-up costs, which are captured by parameter  $c$  in our model. For example, institutions advising entrepreneurs, policies encouraging the creation of business angel networks and designing specific marketplaces for private capital would fall into this category. Many countries also strive to minimize the red tape associated with setting up a firm (eg Fonseca et al 2001). Reduced  $c$ , in terms of Figure 1, shifts the LE curve up and the IR curve down, which increases entrepreneurship. The figure gives no clear answer about the change in interest rates. However, by totally differentiating the equilibrium conditions (3.11) and (3.14) of section 3, one can show interest rates also fall. Institutions that reduce search costs suffer the same drawback as subsidies as they need to be funded through distortionary taxation.

There are also policies that raise the returns of entrepreneurs' projects, notably intellectual property rights. In our model, increasing  $\pi$  shifts both the LE and IR curve upward, raising interest rates. Total differentiation of the equilibrium conditions (3.11) and (3.14) reveals that latent entrepreneurship also increases. Intellectual property rights, however, also involve many inherent issues. For instance, they distort product market competition, reduce consumer surplus, and create hold-up power on subsequent innovations. Like investor protection, intellectual property protection is also costly to enforce.

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<sup>7</sup> Keuschnigg and Nielsen (2003) provide a comprehensive analysis of taxation in an equilibrium model of entrepreneurship and venture capital finance.

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