Fighting for Talent: Risk-shifting, Corporate Volatility, and Organizational Change[1]

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Abstract

In the nineties, average firm size decreased, organizations decentralized, and workers preferences shifted from large to small firms. Our model identifies the economic forces behind this trend. Small firms with little capital at risk are subject to risk-shifting. They realize more of their workers' risky ideas, helping small firms to poach creative workers from better capitalized firms. This advantage increases if a) workers receive easier credit access, and b) technological progress raises the payoff from new ideas, provided that it remains very difficult to distinguish good ideas from bad ideas. As small firms take excessive risk, average enterprise profitability decreases, while bankruptcy increases. Moreover, large firms react through inefficient organizational changes.
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1 Introduction

The nature of the firm has changed substantially in the last decade. As Zingales (2000) notes, asset-intensive and highly vertically integrated firms with tight control over their employees have become old-fashioned. Instead, human capital and skills of workers have become the key element in determining corporate success (Rajan and Zingales, 2002). Not surprisingly, firms have entered into fierce competition for the most talented employees. However, retaining talented workers has proved to be a difficult task because their preferences for different types of jobs seem to change over time.

Surveys during the nineties show that workers expected opportunities for personal growth from their jobs, and that "the organization encourages to challenge the way things are done" (Stum, 1998). Secure jobs in large organizations, formerly considered prestigious, were spurned by the more talented workers. They developped more positive attitudes towards jobs in small, innovative startups, although these involved less job security.[1]

These changes in worker attitudes coincided with decreasing average firm size, in particular, in the high-tech sectors of OECD countries (Pryor, 2001). Large firms, in the attempt to attract the most skilled workers, tried to imitate the way small firms operate by creating spin-offs and moving towards flatter hierarchies (Lawler et al., 1995; Michaels et al., 2001).[2] These attempts appear now vain: After the burst of the new economy bubble, large firms appear to have become very attractive again, even in the high tech sector; similarly, large companies are dismantling their corporate venture funds (*The Economist*, 2001).

The goal of our paper is to better understand the driving forces causing the coincidence of shrinking firm size, organizational transformation, and changes in worker attitudes. We argue that changes in worker attitudes have been caused by developments in financial markets and technological progress. As a consequence of these developments, small firms that rely largely on external finance have gained a comparative advantage over well-capitalized large firms: they do better in attracting more creative workers. Better access to consumer credit makes talented workers less averse to the income risk involved in working in less capitalized organizations that are more likely to default. As these organizations are more inclined to fund risky projects, they acquire a competitive edge and poach the most creative workers from well-capitalized large organizations that screen new ideas more intensively. Technological progress raises the expected payoff from realizing workers' new ideas. Our model shows that it has a similar effect: it makes small firms more, and large firms less attractive to creative workers, provided that it remains difficult to distinguish profitable ideas from loss-making ones.

In our model, the key to the comparative advantage of small firms is risk-shifting. Large firms tend to have more self-financed assets than small firms. According to the asset-substitution effect highlighted

[1] The mortality rate of firms is decreasing with age and size (Caves, 1998).

[2] A prominent example of this "small-is-beautiful" tendency was the Bertelsmann Group, which even created its own venture fund (Day et al., 2001).

by Jensen and Meckling (1976), less capitalized firms have stronger incentives to choose riskier projects, to maximize shareholder value and expropriate investors holding senior claims. As funding a worker's idea involves the risk of losing the initial investment, the more own assets or future cash flows of other projects a firm risks, the less prone it will be to fund the ideas of workers. For this reason, larger firms are more careful in screening their employees' ideas. They choose hierarchical organizational structures where several tiers have to approve any new project or larger committees devote more time to decision making. As a result, large firms are more likely to reject ideas that could have a positive net present value. This is *ex post* optimal from the point of view of maximizing the return to investment, but it has important *ex ante* implications on the attractiveness of jobs in large firms. Small firms can use the higher probability of realizing their workers' ideas in a similar way as variable pay, the positive effect of which on sorting of workers has been highlighted by Lazear (1986 and 2001). Large firms cannot commit themselves to offer jobs in which workers realize as many of their ideas as they could in small firms. This is particularly important for the more creative workers. They are the most concerned to see their ideas realized, in order to show their ability and to get higher salaries. They may, however, appreciate jobs in large firms as they are less likely to default.

Workers thus face a trade-off between better insurance and lower probability of realizing their own ideas. How this trade-off affects the choice of workers between jobs in small or large firms depends on the possibility of insurance offered by the financial market and on technological change. First, if liquidity constraints of households are relaxed - as has been the case during the last decade[3] - the propensity of creative workers to work in large firms decreases. In fact, if their idea turns out to be bad and their firm defaults, they can borrow against their future income, while looking for a new job. This implies that better access to household credit, which may be due to financial development or to easier access to consumer credit in expansive phases of business cycles,[4] makes the insurance offered by large firms less desirable. Small firms thus gain a competitive edge over larger firms in attracting creative workers. Second, technological change raises the expected payoff from realizing new ideas and negatively affects the capability of large firms to attract the most talented workers, if it remains difficult to distinguish profitable ideas from loss-making ones. In this case, the screening process of large firms remains intensive, and the most talented workers prefer to work in small firms even though the entry wage differential between large and small firms may increase.

The main contribution of the paper is to show that financial market development affects corporations not only through financial markets, but also through the labor market. Rajan and Zingales (2002) argue that better developed financial markets decrease collateral requirements and thus make it easier

[3] The eighties were characterized by a process of financial deregulation that made consumer access to credit markets easier. As a consequence, the liabilities of households increased substantially over the nineties, especially in the US. See Guiso et al. (2002) for empirical evidence of this trend.

[4] During expansions, for instance, the value of real estates is generally higher and workers can increase more easily their mortgages.

for startups to access external finance. Our model shows that access to consumer credit also affects the choice of workers to sort into small or large firms and may harm large firms because of a *labor-stealing effect*. Interestingly, workers' choices between small and large firms may change over the business cycle if the level of access to consumer credit changes.

An important implication of the model is that better access of households to capital markets may reduce average enterprise profitability. In our model, better access to credit raises the number of ideas that are funded, as small firms are less choosy in accepting new projects. In equilibrium, too many ideas are funded, the variance of small firms' profits increases, and there are more bankruptcies. The source of this inefficiency is that small firms do not fully internalize the cost of investment. This is *sub*optimal from the point of view of maximizing the gross output of the economy, but benefits the more creative workers.

The model also implies that the desire of creative workers to realize their ideas may spur organizational change in the wrong direction. Large and well-capitalized firms lose their most creative workers and become less profitable, although their conservative behavior in project selection is good for the economy. Small risk-loving firms may have higher profits than large firms, because they attract more creative workers. The loss of competitiveness of large firms may force them to change their organizations. In particular, in order to commit to adopting less intensive screening processes, large firms may have an incentive to create spin-offs that - being less capitalized - behave more like small firms.

In this respect, our paper contributes to the literature studing the conditions under which it is optimal to decentralize production: By introducing heterogeneity in workers' creativity, we show that companies may have an incentive to spin off some of their activities not only to affect workers *ex post* incentives to provide efforts, as for instance in Scharfstein and Stein (2000) and Gromb and Scharfstein (2002), but also to influence workers' *ex ante* occupational choice. Our paper is also related to Laux (2001). In his model, spinning off a highly indebted subsidiary is a device for the principal to commit to monitor the manager of the subsidiary. We show that if *ex ante* sorting and occupational choices rather than *ex post* incentives are important, the contrary may be true: spin-offs funded with external funds may be a commitment device *not* to screen projects too intensively (in order to attract creative workers).

In our model, large firms lose their competitiveness in the labor market because they screen too carefully, that is, they acquire "too much" information relative to small firms. This is related, but not identical, to the effect pointed out by Crémer (1995): more information of the principal about the type of a worker reduces the commitment to be tough if output is low.[5] Less information can then be better as it strengthens the worker's incentives. In contrast, in our model, information acquisition is always optimal with respect to maximizing the return to investment. It also does not adversely affect the payoff of the idea, which is exogenous. Nonetheless, more information acquisition may be bad for a firm as it

[5] A similar point, applied to internal capital markets, is made by Stein (2002).

makes it harder to recruit talented workers. It may then be optimal to spin off units, because this is the only way to commit to increased risk-taking as desired by the most creative workers.

The remainder of the paper is organized as follows: Section 2 describes the model; section 3 derives the equilibrium and its implications and discusses extensions; section 4 concludes.

2 The Model

Both workers and firms are heterogenous. Workers differ in their creativity, while firms differ in the amount of internally financed assets. We assume that large firms are better capitalized and fund more assets internally than small firms. Workers decide in which firm to work, that is, they "make their occupational choice" taking as given the wages firms offer, and their own beliefs about the probability of realizing their idea in large vs. small firms. Workers are risk-averse and maximize expected utility that depends on how easily they can access consumer credit and on their lifetime income. This in turn depends on the basic wage offered by the firm when they are recruited and on the additional remuneration that will accrue if they have a successfully realized idea.

We will show below that the creativity of workers determines their occupational choice. More creative workers, who are more likely to have an idea, are more inclined to work in small firms as these offer better chances to realize ideas. In what follows we present more detailed explanations about the timing of the game, workers, firms, and the supply of capital. We then define equilibrium.

2.1 Timing

First Period

- At $t = 0$, firms offer a wage contract.
- At $t = 1$, workers make their occupational choice. After choosing between small and large firms, workers are randomly matched with a firm of their favored type.
- At $t = 2$, each worker has an idea with probability ϕ, and communicates it to her employer.
- At $t = 3$, firms choose screening intensity for any idea submitted by their employees. On the basis of the outcome of the screening process, each firm decides whether or not to fund the worker's idea. If the idea is not funded, the firm employs its capital and the worker using an alternative, "traditional" technology.
- At $t = 4$, stochastic output is realized if the firm funded the worker's idea. If the idea was successful, worker and firm share the surplus according to an exogenously fixed sharing rule. If a firm goes bankrupt, workers do not get any wage. If the worker (capital) has been employed in the

traditional technology, safe returns $\underline{w}$ (r) are realized. After receiving their wages (or nothing), workers can borrow up to an exogenously fixed amount. Then, they consume.

Second Period

- At $t = 5$ (in the second period of their life), all workers and assets are employed in the traditional technology. For sake of simplicity, no further ideas emerge. Production provides safe returns r and $\underline{w}$. Workers consume.

2.2 Workers

There is a set of workers of mass 1 who live for two periods. All workers have the same productivity when employed in the traditional, risk-free technology, but they differ in creativity. A worker's creativity is ϕ, the probability of having an idea after being employed by a firm, which is uniformly distributed. A worker's idea consists of a process or product innovation that may increase the expected profits of the firm where the worker is employed.[6] It is important for our results that firm and worker are complementary in the realization of the idea: the worker cannot realize her idea outside of the firm, and the firm needs the worker to realize the idea. Ideas can be either profitable (good) or not (bad). For sake of simplicity, we assume that the quality of the idea is not correlated with the worker's creativity.

Workers know ϕ, that is, their type. Prior to recruitment firms cannot identify ϕ, and workers cannot signal their type. After recruitment, firms can screen the creativity of a worker. It is key to the results of the model that firms cannot commit themselves to a certain probability of realizing their workers' ideas.[7] Rather, they take the *ex post* optimal screening (and funding) decision after hiring a worker. As firms differ in the amount of internally financed assets, they have different screening intensities. In particular, larger firms with more assets at risk optimally want to have more precise information about the profitability of an idea before funding it. Small firms with fewer assets are more likely to realize workers' ideas (but they are also more likely to default if the idea turns out to be unsuccessful).

Workers make their occupational choice (at $t = 1$) by maximizing their expected utility that depends on the lifetime profile of their wage. This depends on the decision to work in a small or a large firm and on whether or not the worker has an idea. Thus, the worker maximizes her expected utility over two periods, $E_1(U)$, by choosing what type of firm to work in, subject to two budget constraints and

[6] In organization theory it is common to interpret value-improving innovations in a broad sense, which include all improvements of the processes for getting things done. See, for instance, Rotemberg and Saloner (2000).

[7] This assumption appears reasonable: the screening of ideas happens within the organization. Clearly, firms would want to promise to their investors that they screen intensively, but this is hardly credible.

the liquidity constraint:

$$\max_{\{c_1,c_2,b,f\}} E_1(U) = E_1\left(u(c_1) + \frac{1}{1+\delta}u(c_2)\right) \tag{1}$$

$$s.t.\widetilde{w}_1(f,i) - b = c_1 \tag{2}$$

$$\widetilde{w}_2(f,i) + (1+r)b = c_2 \tag{3}$$

$$b \geqslant -B. \tag{4}$$

Workers are risk averse: $u' > 0$, $u'' < 0$; and δ is the intertemporal discount rate. The worker's consumption (wage) in period t is denoted c_t (w_t). Wages $\widetilde{w}_t$ are random variables the probability distribution of which depends on the type of firm where the worker is employed, $f \in \{S, L\}$, for large and small firms respectively, and on whether the worker will have an idea $(i = 1)$ or not $(i = 0)$. Workers' first-period savings (bonds) are $b \equiv \widetilde{w}_1 - c_1$, and r is the risk free interest rate at which a worker can borrow and lend. Workers decide on first-period consumption and whether to borrow or save after the first-period wage is realized.

Because $u(.)$ is concave, workers want to smooth their consumption over the two periods. As we assume $\delta = r$, there are no incentives to borrow and lend other than consumption smoothing. The constraint $b \geqslant -B$ implies that in $t = 1$, workers may not be able to borrow as much as they want against future wage. In this setup, we can model the impact of financial market development in a straightforward way: The easier is access to consumer credit, the larger is the amount B that workers can borrow against future wages. Clearly, an increase in B affects the consumption path and occupational choices only if the borrowing constraint is binding, that is if $\widetilde{w}_2(f,i) \geq B$. Otherwise, the worker would not be able to repay a loan larger than the second-period wage. In what follows we assume that the borrowing constraint is binding.

2.3 Firms

There is a set of large firms of mass γ and an *a priori* indeterminate number of small firms. Firms are run by a manager who maximizes expected profits. Managers take two decisions: first, what wages to offer $(t = 0)$; second, whether or not to fund worker ideas $(t = 3)$.

Large firms have an initial amount of self-financed assets equal to A^L. As will become clear below, these initial assets may be interpreted as physical assets the firm owns or, more broadly, as the future cash-flows of the other projects,[8] net of any liabilities of the company. The number of workers large firms employ, and, thus, the capital per worker will be determined in equilibrium. For the sake of simplicity, we assume that small firms have no assets in place $(A^S = 0)$.[9] Similarly to large firms, this can be interpreted as a small firm having no concurring projects the surplus of which may be lost if one of them fails. In equilibrium, the number of small firms equals the number of workers who choose

[8] A company must liquidate the ongoing projects if it defaults on its obligations.

[9] It will become clear later that the results do not depend on this assumption.

to be employed by a small firm. To this extent, workers in small firms may also be interpreted as entrepreneurs who go to a venture capitalist.

Firm assets can be employed in a risky or in a risk-free, traditional technology. Capital and labor are perfect substitutes in the traditional technology, yielding return r ($\underline{w}$) per unit of capital (per worker). As everyone can access the risk-free technology, we assume that $\underline{w}$ is the economy-wide reservation wage.

Workers' ideas are risky. If the worker's idea is good (G) and the firm funds it investing I, it generates revenue Y, while if it is bad (B), it generates zero return. The prior probability of an idea being good is α. We assume that new ideas have positive net present value, i.e. $Y > \frac{I}{\alpha}$. In order to invest in the risky technology (i.e. to fund a new idea), a firm needs I units of capital and an idea that can only be supplied by a creative worker. Small firms always need to raise outside capital, as they have no assets. The amount of outside finance necessary to fund an idea in a large firm depends on the number of ideas a firm decides to realize, x, which is related to the number of workers employed by the company and to their creativity. We define the amount of self-financing for a project of a large firm as $a^L = A^L/x$, where x and therefore a^L will be determined in equilibrium.

2.3.1 Screening

At $t = 3$, firms screen ideas, that is, they receive signals about the quality of an idea based on which they decide whether or not to realize it. As in Sah and Stiglitz (1986 and 1988), we assume that firms receive n signals, as a project can be evaluated according to different dimensions such as competitive situation, cost efficiency, marketing, etc... Each of the signals can take value "good" ($s = g$) or "bad" ($s = b$). We denote the probability of receiving a good signal when the idea is good $p_1 \equiv prob\,(s = g \mid G)$ and the probability of receiving a good signal when the idea is bad $p_2 \equiv prob\,(s = g \mid B)$. For the signal to be informative about the idea requires that $p_1 > p_2$. The firm's screening decision then consists of choosing a number $k \leq n$, where k is the minimum number of good signals the firm requires to fund an idea. This number can be interpreted as the intensity or precision of screening.

In this set-up, one can show (see Sah and Stiglitz (1988), page 454) that the probabilities of accepting good (h_1) and bad (h_2) ideas, respectively, are determined as follows:

$$h_1(k) = \sum_{j=k}^{n} \binom{n}{j} p_1^j \left(1 - p_1\right)^{n-j} \tag{5}$$

$$h_2(k) = \sum_{j=k}^{n} \binom{n}{j} p_2^j \left(1 - p_2\right)^{n-j} \tag{6}$$

Notice that both h_1 and h_2 are decreasing in k, and that h_1, h_2 are increasing in p_1, p_2.

Sah and Stiglitz (1988) also show that a firm's profits from realizing ideas are single-peaked in the number of good signals and can be expressed as follows:

$$\max_{k^f} \pi(k^f) = \alpha z_1^f h_1(k^f) - (1 - \alpha) z_2^f h_2(k^f) \tag{7}$$

where z_1^f (z_2^f) represents the gains (losses) of funding a good (bad) idea for firm f, and the prior probability for good ideas is α.[10] In subsection (3.1), we substitute for z_1^f and z_2^f, and derive the optimal number of signals for firm f, k^f. In what follows, for notational simplicity, we will sometimes use the shortcuts h_1^f, h_2^f for $h_1\left(k^f\right), h_2\left(k^f\right)$.

2.3.2 Wage contracts

At $t = 1$, firms offer wages. We assume that contracts take a simple form and that firms can credibly commit themselves to honor them. First, contracts specify w^f, a fixed wage the firm pays to the workers employed in the firm. If the firm defaults, we assume without loss of generality that the firm pays a wage of nil. Thus, workers incur a loss in the wage income, as they have to wait until the second period to be employed in another firm.

Second, in case the worker has an idea that is successfully realized, she receives an exogenously fixed share λ of the net present value of this idea. What we have in mind here are process or product innovations the profitability of which is only revealed in the future, and for which the division of surplus is not contractible *ex ante*. Rather it depends on many exogenous institutions and on workers' and firms' bargaining powers, all of which are summarized in λ.[11] As pointed out before, it is also important that the worker and the firm are complementary in the realization of innovative ideas. Ideas can only be realized within the firm and the firm cannot realize the idea without the worker.[12]

By making theses assumptions, we restrict the set of possible contracts, as we do not allow wages to depend on the decision of a firm to fund an idea. A worker's remuneration depends only on the realization of the output of the idea, and on whether or not the firm defaults. This assumption is consistent with the one that firms cannot commit to the probability of realizing a worker's idea; ideas are thus an aspect of the firm-worker relation that cannot be contracted upon. Nonetheless, it imposes a relevant restriction on large firms that do not necessarily default after funding an unsuccessful new idea. These firms could thus have an incentive to offer different wages to workers who do not come up with an idea, whose idea is not realized, and whose idea turns out to be bad. However, as we will make clear at the end of subsection (3.3), allowing for such contracts adds computational complications but no new economic insights to our model.[13]

[10] None of the results would change if we considered a screening cost.

[11] For instance, a law on intellectual property rights can assign to worker and firm their respective share of the output of a patentable idea.

[12] More generally, we could assume that realizing the idea outside the firm (without the worker) entails a consistent loss for the worker (the firm), like in Gromb and Scharfstein (2002) and Hellmann (2002). As our objective is to analyze how individuals sort in different organizations and not whether the ideas are funded within the firm or in a new start up, we summarize reservation utilities in one parameter, λ.

[13] It is also irrelevant that the second-period wage does not enter in the contract: a raise of the first-period wage of a given amount in present value can achieve at least the same effect as a raise of the second-period wage, since workers can save and earn the risk-free interest rate.

2.4 Supply of capital

Capital is supplied by an infinite number of risk-neutral investors, who have access to a risk-free asset with return r and have an infinite amount of capital. Both workers and firms have access to this market, as long as they provide investors an expected return equal to r. We assume that investors fund small firms with debt. For our theory to hold, risk-shifting is crucial. Thus, our theory holds for instruments other than debt, provided that the management of the firm internalizes the downside of a project to a lesser extent than the investors.[14]

Investors lend I to a small firm to realize its worker's idea. They do not observe the intensity of the screening process adopted by large and small firms, k^f, but can distinguish between large and small firms. In total, $\alpha h_1^S + (1-\alpha) h_2^S$ ideas are funded. In case the idea turns out to be bad, investors recover nothing, since the assets of the small firms are consumed in realizing the project. The nominal value of debt, D^S, must satisfy the participation constraint of investors:

$$\frac{\alpha h_1^S}{\alpha h_1^S + (1-\alpha) h_2^S} D^S \geqslant (1+r) I. \tag{8}$$

Given that investors behave competitively, (8) is satisfied with equality, yielding:

$$D^S = \frac{\alpha h_1^S + (1-\alpha) h_2^S}{\alpha h_1^S} (1+r) I. \tag{9}$$

The nominal value of large firms' debt (which finance externally only $I - a^L$) is determined analogously.

Workers can borrow an amount equal to $b = \max\{-B, -\underline{w}\}$ at $t = 1$. We assume that loans up to the amount $\max\{-B, -\underline{w}\}$ are perfectly enforceable and therefore consumers can borrow at the risk-free interest rate, r. In this context, an increase in B represents an improvement in the market for consumer credit, provided that the borrowing constraint is binding.

2.5 Equilibrium

The equilibrium is defined as follows:

- Workers maximize their expected utility by making consumption and occupational decisions. They take wages as given.

[14] To put it differently, the management should not completely internalize the cost of default, as it provides only a small fraction of the initial capital. This excludes a standard equity contract. We are not too concerned about this: in any case, a standard equity contract is not desirable if the management of a firm has to put effort into the realization of the project and has little initial wealth. In addition, the empirical evidence shows that standard equity contracts are generally not used by venture capitalists (Kaplan and Stromberg, 2002).

- Both large and small firms offer wages that maximize their expected profits. They take the wages of other firms as given but internalize the effect of their wages on occupational choice.
- Both large and small firms choose the screening intensity to maximize the expected profits from the implementation of an idea, after it has been submitted by the worker. They take the cost of debt as given.
- The labor market clears. In particular, the number of workers employed by large firms is such that all the workers who prefer to work in a large firm are, in equilibrium, hired by large firms.
- The capital market supplies any amount of capital demanded, provided that the expected return equals the return of the risk-free asset. The external financiers take the intensity of the screening process in large (k^L) and small (k^S) firms as given.

In equilibrium, workers sort themselves into large and small firms. Then, the workers are randomly matched with the type of firms they choose. We consider only symmetric equilibria, in which all small and all large firms hire the same number of workers.

The most important feature of the equilibrium is that firms *cannot* commit themselves *ex ante* to realize a worker's idea with a certain probability. The *ex post* optimally intensive screening decision may then be *ex ante* inefficient, because it discourages the most creative workers from taking jobs in a large firm.

The capital market provides firms with any amount of capital demanded, if the investors' participation constraint is satisfied. This assumption helps to focus on the distortion created by *ex post* optimal screening intensity on the occupational choice of workers. It also helps to show that the distinction between large and small firms matters even if the latter have access to external funds. An important assmption here is that external financiers cannot observe the intensity of the screening process, but they know whether they are dealing with a large or small firm. This implies that when firms screen ideas, they do not internalize the effect of less intensive screening on the cost of debt.

3 Equilibrium implications and extensions

We solve the model backwards. We first investigate large and small firms' respective screening decisions. Then, we look at workers' occupational choice. Finally, we determine what wages the firms offer.

3.1 Screening of ideas

Firms choose the intensity with which they screen workers' ideas, given wage contracts signed before. Formally, they maximize (7) over k^f. Here k^f is the number of good signals required to accept a project.

To determine the expected profit, we need z_1^f, firms' gains from funding a good idea, and z_2^f, the losses from funding a bad idea. We assumed before that firms and workers share the surplus of a successful project according to an exogenously fixed allocation of bargaining power. A proportion λ, $(1-\lambda)$ of the surplus is appropriated by the firm, (worker). Thus, for a firm of type f the gains and losses from funding an idea are:

$$z_1^f = \lambda\left(Y - D^f - a^f\right), \tag{10}$$

and

$$z_2^f = (1+r)\min\left\{a^f, I\right\} + w_1^L i_L(f), \tag{11}$$

In z_1^f, the term in brackets is the total surplus from a successful idea. In equation (11), the first term represents the assets the firm loses in realizing the idea multiplied by $(1+r)$ as capital employed in the traditional technology yields return r; $i_L(f)$ is an indicator function with a value of 1 if $f = L$, and 0 otherwise. Notice that as assumed before, a large firm pays w_1^L whenever the worker is employed by the firm, while a small firm defaults if the idea fails, and thus pays nil.

A firm of type f maximizes its expected profit from an idea over k:

$$\max_k \pi^f(k) = h_1(k)\,\alpha\lambda\left(Y - D^f - a^f\right) - h_2(k)(1-\alpha)\left[(1+r)\min\left\{a^f, I\right\} + w_1^L i_L(f)\right]. \tag{12}$$

From the firm's profit maximization the following can be easily established.

Lemma 1 *For given level D^f, large firms require more positive signals from an idea than small firms, that is, $k^L > k^S$.*

This result can be readily established by the following argument. Sah and Stiglitz (1988) show that k^f, the optimal number of positive signals an organization requires to accept a project (the screening intensity), increases in the ratio between the loss in the bad state of nature and the gain in the good state. In our case, this ratio is:

$$\frac{(1-\alpha)\left[(1+r)\min\left\{a^f, I\right\} + w_1^L i_L(f)\right]}{\alpha\lambda\left(Y - D^f - a^f\right)}.$$

Obviously, the ratio increases in a^f, which without further proof establishes the Lemma.

According to Lemma 1, better capitalized firms that risk a larger amount of their own assets per worker require more good signals to realize a project than less capitalized firms. This finding is in line with the conventional wisdom that large firms tend to take longer, behave more bureaucratically, or require larger consensus before realizing the idea of an employee. One can also interpret k^f as the number of hierarchical levels an idea has to pass through before being accepted. Then it follows that better capitalized firms ought to have steeper, and less capitalized firms flatter hierarchies.

Recall that h_1^f, h_2^f decrease in k^f. Then, from $A^L > A^S = 0$, it follows from Lemma 1 that $h_1^S > h_1^L$ and $h_2^S > h_2^L$. Thus, small firms accept both more good and more bad ideas, while large firms are more conservative because they risk more of their own assets. Moreover, if $A^S = 0$, losses are zero for small firms ($z_2^S = 0$) because of limited liability, and therefore $k^S = 0$ maximizes profits for small firms.

These results hold not only if firms are funded with debt as we assume here, but also if they are funded by a venture capitalist. In this case, as before, they will choose to take on more risk because they do not risk their own funds.[15]

3.2 Occupational choice of workers

We here show that workers with an expected creativity above some ϕ^* prefer a job in a small firm, while workers with a creativity below ϕ^* prefer to work in a large firm. We also show that financial markets affect the willingness of workers to take on risks - through the level of the borrowing constraint B.

For the sake of simplicity, in deriving the results we assume that large firms do not default, that is, in equilibrium they have enough capital to pay wages w_1^L to all their workers even if all ideas fail. To put it formally: $A^L \geq x(I + w_1^L)$.[16] Thus, $D^L = 0$.[17]

A worker decides which firm to work for based on the following pieces of information: his or her probability of having an idea; the wages and assets of all firms. In the second period, all workers earn $\underline{w}$, as we assume that workers are not creative in the second period. The following table summarizes the probabilities of different states of nature and first-period wages paid by large and small firms.

	Idea realized, succ.	Idea realized, fail.	Idea rejected	No idea
Probability	$\phi\alpha h_1^f$	$\phi(1-\alpha)h_2^f$	$\phi\begin{bmatrix}\alpha\left(1-h_1^f\right)+\\(1-\alpha)\left(1-h_2^f\right)\end{bmatrix}$	$1-\phi$
Large firm	$(1-\lambda)(Y-I)$	w_1^L	w_1^L	w_1^L
Small firm	$(1-\lambda)\left(Y-D^S\right)$	0	w_1^S	w_1^S

We define ϕ^*, the level of creativity at which a worker is indifferent between working in a small or in a large firm.

Moreover, we define the indirect utility functions in different states of nature as:

$$\begin{aligned} U_{suc}^L &= U^*\left((1-\lambda)(Y-I)\right); \\ U_{suc}^S &= U^*\left((1-\lambda)\left(Y-D^S\right)\right); \\ U_{fail}^S &= U^*(B). \end{aligned}$$

[15] In particular, if the idea of a small firm is funded with a contract other than debt the numerator of this ratio would be unchanged, as long as the entrepreneur does not contribute any initial capital.

[16] This is a simplifying assumption, discussed in (3.3), and generalized in (3.5.2).

[17] Alternatively, a large firm issuing debt is under these assumptions risk-free.

Expressions U^L_{suc}, U^S_{suc}, U^S_{fail} represent the indirect utility function (UC) when the respective lifetime resources are $(1-\lambda)(Y-I)+\underline{w}$, $(1-\lambda)\left(Y-D^S\right)+\underline{w}$, and $\underline{w}$ with B, the maximum amount that may be borrowed at $t=4$. Notice that $U^L_{fail}=U^*(w^L)$, because we have assumed that the large firm has enough capital to always pay at least w^L. Below, $U^*\left(w^L_1\right)$ and $U^*\left(w^S_1\right)$ are defined analogously.

Given the above wage profile, workers borrow only if they are employed in a small firm, their idea is realized and it fails. As intertemporal utility maximization implies that workers want to consume the same amount in both periods of their life, we can conclude that they will want to borrow $\frac{\underline{w}}{2}$. Therefore the borrowing constraint is binding in equilibrium only if $B<\frac{\underline{w}}{2}$.

Proposition 1 *Workers with a creativity $\phi\leq\phi^*$ choose large firms. Workers with creativity $\phi>\phi^*$ choose small firms. The level of creativity at which a worker is indifferent between a large and a small firm is defined as:*

$$\phi^*=\frac{U^*\left(w^L_1\right)-U^*\left(w^S_1\right)}{\alpha\left[h^S_1\left(U^S_{suc}-U^*\left(w^S_1\right)\right)-h^L_1\left(U^L_{suc}-U^*\left(w^L_1\right)\right)\right]-(1-\alpha)\,h^S_2\left(U^*\left(w^S_1\right)-U^S_{fail}\right)}. \tag{13}$$

The proof is simple and provides some intuition for the proposition. The cutoff level of creativity in Proposition 1 is determined by equating the expected utility from working in a large and in a small firm:

$$\begin{gathered}\phi\alpha\left[h^S_1U^S_{suc}-h^L_1U^L_{suc}\right]= \\ \left[1-\phi\alpha h^L_1\right]U^*\left(w^L_1\right)-\left\{1-\phi\left[\alpha h^S_1+(1-\alpha)\,h^S_2\right]\right\}U\left(w^S_1\right)-\phi\,(1-\alpha)\,h^S_2U^S_{fail}.\end{gathered} \tag{14}$$

This can be rewritten as:

$$\begin{gathered}\phi\alpha\left[h^S_1\left(U^S_{suc}-U^*\left(w^S_1\right)\right)-h^L_1\left(U^L_{suc}-U^*\left(w^L_1\right)\right)\right]= \\ U^*\left(w^L_1\right)-U\left(w^S_1\right)+\phi\,(1-\alpha)\,h^S_2\left(U^*\left(w^S_1\right)-U^S_{fail}\right).\end{gathered} \tag{15}$$

The left-hand side (LHS) of this equations represents a worker's advantages of working in a small firm, due to the higher probability of realizing one's idea ($h^S_1>h^L_1$). On the right-hand side (RHS), the advantages from working in a large firm consist of: additional utility from the wage differential between large and small firms, plus the utility loss associated with default of the small firm when a bad idea is funded. A necessary condition for the set of workers who want to work in large firms being non-empty is:

$$\begin{gathered}\alpha\left[h^S_1\left(U^S_{suc}-U^*\left(w^S_1\right)\right)-h^L_1\left(U^L_{suc}-U^*\left(w^L_1\right)\right)\right]> \\ U^*\left(w^L_1\right)-U\left(w^S_1\right)+(1-\alpha)\,h^S_2\left(U^*\left(w^S_1\right)-U^S_{fail}\right).\end{gathered} \tag{16}$$

Put differently, the benefits from working in a small firm must exceed the costs for the most creative worker ($\phi = 1$). As stated before, there is only one benefit from working in a small firm: the probability of realizing a successful idea is larger. This is only sufficient to ensure that there are workers willing to work in a small firm if $(1-\lambda)\left(Y - D^S\right)$ is large enough, relative to w_1^L. In fact, $U_{suc}^S < U_{suc}^L$: The higher financing costs for small firms reduce the surplus generated by the idea as $(Y - I) > \left(Y - D^S\right)$. Therefore, contingent on having a successful idea, the worker receives less in a small than in a large firm, an effect that, again, works against the small firm. However, this is more likely to be unimportant if Y is large, because the utility is concave. A marginal increase in income when the idea is successful hence does not generate a high increase in utility. In contrast, the expected utility increases linearly in the probability that a successful idea is realized, which is key for large levels of the expected profits.

Under the assumption that inequality (16) is satisfied, it is obvious from equation (15) that the LHS increases in ϕ faster than the RHS. This implies that the expected utility from working in a small firm is larger than the expected utility from working in a large firm for all workers with creativity $\phi > \phi^*$. q.e.d.

Our result is common in the literature on entrepreneurial choice (see, for instance Lucas, 1976), which has established that the most productive workers choose to become entrepreneurs (i.e. to realize their ideas). In our model, creativity is equivalent to expected productivity. As expected, we find that workers with higher expected productivity choose organizations where they have higher chances to realize their ideas.

For given wages the following results hold. First, an increase in B affects ϕ^* because the liquidity constraints affect large and small firms asymmetrically. As assumed in subsection (2.3), workers in small and large firms receive the same wage, $\underline{w}$, in the second period, because they are employed in the traditional, risk-free technology. Moreover, workers in large firms continue to receive their wage in the first period if their idea fails and therefore the workers have no incentive to borrow. The borrowing constraint is relevant only for workers in small firms in case an idea fails. In fact, the borrowing constraint becomes binding if the ideas fail, because small firms go bankrupt and workers receive no wage. In this situation, workers would like to borrow against their future income to smooth their consumption but they encounter a binding borrowing constraint if $B < \frac{\underline{w}}{2}$. Hence, when B increases, U_{fail}^S increases. This implies that ϕ^* decreases, and for given wages, more workers want to be employed in small firms.

Second, the effect of an increase in the expected payoff of innovative ideas – through a higher probability of success (α) or through a higher output in case of success (Y) – depends on the optimal screening intensity of large firms. If the large firm keeps unchanged its behavior (h_1^L remains more or less unchanged) ϕ^* decreases, becau se the denominator increases. However, if it becomes optimal for the large firm to decrease significantly the screening intensity (h_1^L increases sufficiently), it may become optimal for more workers to work at large firms (i.e. ϕ^* increases).

Third, and most importantly, wages have the following impact on ϕ^*: When w_1^L increases, both numerator and denominator increase, but the numerator increases faster. Hence, ϕ^* increases. When

w_1^S increases, the numerator of ϕ^* decreases, while the denominator increases. Hence, ϕ^* decreases.

Proposition 1, together with the assumption that the creativity of workers is distributed uniformly on the support $[0,1]$ implies that the expected creativity of a worker employed at a large and a small firm are, respectively:

$$E(\phi^L) = \frac{\phi^*}{2};$$

$$E(\phi^S) = \frac{1+\phi^*}{2}.$$

Here, ϕ^* is defined as in Proposition 1. Thus, when w_1^L increases, the average creativity of workers in large firms increases, while when w_1^S increases, the average creativity of workers in small firms decreases. This effect is crucial to deriving equilibrium wages in the next section.

3.3 Wage determination

We now investigate how large and small firms set their wages. Firms here take into account the effect of wages on the occupational choice of workers, analyzed in the preceding section. Through its wages, a firm affects its probability of realizing workers' ideas that bear risk but have positive expected surplus. Wages are thus used to sort workers according to their productivity, as in Lazear (1986).

Formally, at $t = 0$, a large firm maximizes the total expected profits per worker by choosing w_1^L:

$$\max \left[1 - E\left(\phi^L\right)\right]\left[ra^L + \underline{w} - w_1^L\right] + E\left(\phi^L\right) E\left(\pi_1^L\right). \tag{17}$$

In (17), the first term represents the expected profit from a worker who does not generate an idea. Here, $(1 - E\left(\phi^L\right))$ is the respective probability, multiplied by the total return of employing the firm's assets and the worker in the traditional technology net of the wage paid to the worker. The second term is the probability that the large firm attracts a worker who generates an idea, multiplied by the firm's respective expected profit defined in equation (7). The function (7) is maximized subject to the constraint that the expected utility of working in the large firm exceeds the utility of working both periods in the traditional sector (i.e. $w_1^L \geqslant \underline{w}$). If this constraint were not satisfied, the worker would not accept the job offer and would prefer to be self-employed in the traditional technology, which is freely available. In what follows, we assume that the constraint is not binding.

The expected total profits of a small firm are :

$$\max_{w_S} \left[1 - E\left(\phi^s\right)\right]\left[\underline{w} - w_1^S\right] + E\left(\phi^s\right) * E\left(\pi_1^s\right) \tag{18}$$

and are subject to the same constraint as large firms. Notice that $E\left(\pi_1^s\right)$ is function of D^S, as derived before.

The next Proposition states the first order conditions for the programmes of large and small firms, respectively.

Proposition 2 *The first-order condition of a large firm determines w^L as follows:*

$$\frac{dE\left(\phi^L\right)}{dw^L}\left\{E\left(\pi_1^L\right)-ra^L-\underline{w}+w_1^L\right\}=\left[1-E\left(\phi^L\right)-\frac{dE\left(\pi_1^L\right)}{dw^L}E\left(\phi^L\right)\right]. \tag{19}$$

The first-order condition of a small firm determines w^S:

$$-\left[1-E\left(\phi^S\right)\right]+\frac{dE\left(\pi_1^S\right)}{dw^S}+\frac{dE\left(\phi^S\right)}{dw^S}*\left\{E\left[\pi_1^S\right]-\underline{w}+w^S\right\}<0. \tag{20}$$

Proposition 2 implies that, under the assumption that the second-order conditions are satisfied, a large firm may offer a wage larger than the productivity of the worker in the traditional sector in order to attract a pool of more creative workers. Small firms, however, want to set wages as low as possible because the expected profits decrease in w^S. The results of the model would remain qualitatively unchanged if the small firm could offer a wage less than $\underline{w}$. It is interesting to know that the number of ideas a large firm funds at t=3 is expected to be: $E(x)=\frac{E\left(\phi^L\right)\left(\alpha h_1^L+(1-\alpha)h_2^L\right)}{\gamma}$. Therefore, our simplifying assumption that large firms do not fail (i.e. $A^L\geq x(I+w_1^L)$) holds, provided $E\left(\phi^L\right)$ is small enough in equilibrium, or if the set of large firms, γ, is large.

Remarks: First, by relaxing the assumptions concerning wage contracts (see (2.3.2)), we can show the following: If the wages of large firms could be made contingent on the funding of a worker's idea, large firms would have an incentive to commit themselves to offer a wage higher than the reservation wage, $\underline{w}$, even if a realized idea turned out to be bad. In fact, offering more insurance, the large firm can make its jobs relatively more attractive to more creative workers. Depending on parameter values, the wage paid if an idea is funded is generally different from the wage large firms offer to workers whose ideas are not realized. However, none of the conclusions regarding occupational choices would change.

Second, we have assumed that a firm continues to pay its wages unless it defaults. Thus, the firm does not renegotiate the wage contract of workers whose ideas are realized and subsequently fail. The results do not depend on this assumption. If the wage contract could be renegotiated, large firms would be slightly less conservative, because they do not risk paying the wage for unproductive workers in case of failure. At the same time, they could become relatively less attractive for creative workers, because they would offer less insurance. However, as long as $a^L>0$, large firms would still be more conservative than small firms. This is all that we need for the results of our model to hold.

3.4 Comparative statics

We now investigate the impact of better access to capital markets and of technological changes on the occupational choice of workers.

3.4.1 Better access to credit

If B increases, U_{fail}^S, the utility of a worker when his or her idea fails, increases, as better access to capital markets allows better intertemporal consumption smoothing. This implies that, at given wages, more workers would choose to work in small firms, that is the cut-off creativity level would decrease.

This is, however, an incomplete argument as B influences equilibrium wages. The wages of small firms do not adjust, as is clear from the first-order condition to the small firms' profit maximization programme, stated in Proposition 2. To see how large firms adjust, consider the respective first-order condition (again, in Proposition 2). As $E\left(\phi^L\right)$ decreases when more workers want to work in small firms, the RHS increases. It follows that the LHS must also increase to satisfy the first-order condition. Whether or not this implies that large firms increase wages depends on the effect of B on $\frac{dE\left(\phi^L\right)}{dw^L}$, the marginal effect of large firm wages on the expected creativity of workers employed in large firms. Unfortunately, this is ambiguous and we cannot make general predictions on the effects of B on large firm wages. However, we can say that there is a negative net effect on the average creativity level of workers employed by large firms, $E\left(\phi^L\right)$.

An increase in B has the following further consequences.

1. Large firms employ less creative workers and realize fewer projects. Thus, large firms' profits per worker decrease.

2. Small firms also employ on average less creative workers. Thus, small firms' profits per worker also decrease, because there are more workers without ideas who work with the traditional technology and make zero profits.

3. More ideas are realized in equilibrium, because small firms realize ideas with larger probability. This implies that there are more second-type errors $[\phi^* h_2^S + (1-\phi^*)h_2^L]$, because at a given screening intensity more ideas are screened by small firms. Thus, more bad projects are accepted. At the same time, there are less first-type errors $[\phi^*(1-h_1^S) + (1-\phi^*)(1-h_1^L)]$, because small firms reject less projects that are good.

4. The aggregate output of the economy decreases. Small firms do not internalize the waste of investing assets in bad ideas and rather shift risk to creditors. This risk-shifting problem is less acute for the project selection of large firms. The expected utility of creative workers employed in small firms increases, because they have a higher probability of second-type error than average workers. They only risk their first-period wage when having their idea funded. Hence, provided that they can borrow a sufficient amount against their future income if their idea turns out to be a failure, they prefer to be employed in small firms. However, the utility of workers employed in large firms can decrease, because w^L may decrease.

3.4.2 Increase in the expected payoff of ideas

Parameters Y and α determine the expected payoff from realizing workers' ideas. When technologies change, Y and α may increase. What happens in equilibrium depends on how firms adjust their screening intensity. This in turn depends on the solution of the firm's programme with respect to screening intensity (12).

To keep things simple, we continue to assume that small firms have no assets at all, and thus, that $h_1^S = 1$. We can then focus on the reaction of large firms, as small firms do not change their screening behavior.

If the optimum screening intensity k^L does not vary significantly, h_1^L and h_2^L remain about constant, but realizing an idea becomes even more important for the worker. Therefore, ϕ^* decreases and so does $E\left(\phi^L\right)$. In equilibrium, as before, large firms may or may not increase their wages, depending on $\frac{dE\left(\phi^L\right)}{dw^L}$. In any case, their expected profits decrease relative to small firms, because fewer of their workers have innovative ideas. This implies that if large firms are not able to change the procedure they use to screen new ideas, they cannot fully benefit from the improvement in technology.

However, if the optimum k^L varies significantly, an improvement in technology may *decrease* the difference in the probability that ideas are accepted at large and small firms. In this case, the expected creativity of large firms' employees increases, and large firms may be able to decrease wages.

Which case prevails depends on the characteristics of the screening technology and, in particular, on how fast h_2^L decreases in k. It is more likely that large firms do not adjust their screening intensity very much, if the screening technology is very noisy, that is, if p_2 is relatively large. Then, the probability of second-type errors increases relatively fast, when the screening intensity decreases. If the screening technology is less noisy, large firms relax their screening intensity and become more attractive for creative workers.

Therefore, if new technologies become available, and the available screening technology is not very precise, small firms acquire a competitive edge over large firms and find it easier to steal the most creative workers from large firms.

3.5 Further implications

We here highlight implications of our analysis for organizational change and dynamics.

3.5.1 Organizational change

We have shown that the profits of asset-intensive firms may drop relative to small firms, if the liquidity constraints of workers relax, or if the expected output from new ideas increases. Depending on parameter values, the return on assets of well-capitalized large firms may be lower than the return on assets of low-capitalized small firms.

An asset-intensive firm can react by creating a spin-off, that is, a low-capitalized separate legal entity. The manager of a spin-off would consider the capital provided by the headquarters as external funds and would be less conservative in realizing the ideas of workers. Thus, large firms can commit themselves to carry out less intensive screening by spinning off units. This means that large firms may find it optimal to create a risk-shifting problem using organizational change. A similar effect could be achieved using capital structure: a large firm could distribute dividends (or buy back equity) and increase leverage. However, when new ideas are realized within the existing firms, their cash flows are mingled with the firm's other cash flows. Therefore, for large firms with many simultaneous projects it may not be possible to choose a capital structure that allows to change the incentives with respect to one project without affecting adversely the incentives with respect to other projects. For this reason, we believe that our implications for organizational change are more relevant.

In this respect, the implications of our model are in line with the way innovation is promoted in sectors in which the creativity of workers is crucial for success. In biotechnology for instance, innovation often happens in small independent start-ups that have contractual ties to large asset-intensive firms in the pharmaceutical industry (Lerner and Merges, 1998). Biotechnological research involves the application of ideas within the organization, just as in our model. Hence, as in the model, creative workers choose organizations where they have a fair chance of realizing their ideas, because once employed they cannot develop their ideas elsewhere.

The recent experience of Enron shows the dark side of this kind of organizational change: over the nineties Enron had transformed from a traditional power distribution company to the most innovative company in the sector. Organizational change and management of talent had an important role in its transformation as the case study of Bodily and Bruner (2002) and interviews with the CEO (Michaels et al, 2001) show. The company abolished several layers of management, presumably decreasing the quality of the screening of new projects, and funded most of the projects through external partnerships. Its incentives to take on risk were reinforced by recourse to high leverage. This reorganization and the apparent success in innovating were eventually followed in December 2001 by the filing of bankruptcy procedures. Our model provides an explanation of why large firms, which pursue a policy of decentralization in order to attract talented workers, may take on too much risk and, ultimately, may default.

3.5.2 Dynamics

If we look at the model from a dynamic point of view, firms can lose and gain the competitive edge in attracting creative workers. Obviously, low-capitalized small firms that generate cash flow from the realization of good ideas accumulate assets, and unlucky large firms can decumulate assets. Our simplifying assumptions that $A^S = 0$ and $A^L \geq x(I + w_1^L)$ become restrictive. However, the results of our model hold as long as $k^L > k^S$. From Lemma 1 we know that this is true if $\frac{(1-\alpha)\left[(1+r)\min\left\{a^L, I\right\}\right]}{\alpha\lambda(Y - D^L - a^L)} > \frac{(1-\alpha)\left[(1+r)a^S\right]}{\alpha\lambda(Y - D^S - a^S)}$,[18] which holds provided the difference between a^L and a^S is large enough.

Therefore small firms may grow "too" large (i.e. they may become too cash rich) and become too conservative in the selection of the ideas that they fund. The most creative workers may then turn their back on these firms and choose younger, less capitalized companies. More interestingly, unlucky large

[18] Here, we are taking into account that if a large firm can fail, it does not pay wages.

firms can acquire competitiveness, because they lose part of the assets and find it optimal to adopt less intensive screening technologies.

4 Concluding remarks

We have shown that financial market development affects organizational structure and innovation by relaxing the liquidity constraints of workers and, indirectly, by changing their attitude towards job security. Better access to credit induces workers to take on more risk. Only organizations that have less self-financed assets and screen less intensively can attract workers who want to realize their ideas. We point to a new channel through which access to credit matters, beyond the one highlighted by Rajan and Zingales (2002), who argue that the financial revolution by relaxing collateral requirements favors small firms.

The paper shows that financial development has its dark sides: It may create excessive volatility and reduces average profits of firms. Small firms are not necessarily good for the economy just because they are innovative: since they do not have many assets or other concurrent projects at risk, they recklessly fund new ideas and steal the most creative workers from large firms. Although large firms' cautious screening policies would be optimal, large firms may adopt policies to commit themselves to be less conservative, in order to attract creative workers and not lose the profits from financing new ideas: The creation of spin-offs and the increase in leverage may be seen as attempts to stop small firms from stealing the most creative workers.

There are extensions to the model in which having a risk-shifting problem may be optimal. For instance, if workers exert effort *ex ante* to generate profitable ideas, firms would want to commit themselves to realize ideas with high probability to increase incentives for workers. In this context, capital structure may be seen as an alternative solution to the one by Rotemberg and Saloner (2000), namely to hire a visionary CEO, who has a positive bias toward realizing certain ideas. Whether or not risk-shifting spurs innovation and is beneficial for the overall economy is ultimately an empirical issue. We see our contribution in pointing out its implications on occupational choices, organizational change, and corporate volatility.

Our model also suggests that the relative competitiveness of large vs. small firms may be different over the business cycle. During expansions, for instance, the value of housing increases. Like in the most recent US experience, individuals find it easier to borrow by increasing their mortgage. In this situation, an increasing number of creative workers will choose small firms. The contrary is true in contracting phases of the business cycles. If household access to credit becomes more difficult, because real estate prices decrease or because households are too indebted, a stable income becomes more important than upside opportunities. This effect is reinforced because during recessions it becomes more difficult to find new jobs and, as a consequence, income losses after firm defaults are larger, because workers stay unemployed longer. Jobs in large firms once again become what they used to be: safe havens for workers.

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