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CREDIT MARKET IMPERFECTIONS AND
SEPARATION OF OWNERSHIP FROM CONTROL
AS A STRATEGIC DECISION

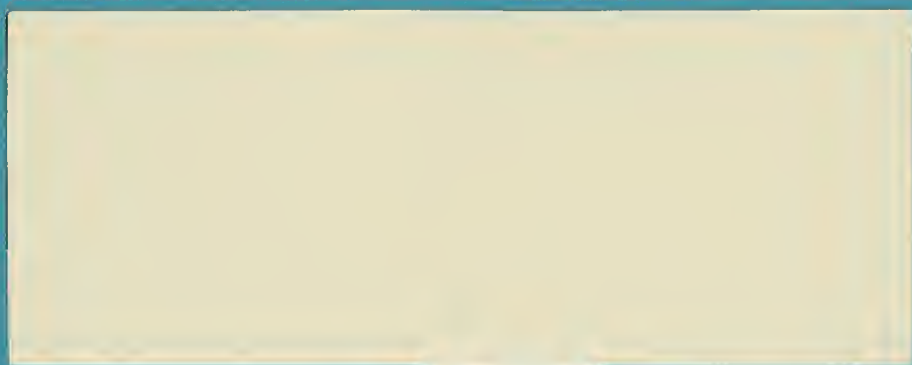
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Oct. 1993

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SEPARATION OF OWNERSHIP FROM CONTROL AS A STRATEGIC DECISION**

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Abstract

This paper considers a simple finance model with asymmetric information and moral hazard and establishes the following results: (i) in the unique equilibrium of our economy, projects are financed using debt contracts with warrants, thus there exist forces that make equilibrium contracts resemble what we observe in practice; (ii) these contracts are often inefficient and in particular the equilibrium is constrained Pareto inefficient because of the competition among financiers; (iii) the internal organization of the firm is closely linked to the credit market. If ownership can be separated from control, the inefficiencies can be avoided. In equilibrium only projects that hire an outside manager and give sufficient "career concerns" to their managers receive funding; (iv) the introduction of a third-party is essential for this result; (v) even when collusion (renegotiation) between the manager and the entrepreneur at the expense of other claim-holders is possible, separation of ownership from control is beneficial. In this case, debt contracts are used to minimize the gain to collusion, managers are paid an "efficiency salary" and the managerial labor market does not clear.

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1) Introduction

The internal organization of the firm has experienced radical changes over the past two centuries. Most importantly, many small and medium sized owner-managed firms have been replaced by large firms run by professional managers. Many implications of this separation of ownership from control are now well understood, e.g. Baumol (1959), Marris (1964), Williamson (1964). Although such separation introduces obvious inefficiencies, it also enables much more complex organizational forms to develop and many economic historians view this process as one of the most important foundations of modern industrial growth. In his influential book, *The Visible Hand: The Managerial Revolution in American Business*, Alfred Chandler writes "The rise of modern business enterprise brought a new definition of the relationship between ownership and management and therefore a new type of capitalism to the American economy" (p.9). Chandler's emphasis throughout is on how the introduction of management has changed the organizational form and led to more productive production and distribution systems. As suggested by many economists, the separation of ownership and control does not only influence organizational efficiency but also the cost of capital to the corporation. Since the availability of credit and the cost of capital are among the important ingredients of the growth of industrial enterprise, it is important to investigate the interaction between organizational form and financing decisions.

Starting with Jensen and Meckling (1976) many studies have shown how the separation of ownership from control can be one of the key determinants of the capital structure of the firm and the implication of this literature is that *ceteris paribus* separation of ownership from control leads to a higher cost of capital and perhaps even to more severe credit rationing. However, Chandler in a famous article also points out "After 1897, however, outside funds and often outside promoters who were usually Wall Street financiers, played an increasingly significant role in industrial combination and consolidation" (see also Goldsmith (1969)). This is also the time of the emergence of the modern business enterprise with managerial hierarchies separated from ownership, suggesting that there may be a link between the two events. Related to this conjecture, we can note the example of Barclays Bank & Co in the UK which experienced an increase in price-earnings ratio from five to twenty (and hence a comparable reduction in the cost of capital) after separating ownership from management and floating on the stock market in 1902 (see Hannah (1993)). For the US, similar evidence is reported in Navin and Sears (1955) where they document how, at the turn of the century, the dilution of inside ownership

and greater availability of capital went hand in hand (see also Nelson (1959)). In his study of a group of 389 UK quoted companies, Curcio (1992) finds that higher managerial ownership leads to better productivity growth but not to higher stock market value. A possible explanation is that managers who own more stock supply more effort thus achieve higher productivity but may also act more opportunistically which increases the cost of capital to the corporation and hence offsets the effect of higher productivity. Finally, De Long (1990) discusses how Morgan Company, by appointing one of its employees on the board of a number of companies mitigated the informational and opportunistic problems that existed between insiders and outside claim-holders, thus leading to significantly better stock market performance and lower cost of capital. This is line with our argument but the role played by separation of ownership from control in our paper is played by the presence of a Morgan Company employee on the board.

It is therefore not implausible, though not line with the conventional wisdom, to imagine that in certain cases, the modern corporation with management separated from ownership faced a lower cost of capital and less severe credit constraints. There can be a number of reasons for such a phenomenon. First, if the modern corporation is more efficient as argued by Chandler, financiers would be more willing to lend. Secondly, we will argue that in certain contexts, managers may be induced to act less opportunistically than the entrepreneur and a firm run by a manager may have a better reputation as a safe investment¹. This suggests that a firm may strategically decide to separate ownership from control in order to benefit from the commitment and reputation effects brought by this organizational form and that, not only does the internal organization affect the relationship of the firm with the credit market but it is also partly determined by this relationship. In Chandler's words "Where the creation and growth of an enterprise required large sums of outside capital, the relationship between ownership and management differed".

In order to illustrate the above intuition, this paper will show how separation of ownership from control may improve the availability of credit and reduce the cost of capital. We show that separation of ownership from control may endogenously arise in an environment where managers have no comparative advantage over entrepreneurs in running a company.

¹ This is not to deny that separation of ownership from control introduces substantial costs but to argue that there may also be benefits. The historical discussion is only meant to be suggestive. Whether these benefits are of the same order of magnitude as the costs is of course an empirical matter.

Consider an owner-managed corporation that seeks external finance in order to undertake a project. Creditors may be unwilling to invest in this firm because of two reasons; first, as the profitability of the project is better observed by the owner than the outsiders, they risk paying too high a price for the right to have a portion of the returns. Second, when there is a conflict of interest between the owner and the creditors, the owner will choose the course of action that will maximize his return, not necessarily the joint benefit. Both of these considerations would increase the cost of capital to the corporation and may even lead to credit-rationing.

We analyze a simple and tractable model of this sort and show that the asymmetry of information and the possibility of a risk-shifting option for the entrepreneur lead to substantial inefficiencies in the credit market. We characterize the unique equilibrium of this economy and show that projects are financed with convertible debt and hence there exist natural reasons for debt-like contracts to arise. However, the decentralized equilibrium is very inefficient *especially* when we allow unrestricted contracting possibilities between entrepreneurs and the market: a *restriction* upon the available contracts would lead to a Pareto improvement. This is because competition among financiers increases the return to entrepreneurs when they are successful and thus makes it more attractive for "bad types" to choose the risk-shifting option. On the other hand, if we allow the entrepreneurs to separate ownership from control by hiring a manager, "good" projects find this profitable and thus separation of ownership from control restores the first-best. This is because separation of ownership from control acts as a commitment and signalling device. The contract of the manager can be chosen such that she has "career concerns" in the sense that she would be adversely affected if the project does badly, thus she has incentives to abandon certain projects and will never find it profitable to choose the risk-shifting option. The manager's role is very similar to an outsider being appointed as the CEO of a company and then cleaning up the bad projects. This is in line with Weisbach's (1993) finding that new CEOs are much more likely to abandon poorly performing projects in a sample of 270 large firms that previously carried out an acquisition.

When the manager is provided with the right incentives, only projects that are sufficiently profitable find it worthwhile to hire a manager and thus separation of ownership from control signals a profitable project (or provides an improved reputation for the firm). Therefore credit market imperfections significantly influence the organization of the firm by introducing a third-party. The important point to note is that although the manager cannot carry out any of these functions better than the entrepreneur, her introduction is essential for this result: the same

outcome cannot be achieved by a complicated contract between the creditors and the entrepreneur, nor by the entrepreneur selling the company and acting as the manager. It can however be asked whether the entrepreneur and the manager could not renegotiate (collude) and agree on a course of action that would harm the creditors. A simple intuition would suggest that when such collusion is possible, separation of ownership and control will not be useful. However, we show that collusion may prevent first-best but separation of ownership and control is still beneficial. In equilibrium the manager is paid an "efficiency salary", an amount above her reservation return, so as to give her greater career concerns and thus prevent collusion. This leads to rationing in the managerial labor market. Finally, convertible debt contracts turn out to be most beneficial when collusion is possible because they minimize incentives to collude between the manager and the entrepreneur.

The plan of the paper is as follows; the next section lays out the basic model, characterizes the equilibrium and shows how the decentralized credit market creates wide-spread inefficiencies. Section 3 introduces the possibility of hiring a manager and demonstrates how first-best can be restored. Section 4 investigates the possibility of collusion. Section 5 considers a canonic asymmetric information principal-agent relationship and extends the results of sections 3 and 4 to this setting. Section 6 discusses the relation of the paper to the existing literature. Section 7 concludes while an appendix contains all the proofs.

2) The Model

We consider an economy consisting of a continuum of identical entrepreneurs, each with a project but without the necessary capital to undertake the start-up investment. To simplify the analysis we assume that entrepreneurs have no collateral and each requires an amount k for investment². However, not all projects are equally profitable and their profitability is only observed by the entrepreneur. Additionally each entrepreneur has a choice between two different courses of action. If action 1 is chosen, project i has certain (non-stochastic) return x_i . The level of x_i is what distinguishes entrepreneurs and thus is referred to as their "type". The distribution

² Introducing heterogeneity among entrepreneurs would leave the thrust of our results unchanged. Also in practice most creditors require the entrepreneur to provide collateral. If we allow the entrepreneur to have some wealth that can be used as collateral, the analysis would be more complicated with a semi-separating equilibrium but "good" and "bad" projects would still be bunched together giving us similar results.

of x_i in the population of projects is given by $f(x)$ with support $[x^{\min}, x^{\max}]$ where x^{\min} is positive but smaller than k . However, in the case of action 2, which we refer to as the *risk-shifting* option, the project pays-out $X (> x^{\max})$ with probability ϵ (very small) and nothing with probability $1-\epsilon$. It is also assumed that $\epsilon X < x^{\min}$ which implies that the risk-shifting is never socially desirable. However, the course of action chosen by the entrepreneur is not observable and thus contracts that directly prevent such action cannot be written.

The economy has three periods, $t=0, 1$ and 2 and there is no discounting. In this section nothing happens at $t=0$. At $t=1$, the market offers a menu of contracts to entrepreneurs and each entrepreneur chooses a contract from this menu to finance his project. Between $t=1$ and $t=2$ the entrepreneur chooses his action and at $t=2$ the return of the project is realized and creditors are paid according to the contract signed at $t=1$. However we also assume that the entrepreneur can freely dispose of his returns if he so wishes and only whatever he has chosen not to dispose of becomes publicly observable. This assumption implies that only monotonic contracts will be offered in equilibrium³. The sequence of events is shown in Figure 1.

We also need to model the organization of the credit market and how the menu of contracts offered to entrepreneurs are determined. The credit market consists of risk-neutral investors with unlimited funds competing a la Bertrand. Each investor makes a contract offer to the market that can be accepted by any entrepreneur. This form of competition among investors, which can be thought as Rothschild-Stiglitz (1976) competition, ensures that in equilibrium no investor would make positive profits. The equilibrium concept we use is Perfect Bayesian, which requires all players to behave optimally at all stages given their beliefs and, whenever possible, their beliefs to be derived by Bayes' rule from the equilibrium strategies. For expositional reasons, before moving to unrestricted contracts, we will consider two illustrative cases; one in which only pure equity is possible and the other with only pure debt finance. These will illustrate the basic mechanisms of market failure in this model. We will later allow general contracts and financiers competing with each other by making different offers.

³ Note that the entrepreneur is not able to secretly appropriate these returns, he can just dispose of them without any cost. Without this free-disposal assumption, a simple non-monotonic contract would implement the first-best. As we will see in section 5, when there are random variations in returns, we do not need this assumption. It is used here in order to keep the main body of the paper as simple as possible. Also the ordering of moves is chosen to simplify the exposition, an earlier version considered the case in which the entrepreneur made contract offers to the credit market and we obtained exactly the same results.

Let us begin with equity contracts which entail selling a proportion s of the firm at a price p . This entitles the equity holders to a proportion s of the final return of the firm. For the project to go ahead, we require $ps \geq k$. Inefficiency arises in equity finance due to "overvaluation of stock", i.e. investors end-up paying too high a price for the right to have a portion of the firm's returns. The return of a typical investor is $sx-k$ and if $x < k$ this is negative. The entrepreneur's return is $(1-s)x$ which is always non-negative and strictly positive for $s < 1$. Thus entrepreneurs always want to invest, even if $x < k$ and there exists a conflict of interest between creditors and entrepreneurs (the presence of these loss making projects also prevents a separating equilibrium).

Next consider a debt contract which consists of an obligation to pay r by the entrepreneur. Because of the "limited liability" of the entrepreneur, the risk involved in the project can be shifted to the investor and when the return of the project is less than r , the debt-holder receives all the return of the company. However, the entrepreneur always wants to go ahead with the project since when he chooses the risk-shifting option, his expected return is given by $\max \{0, \epsilon(X-r)\}$ which is always non-negative and strictly positive for $r < X$. We can now state the following propositions (all propositions except for 0 are proved in Appendix A);

Proposition 0 (first-best):

The first-best is given by all projects with $x \geq k$ investing and taking action 1. The form of finance is irrelevant.

In terms of Figure 2, all projects that fall in area B should invest and choose action 1. The rest of the projects (area A) make a loss thus are not financed in the first-best.

Proposition 1 (equity contracts):

When only equity contracts are allowed, we have a unique equilibrium which is pooling with all projects undertaken and all entrepreneurs choosing action 1, iff

$$\int_{x=k}^{x=X} f(x)xdx \geq k \tag{1}$$

If (1) is not satisfied, the equity market collapses and no project is financed.

Because of the overvaluation of stock, all entrepreneurs want to invest and there is nothing that stops "bad" projects imitating "good" projects which makes the unique equilibrium a pooling one. However, since the entrepreneur is a shareholder, he would like to maximize the ex post value of the firm which makes him always choose action 1. Obviously in this case, an investor would only be happy to provide finance if the average project is profitable, i.e. the area under the curve in Figure 2 is greater than k (condition (1)). Inefficiency arises because projects in area A invest despite the fact that they make losses.

Proposition 2 (debt contacts):

Let us suppose that only debt contracts are allowed, then iff

$$\exists r > 0: \int_{\epsilon X + (1-\epsilon)r}^{x^m} f(x)r dx + \epsilon \int_{x^m}^{\epsilon X + (1-\epsilon)r} f(x)r dx \geq k \quad (2)$$

we have a unique equilibrium in which all projects undertaken and those with $x \geq \epsilon X + (1-\epsilon)r$ choose action 1 and $x < \epsilon X + (1-\epsilon)r$ choose the risk-shifting option where r is the smallest positive value that satisfies (2) as an equality. If condition (2) is not satisfied, no project is financed.

In terms of Figure 2, all projects invest but only those in area B1 choose action 1, the rest opt for action 2. Again "bad" projects wish to imitate "good" projects and invest. However the return of the entrepreneur is no longer linear in total revenue but convex. Thus he would be willing to choose a variable revenue stream with a lower expected return. In particular, types $x \leq \epsilon X + (1-\epsilon)r$ will be better off with the risk-shifting option than action 1. As the risk-shifting option is now chosen by some entrepreneurs, it is no longer sufficient for the area under the curve in Figure 2 to be greater than k and condition (2) is more restrictive than (1).

These two propositions show how asymmetric information and the presence of a risk-shifting option interact to create inefficiencies in the credit market. However, they are restrictive because we have not allowed investors to offer different contracts to the market and also there is no a priori reason to consider debt and equity contracts only. By means of warrants and other forms of options, much more general financial contracts are often implemented. We thus consider a general financial contract between the entrepreneur and the creditor which is a function $R(\cdot)$ from the realization of the return of the firm, y , into a payment level for the entrepreneur. Thus $R(\cdot)$ is a mapping from $[0, X]$ into the set of non-negative real numbers and

when the return of the firm is y , the entrepreneur receives $R(y)$ and the creditor is paid $y-R(y)$. Naturally we have to bear in mind that y is the amount left-over after the entrepreneur freely disposes of a certain part of the return if he so wishes. As noted earlier this possibility of free-disposal will force the equilibrium contract to be monotonic. Also we have to bear in mind that equilibrium may now take the form of a menu of different contracts.

Proposition 3 (pooling with general contracts):

In equilibrium, either all or no projects are undertaken.

This proposition shows that the pooling result and the inefficiency are not removed by the introduction of unrestricted contracts. The intuition is again that "bad" projects can always choose the risk-shifting option and obtain positive returns. Hence they will always be willing to accept a contract that "good" projects find profitable. Having established that the equilibrium will be pooling, we can also ask which pooling outcome will be desirable for social welfare.

Proposition 4 (second-best):

Among all possible pooling outcomes, social surplus is highest when we have all projects financed with pure equity if (1) is satisfied and when no project is financed if (1) is not satisfied.

Intuitively there are two sources of inefficiency; overinvestment (or underinvestment) and wrong choice of action. We have established that the first source of inefficiency will always be present as the equilibrium will be pooling. The second type of inefficiency can be avoided if all entrepreneurs choose action 1. Equity contracts ensure this as the entrepreneur would like to maximize the ex post value of the firm of which he is a shareholder.

Next we characterize the form of the equilibrium contract more precisely. With this aim in mind, we introduce a debt contract with warrant (convertible debt, see Green (1984)). If $y \geq x^*$, $R(y) = x^* - r$ and $y < x^*$, $R(y) = \max \{0, y - r\}$. Figure 3 illustrates the form of this contract. which can be replicated by a debt contract plus an option to buy all the shares of the firm with the exercise price at $x^* - r$. We will now see that this contract will be used in equilibrium.

Proposition 5 (characterization of the unique equilibrium):

In the unique equilibrium of this economy, iff

$$\epsilon \int_{x^{\min}}^k Xf(x)dx + \int_k^{x^{\max}} xf(x)dx \geq k \quad (3)$$

then, all financiers offer the following debt contract with warrant

$$\begin{aligned} y > k+R, & R(y) = R \\ y \leq k+R, & R(y) = \max \{0, y-k\} \end{aligned} \quad (4)$$

where R is given by the smallest positive root of the following equation.

$$\epsilon(X-R) \int_{x^{\min}}^{k+\epsilon R} f(x)dx + k \int_{k+\epsilon R}^{k+R} f(x)dx + \int_{k+R}^{x^{\max}} (x-R)f(x)dx = k \quad (5)$$

Projects with $x \geq k + \epsilon R$ choose action 1 and $x < k + \epsilon R$ choose the risk-shifting option. If (3) is not satisfied, no project is financed.

In terms of Figure 2, all projects are financed (if (3) is satisfied); those in area A (and a few in area B) choose action 2. Contract (4) is trying to stop the overvaluation of stock while also preventing entrepreneurs from choosing the risk-shifting option. However, it is the presence of the risk-shifting option which implies that "bad" projects still like to imitate "good" projects and then choose action 2. This means that in equilibrium all projects have to be financed (Proposition 3). There are two forces that make the equilibrium contracts resemble debt. First, debt contracts prevent the overvaluation of stock problem. Second, debt makes entrepreneurs the residual claimant of high returns, thus a creditor who offers a debt contract (say while other creditors use equity contracts) would attract the more profitable types. However a pure debt contract, as we saw earlier, makes risk-shifting relatively attractive. Thus contract (4) tries to keep $R(X)$ as low as possible. Yet this implies the return to profitable types, e.g. $R(x^{\max})$, also needs to be low (because of free-disposal). Thus a social planner would ideally like to make $R(X)$ very low and prevent action 2 from being chosen⁴. However, competition among the

⁴ In fact, the social planner could pay all entrepreneurs a fixed return and using their indifference implement first-best. However this is a knife-edge case and also may give the wrong incentives to the entrepreneurs at the project selection stage (see Proposition 7).

creditors ensures that $R(\cdot)$ is sufficiently high to satisfy the zero profit condition. When R is chosen appropriately, all projects with $x \geq k + \epsilon R$ choose action 1 but the rest of the projects also accept the contract offer of the market and choose the risk-shifting option. Projects with $x < k + \epsilon R$ only pay $X - R$ with probability ϵ while good projects pay $x - R$ with probability 1. When condition (3) holds we can find a value of R at which creditors make zero profit. If condition (3) is not satisfied, the credit market collapses and no project is financed. Obviously the exact form of contract (4) is very much dependent on our specific assumptions (e.g. two point distribution when action 2 is chosen). However, the general feature of contract (4) is that (i) in the presence of asymmetric information and risk-shifting, competition among the financiers increases the return to entrepreneurs when the firm is doing well and thus makes risk-shifting more attractive for the "bad" types (see section 5 for a similar result without risk-shifting).

Another important point to note is that far from restoring efficiency, the equilibrium with unrestricted contracts entails second-best inefficiency in the sense that government intervention, subject to the same informational constraints, can improve overall welfare. We know from Proposition 4 that the most efficient method of financing all projects is by pure equity contracts because in this case the risk-shifting option would not be chosen whereas in our unique equilibrium, a number of entrepreneurs are choosing action 2. However competition among investors ensures that equity finance is not an equilibrium (i.e. a creditor offering a debt contract would attract the better entrepreneurs). Therefore if the government legislates to only allow pure equity contracts, welfare will improve. As a result of this second-best inefficiency, it can also be noted that condition (3) is more restrictive than condition (1). Thus it is possible for the decentralized (deregulated) credit market to collapse while the regulated market would not.

Finally note that credit market imperfections influence the internal organization of the firm in an important way. In order to minimize incentives to choose the risk-shifting option, the entrepreneur has effectively been induced to sell the firm (or to sell warrants on the firm) and is receiving a constant salary as long as the firm does not perform too badly. This implies that he is no longer the residual claimant and ex ante he will not have the right incentives to search for profitable projects (see Proposition 7 in the next section).

3) Separation of Ownership and Control and the Credit Market

In this section we introduce a third type of agent, "manager", who has the know-how to run the project. There is a sufficient supply of managers and at time $t=0$, uninformed about the

quality of individual projects. Each entrepreneur can hire a manager and write a publicly observable contract with her. In the case where the manager is hired, she finds out about the return of the project before $t=1$ and can make the financing decision and choose the relevant action (see Figure 1). This is similar to an "outsider" being appointed as the CEO of a company. This "outsider" does not have detailed information about the workings and fortunes of the firm but she will be expected to learn in time and start running the company⁵. We assume that the manager has a small alternative return equal to α and is risk-neutral. She will therefore accept any contract offer providing her with an expected return greater than or equal to α . Alternatively α can be thought of as the disutility of work for the manager. Recall that we assumed the entrepreneur had no outside option. The assumption that the entrepreneur has zero alternative return was made for convenience and can be relaxed without changing the thrust of our results⁶. Moreover we do not require the manager to have a positive outside option either. Nevertheless we will see that we need the manager's contract to give her a small lump-sum payment in order to be able to punish her in the case where she takes the "wrong" action. Thus under the alternative scenario where the outside return of the manager, α , is equal to zero, the lump-sum payment would be chosen from a non-closed set. However the important point is that the results in this section do not follow from the manager's positive alternative return but because she is a third-party to whom control can be delegated. In section 4, when secret side-contracting is allowed, she will be paid more than her outside return and thus α can be set equal to zero.

We will now suggest a simple contract that implements the first best as α tends to zero⁷.

⁵ It can be asked why instead of a manager, an investor does not come in, learn about the quality of the project and then agree to finance. However there would be problems with this solution. First, the credit market is decentralized and implementing such an arrangement may be difficult. Second, k may be larger than what a typical investor is willing to invest in this project (either because the investor is small or because he wants a diversified portfolio) thus even if one of the investors is brought in, similar issues to the one discussed here will arise (e.g. what kind of rewards should we give to this investor? Will he collude with the entrepreneur at the expense of other claim-holders?). Third, many investors may lack the skills necessary to evaluate the quality of a project. Fourth, the information that the investor obtains will be non-verifiable which may introduce ex post hold-up problems.

⁶ In fact, if the outside option of the entrepreneur is less than ϵR where R is given by the equilibrium contract (4), our exact results would remain unchanged.

⁷ Note that we are assuming this contract to be non-renegotiable thus collusion between the entrepreneur and the manager is not possible. We will allow such collusion in the next section.

Managerial Contract: All decisions are delegated to the manager. Her return is given by the following contract; $w = \beta$ if she abandons the project. If she continues with the project and $y < r$, $w = 0$ and if $y \geq r$, $w = w(y)$ where $w(y)$ is non-decreasing and greater or equal to β .

A special case of this contract is to set $w(y) = \beta$ for $y \geq r$, which can be thought of as giving a lump-sum payment to the manager that can then be taken back if the performance of the company is unsatisfactory. This amounts to introducing "career concerns" for the manager because the worst outcome is to continue with the project and then be unsuccessful. Due to this career concern, the manager will act "conservatively" (i.e. in the interest of the creditors).

The first question is where the payment of the manager would come from. As we will see shortly, in equilibrium the manager can borrow k from the market. Either the project is profitable in which case her salary is paid out of the profits. Or the project is unprofitable in which case she gets her salary out of what she borrowed and pays-out the rest back to the investors. It has to be ensured that this is a subgame perfect sequence of events. It can easily be checked that creditors would never want to force a manager who wants to abandon the project because they will bear the cost. It is thus ex post in their interest to allow the manager to pay herself and abandon the project if she wishes so (as her contract specifies that she has to be paid β when she abandons the project, they cannot object to this payment either, in other words, as in practice wages are more senior than financial claims). It can additionally be asked whether ex ante, the creditors may object to a contract in which the manager is paid even when she abandons the project. The answer is no, because if the manager does not get paid when she abandons the project, she will want to continue with the project even when it is not profitable thus separation of ownership will not bring any of the benefits that we stress. Thus a creditor will always find it profitable to allow such managerial contracts. Finally, since the return of the firm (minus what the manager disposes of) is publicly observable at $t=2$, the manager can never receive more than what her contract specifies. Also in this section we are assuming that this contract is non-renegotiable and side-contracting between the entrepreneur and the manager is not possible.

Before we move on to stating our results, we can note that given the behavior of the stock market, entrepreneurs and managers are playing a two-stage game. At the first stage, $t=0$,

Also note that the control is in the hands of the manager, we thus require the entrepreneur to be a passive shareholder.

the entrepreneur, knowing his type, offers a contract to a manager. If the manager, uninformed at this stage, accepts the contract, she will learn about the type of the project before $t=1$, and take her decision to maximize her return as specified by the contract. We will solve this game backwards, taking into account that investors are also maximizing their returns. Most importantly, the creditors will find it profitable to condition their financial contracts upon the internal organization of the firm.

Proposition 6 (separation of ownership from control):

Suppose that entrepreneurs can hire a manager at $t=0$ and write the above contract, then in equilibrium, the contracts will have $w(y)=\beta=\alpha$, only projects with $x \geq k+\alpha$ will offer contracts to managers and they will receive funds from the debt market at $r=k$. Entrepreneurs not hiring a manager do not receive finance. As α tends to zero, we get arbitrarily close to the first-best.

Thus in this equilibrium projects in area A of Figure 2 never invest and as α tends to zero, all projects in area B invest and choose action 1. However, as the informed agent, the entrepreneur, moves first in this game by deciding whether to hire a manager or not, a multiplicity of Perfect Bayesian Equilibria exists. Yet, we can show that all other equilibria are supported by unreasonable conjectures off the equilibrium path. The simplest refinement to eliminate these undesirable equilibria is a version of the Intuitive Criterion of Cho and Kreps (1987). In the Corollary we show that only entrepreneurs separating ownership from management will receive finance when this refinement is imposed. The Intuitive Criterion is defined and the Corollary is proved in Appendix B.

Corollary 1 to Proposition 6 (uniqueness of managerial equilibria):

No equilibrium in which an entrepreneur who has not hired a manager receives finance passes the Intuitive Criterion⁸.

Returning to Proposition 6, the manager always accepts the contract offer of an

⁸ Uniqueness only implies that in all equilibria managers are hired and those projects that do not hire a manager do not receive finance. The contract used to finance the project can take many different forms until we consider collusion. We chose debt because it is simple to work with and it is the form of finance that is favored by other considerations as we will see later on.

entrepreneur at $t=0$ (when she is uninformed) because she can always get her reservation return. However once she finds out the quality of the project, she will never choose action 2 and she will abandon all projects below a certain cut-off profitability level because she does not want to lose her payment (i.e. because she has career concerns)⁹. This is similar to a phenomenon, sometimes alluded to in the financial press, whereby an "outsider" comes in and cleans out the company (closing divisions, etc) and restores a better relation with the financial market (e.g. Sir Harvey Jones in the UK). Because the contract of the manager is publicly observable¹⁰, the creditors know that the manager would never choose the risk-shifting option, thus by hiring a manager, the entrepreneur commits not to choose action 2. Also since the manager will abandon the unprofitable projects, only entrepreneurs with profitable projects would hire a manager and hence separation of ownership from control is a good signal to the market. Since only good projects are now receiving finance, competition ensures that $r=k$. Another way of expressing this result is that companies that have separated ownership and control will have a better "reputation" in the sense that the credit market will view them as safer and more profitable investment opportunities. This is consistent with the observations made in the introduction that companies that established managerial hierarchies achieve better relations with the stock market.

The mechanism through which signalling and commitment are achieved is the following: the contract offered to the manager gives her some lump-sum payment that she would lose if she went ahead with a bad project. By giving the control of the firm to the manager, we make sure that she will take the utility maximizing decision for herself which will in general be different from the utility maximizing choice for the entrepreneur. This is exactly the source of the inefficiencies of separation of ownership and control that previous literature has rightly emphasized. What Proposition 6 shows is that it can also lead to some beneficial effects. This separation of control and the residual claims ensures that the manager will only go ahead with profitable projects. If we now look back at Proposition 5 (equilibrium without managers), we can see that the market was actually trying to stop the entrepreneur being the residual claimant but could not achieve this without creating wide-spread inefficiencies, because at the time the

⁹ With $w(y)=\alpha=\beta$, the manager is indifferent between abandoning and continuing with a good project. This is because in equilibrium she is paid her reservation return, not because our results depend on such indifference.

¹⁰ In fact we do not need the contract of the manager to be observed by the creditors, it is sufficient for them to know that the manager has career concerns.

entrepreneur went to the market he was the residual claimant and his behavior reflected this. For instance if the market wanted to buy the company from the entrepreneur for a fixed price and then hire him back to manage the company, entrepreneurs with bad projects would be more willing to do this (i.e. adverse selection). Separation of ownership from control achieves this at a much lower cost (α), because at the time the manager meets the credit market with her superior information, she is no longer the residual claimant.

It is important to emphasize that the same mechanism could not have been used without a manager, for instance by giving a lump-sum payment to the entrepreneur. Hence introducing a third-party is *essential*. First, there exist practical problems if we wanted to make a lump-sum payment to entrepreneurs for not running their project (i.e. sign a contract similar to the managerial contract with themselves): (i) in our case, bad projects do not hire a manager and thus the lump-sum payment is not paid in all cases, thus it is less costly than a lump-sum payment to all entrepreneurs; (ii) the lump-sum payment may be unprofitably high because the entrepreneur is the residual claimant and may still want to sell overvalued stocks to the market or take the risk-shifting option; (iii) if lump-sum payments are made to all entrepreneurs, many more agents will claim to have a profitable project in order to receive the lump-sum payment. Additionally, to see why making a lump-sum payment to entrepreneurs for not running their projects cannot be an equilibrium, suppose, on the contrary, that entrepreneurs are given an amount which they will lose if the returns are less than a certain threshold. Now consider the following deviation by an investor; a new contract offer to firms with a lower level lump-sum payment and higher $R(x^{\max})$. If the rise in $R(x^{\max})$ is sufficiently small, "bad" types will be worse off with this contract but x^{\max} will naturally be better-off, thus the deviant investor will attract x^{\max} (and types sufficiently close to x^{\max}) and make positive profits. Thus we cannot have such an equilibrium. Intuitively, a contract with a lump-sum payment is more attractive to "bad" types as "good" types will benefit from shifting the payments from the "no investment" case to the "investment and high return" case. Thus a creditor who offers a lump-sum to the entrepreneur will attract "bad" types. On the contrary, employing a manager is a "good" signal because the contract of the manager is such that she will not invest with "bad" projects and only "good" entrepreneurs will have an incentive to hire her. Expressed alternatively, when the entrepreneur takes the project to the market, competition among the financiers implies that he must get positive returns in some states (i.e. he is the residual claimant at least to some degree). As a result, entrepreneurs with bad projects have an incentive to copy good types and try to obtain

those positive returns. However when the manager takes the project to the market, although she has all the powers of the entrepreneur, her contract signed at $t=0$ (i.e. her career concern) ensures that she acts conservatively.

Therefore, as a result of the credit market imperfections we obtain a very different organizational form than we would have done if the entrepreneurs could finance their own investments. First, in this organizational form we need a manager to whom all the decisions are delegated. Note that from a theoretical viewpoint this manager is acting both as a second principal (when she accepts the contract offer of the entrepreneur, she is uninformed) and as a second agent (when she runs the project and has the informational advantage over the creditors). Secondly, we naturally obtain two groups of claim-holders as we observe in practice: the equity-holders and outside debt-holders (as in Dewatripont and Tirole (1992), see section 6).

Another attractive feature of this equilibrium is that entrepreneurs are still the residual claimants which implies that they will have adequate incentives to discover good projects. In particular we can think of a period $t=-1$, where each entrepreneur makes a human capital investment (e.g. education, experience, effort, etc.) and the more human capital he obtains, the higher is the likelihood that he will end-up with a good project. We can model this situation by assuming that each entrepreneur's project is drawn from a distribution $f(x,e)$ and at $t=-1$, all entrepreneurs are identical. To maximize similarity to our analysis so far we can assume that the support of all distributions is still $[x^{\min}, x^{\max}]$ but $F(x,e)$, the associated distribution function, is decreasing in e for all x . This implies that higher human capital increases the likelihood of a good project and reduces that of a bad one. Also for simplicity assume that $f(x,e)$ is differentiable with respect to e and that cost of effort $c(e)$ is differentiable increasing and strictly convex (i.e. increasing marginal cost). We can then state

Proposition 7 (efficient human capital investment):

In the equilibrium without managers there is underinvestment in human capital. In the equilibrium with managers, investment in human capital tends to the first-best value as α goes to zero.

The intuition of this proposition is straightforward. In the equilibrium without managers, entrepreneurs are not the full residual claimants. With a good project they just receive R and with a bad project they get a positive return rather than zero, thus they have insufficient

incentives to invest in human capital. Put differently, by investing more an entrepreneur would be creating a positive externality on other entrepreneurs and investors. As this effect is not internalized, there will be underinvestment, the average quality of projects would be too low and the credit market will be more likely to collapse. However, when ownership is separated from control, entrepreneurs become the residual claimants and hence they are more willing to invest. Therefore separation of ownership from control will also help in this respect and lead to better business opportunities in general as entrepreneurs know that they will receive the marginal revenue product of their human capital investments.

This section therefore provides us with a theory of separation of ownership from control. Entrepreneurs discover projects and managers run them despite the fact that they do not possess an advantage in running companies. However, this separation leads to better credit availability and lower cost of capital for the company. Further as entrepreneurs are kept as the residual claimants they have the right incentives to discover good projects. This theory can be interpreted as to apply to medium-sized firms that start as owner-managed and separate ownership from management when they get more integrated into the financial markets. Yet it may equally apply to the question of why large companies are not always run by the largest shareholders (for example Chandler (1977) reports that largest shareholders running the company was relatively rare after the "managerial revolution" in the 19th century). It can also be interpreted to apply to different kinds of delegation in line with the evidence in De Long (1990) discussed earlier.

A problem which we have avoided so far is that of secret renegotiation and side-contracting between the manager and the entrepreneur. This is a topic that the delegation literature rightly emphasizes (e.g. Tirole (1986), Kofman and Lawarree (1993)) and room for such collusion may exist in our context. We next turn to this problem.

4) Collusion and Separation of Ownership From Control

Suppose that in the equilibrium suggested by Proposition 6, an entrepreneur with $x < r$ hires a manager. We know that given her contract the manager is supposed to abandon the project and go home with α . But now consider the entrepreneur making the following offer; "rather than abandoning the project, obtain finance at r and choose action 2. If the project is successful I will share the gains with you". This may be a tempting offer for the manager and if she believes the entrepreneur will not renege on this promise, she may find it profitable to accept this side-contract and collude with the entrepreneur. Anticipating the possibility for such

collusion, all entrepreneurs will hire a manager and separation of ownership from control will achieve neither commitment nor signalling. In this section we will firstly suggest a reason why such renegotiation may be less serious in our context than others. Further, recognizing that as long as gains from collusion exist, ways to circumvent these problems may be found (e.g. implicit collusion as in Acemoglu (1993)), we will also analyze the implications of collusion.

Consider a two-person dynamic contracting problem. If at later stages renegotiation is mutually beneficial, we cannot plausibly assume that such opportunities will not be exploited, thus we would require the equilibrium contract to be renegotiation-proof. We have a three-person contracting problem and in the same way if at $t=1$, a renegotiation could make all parties better off *ex post*, ruling out such renegotiation would be unsatisfactory. However, as first-best is achieved in Proposition 6, *ex post* renegotiation beneficial to all parties is not possible. Yet, side-contracting (or bilateral renegotiation) between the manager and the entrepreneur may still be profitable at the expense of the creditors. On the other hand, there may exist institutional constraints preventing such collusion. In particular, financial contracts with debt-holders often include covenants which may make such collusion difficult. To see this, let us consider the simple case where the project is financed with a debt contract which has a covenant preventing renegotiation of the managerial contract. This covenant implies that only secret renegotiation is possible. The entrepreneur may tell the manager that he would secretly pay her a high salary if she goes ahead with the project (the payment cannot be made immediately as the entrepreneur has no wealth at the time). However, when the promised payment time comes, the entrepreneur can easily renege as there is no enforcement mechanism: legally the first contract is still binding. Therefore, in general a covenant in the credit contract which requires the approval of the creditors for any major changes in the managerial contract would prevent side-contracting and first-best would be achieved by separation of ownership from control.

Although the above argument is suggestive, it may be argued that the manager and the entrepreneur will find ways of dealing with the enforcement problem and collude as long as gains from such side-contracting are present. A simple intuition would suggest that when such collusion is possible, separation of ownership and control is of no benefit because the manager and the entrepreneur will face the market having already aligned their interest and we will thus go back to Proposition 5. This however turns out not to be correct because the stage where the manager signs her first contract enables some separation of interests which is sufficient to make such organizational change beneficial.

Suppose that an entrepreneur with $x < r$ has hired a manager and signed the above contract and further that the manager obtained debt-finance from the credit market with an obligation to pay r to the creditors. Under what conditions does there exist an opportunity to collude? Before answering this question we have to note that the manager will have signed a legally binding contract and thus she needs to obtain at least as much as what she is getting from that contract. Without collusion the manager will abandon the project and get β and the entrepreneur will obtain 0. Thus the joint benefit to collusion needs to exceed β . This gain to collusion will obviously depend on the financial contract that the company signs with the credit market, we thus need to analyze the two contracts together.

To illustrate the main argument suppose the financial contract is debt. If they collude and choose action 1, they will both receive 0 as $x < r$, the reason being that as credit is provided in the form of a debt contract, there is no room for "overvaluation of stock". However, "risk-shifting" is still possible. If the manager goes ahead, undertakes the project and chooses action 2, the sum of the expected returns of the manager and the entrepreneur will be $\epsilon(X-r)$. Thus as long as $\epsilon(X-r) > \beta$, there exist profitable collusion opportunities. In order to prevent collusion, β needs to be greater than or equal to $\epsilon(X-r)$. We also know that β needs to be larger than α from the last section, so if $\alpha > \epsilon(X-k)$, collusion will never take place and $r=k$ as in Proposition 6. However, in the previous section we analyzed the case where α was small and we approached the first-best, thus it is now natural to look at the case where $\alpha < \epsilon(X-k)$. What will happen in equilibrium? First, no manager will be hired with a contract that has $\beta < \epsilon(X-r)$ because such delegation will not act as a commitment or signalling device and will cost money. Let us suppose that no managers are hired, then we are back to Proposition 5 and x^{\max} is receiving R given by (5). If x^{\max} now hires a manager and sets $\beta = \epsilon X$, he will signal that he is a good type and thus obtain finance at $r=k$ which implies that he will make $x^{\max} - k - \epsilon(X-k)$. This will be greater than R and thus in the equilibria that pass the Intuitive Criterion, x^{\max} and other profitable types will hire a manager and those who do not hire a manager will not receive finance. Given that hiring a manager is more expensive now, only projects with $x > k + \beta$ will do so. Thus, even when α approaches zero, we do not achieve the first-best. Moreover, managers who get hired are now receiving a salary higher than their reservation return. We can think of this as an "efficiency salary" paid in order to prevent the manager from colluding with the entrepreneur. This "efficiency salary" implies that the managerial labor market will not clear. Managers will receive high salaries and employers will not be willing to cut these salaries because with a lower salary,

the manager will provide neither commitment nor a good signal. However, as a rent is being paid to the manager in equilibrium, the financial and managerial contracts will also try to minimize this rent. Debt contracts are quite attractive in this respect as they prevent the problem of "overvaluation of stock". Yet when the return of the project is X , the entrepreneur receives $X-k$ and gains to choosing the risk-shifting option are high. We can show that contract (3) with $R=x^{\max}-k$ is optimal in this situation as it prevents overvaluation of stock and also minimize the rent paid to the manager. For all projects that choose action 1, contract (3) is exactly the same as a debt contract while incentives to choose action 2 are reduced.

Corollary 2 to Proposition 6 (collusion-proof equilibrium):¹¹

When collusion is possible between managers and entrepreneurs, in the unique equilibrium that passes the Intuitive Criterion, projects with $x > k + \epsilon(x^{\max}-k)$ hire a manager, sign the managerial contract with $w(y) = \beta = \epsilon(x^{\max}-k)$ and are offered contract (3) with $R = x^{\max}-k$. This economy does not achieve the first-best as long as $\epsilon > 0$ and the managerial labor market does not clear.

Although, in the previous section, we could achieve efficiency using quite different forms of finance (and managerial contracts), when we consider collusion possibilities, we obtain a unique managerial and financial contract. This is due to the additional consideration of trying to minimize the "efficiency salary" paid to the manager. The benefit of the equilibrium managerial contract is that it imposes maximum punishment on the manager. The attraction of debt contract on the other hand is that it prevents the "overvaluation of stock", attracts good types (relative to equity type contracts) and the warrant on the debt ensures that risk-shifting incentives are limited, thus minimizes the gains to collusion. What makes separation of ownership and control still useful is that the first contract that the manager signs creates a divergence between the interests of the manager and of the entrepreneur and makes sure that unless the entrepreneur is able to compensate the manager, she will do what the creditors want (i.e. act in a conservative way). We can then choose the financial contract such that it is as difficult as possible for the entrepreneur to compensate the manager. Also note that in this setting too, the entrepreneur is the residual claimant so again she will have the right incentives to exert high effort at $t=-1$ as in Proposition 7.

¹¹ For a proof see Appendix B.

5) Delegation in Asymmetric Information Principal-Agent Relationships

We have argued that separation of ownership from control can have two strategic roles; as a commitment device and as a tool for information revelation. Our analysis so far has combined these two roles as we believe both to be important in practice. However, as it is argued in the next section, our emphasis on information revelation, among other things, separates us from previous literature on delegation. In this section, we illustrate that our basic results remain unchanged when we consider a slightly more general principal-agent model with asymmetric information but stripped from the moral hazard aspect. It is still useful to think of an entrepreneur (informed agent) demanding a loan from a principal (the credit market) and we will be studying the role of delegation to a third party (the manager). This model will also show that, when there is sufficient noise in the system, the assumption of free-disposal that gave us monotonic contracts is unnecessary.

We assume the type of the agent, x , to be distributed with density $f(x)$ over $[x^{\min}, x^{\max}]$. The type of the agent is not known to the principal and is not verifiable. If agent x accepts the task, he generates return y distributed with density $\mu(x, y)$ but also costs the principal an amount k . All $\mu(x, \cdot)$ have the same support $[y^{\min}, y^{\max}]$ and are positive at all points over this range. We also assume that for all $x_1 > x_2$, $\mu(x_1, \cdot)$ first-order stochastically dominates $\mu(x_2, \cdot)$. The contract of the agent can only be conditioned on y , the only observable variable. The agent has an increasing utility function given by $U(\cdot)$ and the principal has an increasing utility function denoted by $W(\cdot)$, both defined over income only. Again, contracts are offered by the credit market (the principal) and the equilibrium concept is Perfect Bayesian. The principal will offer a contract $R(\cdot)$ to the agent that relates his payment to y . The agent has zero ($U(0)$) reservation return and "limited liability" ($R(y) \geq 0$ for all y). Finally we assume

$$\int_{x^{\min}}^{x^{\max}} \int_{y^{\min}}^{y^{\max}} W(y) \mu(x, y) f(x) dy dx > W(k) \quad (6)$$

where the principal obtain $W(k)$ without investment and $W(y)$ when the return is y . (6) implies that it is beneficial for the principal to employ the agent at zero salary.

Proposition 8 (equilibrium without a third-party):

In equilibrium all agents are financed.

The intuition of this proposition is no different than the ones we have already discussed. In equilibrium, "bad" types would like to imitate "good" types since a high realization of output that yields attractive returns for the agent is also possible for "bad" types (albeit less likely). This is because $\mu(\cdot, y)$ is positive at all points over its support and again the zero profit constraint for the principal (i.e. competition in the credit market) ensures that $R(y) > 0$ for some y and thus all agents would like to try their "luck" whatever their type. However if

$$\int_{y^{\min}}^{y^{\max}} W(y)\mu(x^{\min}, y)dy < W(k) \quad (7)$$

this outcome is not efficient because "bad" types undertake the task and the principal incurs the losses. For the rest of this section we assume that (7) holds, implying that the decentralized equilibrium (Proposition 8) entails some inefficiency. Can efficiency be improved by introducing a third-party? Suppose, as in the last section, that a third-party who can discover the private information of the agent can be hired at $t=0$ and the key decision of the agent can be delegated to her. This third-party is assumed to have a utility function, $V(\cdot)$, defined over her income and a reservation return equal to $V(\alpha)$. We also assume that collusion between the third-party and the agent is not possible. The introduction of the third-party will be beneficial if some of the "bad" types are prevented from entering the agency relationship as a result of this delegation.

Proposition 9 (introducing a third-party):

When the third party is hired and offered a suitable contract, we get arbitrarily close to the first-best as α tends to zero.

Corollary to Proposition 9 (uniqueness of delegation equilibria)¹²:

No equilibrium in which the third-party is not hired passes the Intuitive Criterion.

The result is the same as in section 3. The contract that the entrepreneur signs with the third party acts as a signalling device. This is achieved in a similar fashion to the managerial contract used in the previous section. If the project is not sufficiently successful, the third-party is punished. Anticipating this, the third-party will not go ahead with the project unless the

¹² Proof omitted.

project is sufficiently profitable. Thus hiring a third-party acts as a good signal.

However, the short-comings of this result should also be borne in mind. Firstly, the first-order stochastic dominance assumption and the simple structure of our model are crucial for achieving the first-best. Secondly and more importantly, the possibility of secret side-contracting will again restrict the set of outcomes that can be implemented. Thirdly and most importantly, in many real world examples, the private information that lead to inefficiencies cannot be easily discovered by, and relevant decisions cannot be easily delegated to, third-parties. However, apart from an entrepreneur or a major shareholder hiring a CEO, we can also think this case to correspond to hiring an auditor in order to have some hidden information attested (see Kofman and Lawarree (1993), Acemoglu (1993)).

6) Relation to the Existing Literature

Our basic model that leads to inefficiencies is not entirely original. Many important studies have pointed out the inefficiencies that would arise in the presence of asymmetric information (e.g. Leland and Pyle (1977), Stiglitz and Weiss (1981), Myers and Majluf (1984), De Meza and Webb (1987)). Yet, in contrast to these papers, we allow unrestricted contracts between lenders and borrowers which may, under certain circumstances, restore efficiency (see Brennan and Kraus (1987) or Heinkel and Zechner (1990)). In our model, the presence of asymmetric information, non-verifiable actions and competition among financiers makes first-best impossible and leads to marked inefficiencies. The tractability of our set-up enables us to show that the unique equilibrium is pooling and projects are financed by convertible debt contracts (as in Green (1984), but without restricting the contract space). In doing this we also emphasize that there are natural reasons that lead to debt-like contracts we observe in practice. More importantly we also demonstrate that allowing for unrestricted contracts and competition among financiers may lead to additional and novel inefficiencies because such competition increases the return to the entrepreneurs in the good states and thus makes it more attractive for them to choose the risk-shifting option.

The main contribution of the paper is the link it establishes between credit market interactions and the internal organization of the firm. We show that in order to establish efficiency, certain decisions need to be delegated from the residual claimant to a third-party: in other words, control needs to be separated from ownership. That in environments with incomplete markets, commitment is valuable is well known and the contract theory literature has

many examples in which a third-party is introduced into a principal-agent type relationship in order to reduce the inefficiency thus created. The intuition that such delegation can be beneficial goes back at least to Schelling (1960) (and also see Vickers (1984)). However in these models, the third-party has some special features that are indispensable. For instance in the Schelling-Vickers story, the manager enjoys fighting which deters entry. In our model, the preferences of the manager do not matter because they can be manipulated via the contract she is offered. More recent studies of delegation, e.g. Fershtman and Judd (1987) and Skivas (1987), show that in oligopolistic markets, it may be beneficial to offer non-profit motives to managers in order to make them act more like "Stackelberg" leaders. Aghion and Bolton (1987) and Dewatripont (1987) show how a contract that an incumbent writes with its customers or workers can deter entry by acting as a commitment to fight the entrant. Katz (1991) shows how delegation may be helpful even when agents' contracts are not observable.

Our first difference from these papers is that we consider a new application of the notion of delegation which suggests that exactly the same mechanism that makes separation of ownership and control costly, may also bring benefits. A more theoretical difference is that the role of delegation in those examples arises because of the incomplete contracts setting. For instance, the monopolist cannot write a contract with the entrants to share the gains with them and deter entry. However, as section 5 shows, this paper develops a motive for delegation that holds even when contracts are complete. This is because we rely on the signalling as well as the commitment role of delegation. Moreover, in contrast to the above papers, we showed that a complicated contract for the agent would not be sufficient to achieve similar results and that delegation of all the relevant decisions to a third-party is *essential*. We also demonstrated why it is important to keep the entrepreneurs as the residual claimants in order not to distort their incentives to discover good business opportunities and that separation of ownership from control achieves this objective as well. Finally, our simple set-up also enabled us to study the possibility of collusion which is a problem for models of delegation. In our model, collusion can be prevented by paying an "efficiency salary" to the manager and separation of ownership from control still occurs in equilibrium.

Another study which deals with related issues as ours is Dewatripont and Tirole (1992). They try to explain the existence of more than one group of claim-holders and the congruence between the interest of shareholders and managers. Their model is one of incomplete contracts; separation of ownership and control is taken as given and all the results are derived from the

interaction between control rights and income rights. Apart from these differences in approach, the third-party we introduce is different in nature and as emphasized above, her existence is essential even when unrestricted contracts are available. However, there exist some similarities between the results of the two papers. As in their paper, a second principal is very useful (the manager is first used as a second principal) but not because of control reasons. Further, we also end-up with two groups of claim-holders, yet again the reason is not the incompleteness of contracts but the lack of funds of the entrepreneur and the necessity of separation of ownership from control. And finally, when we allow collusion, we also obtain congruence between the interests of the manager and shareholders (rather than all claim-holders) but here, the problem is to limit this kind of congruence.

7) Conclusion

This paper has presented a model which shows how wide-spread inefficiencies can arise in the credit market because of asymmetric information, moral hazard and competition among investors. We demonstrate that there can be strategic gains from separation of ownership and control. Delegation of management can act both as a commitment and a signalling device and first-best can be restored if sufficiently efficient delegation is possible in our economy. Therefore other factors than comparative advantage and specialization need to be considered in a theory of separation of ownership from control. Such separation may be carried out strategically to improve the availability of credit and reduce the cost of capital. This suggests the impact of credit market imperfections on the internal organization of the firm, and on the assignment of tasks across agents is important. Our analysis also shows that if managers have an important strategic role they may be paid more than their reservation return, the managerial labor market may not clear and debt contracts may naturally arise in equilibrium as they minimize incentives to collude.

Figure 1

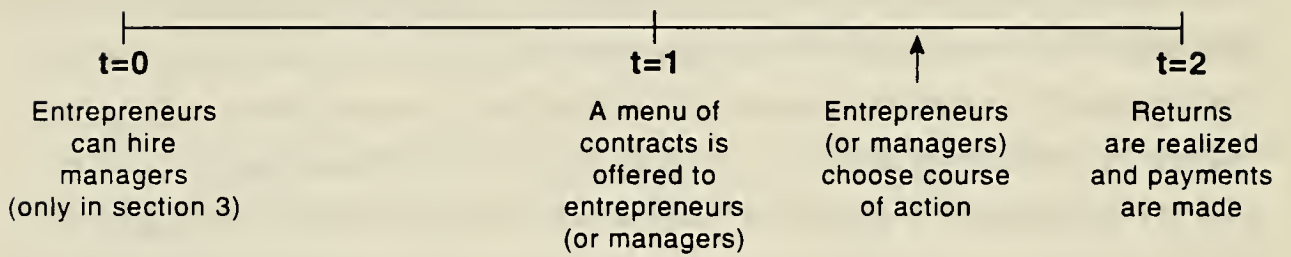


Figure 2

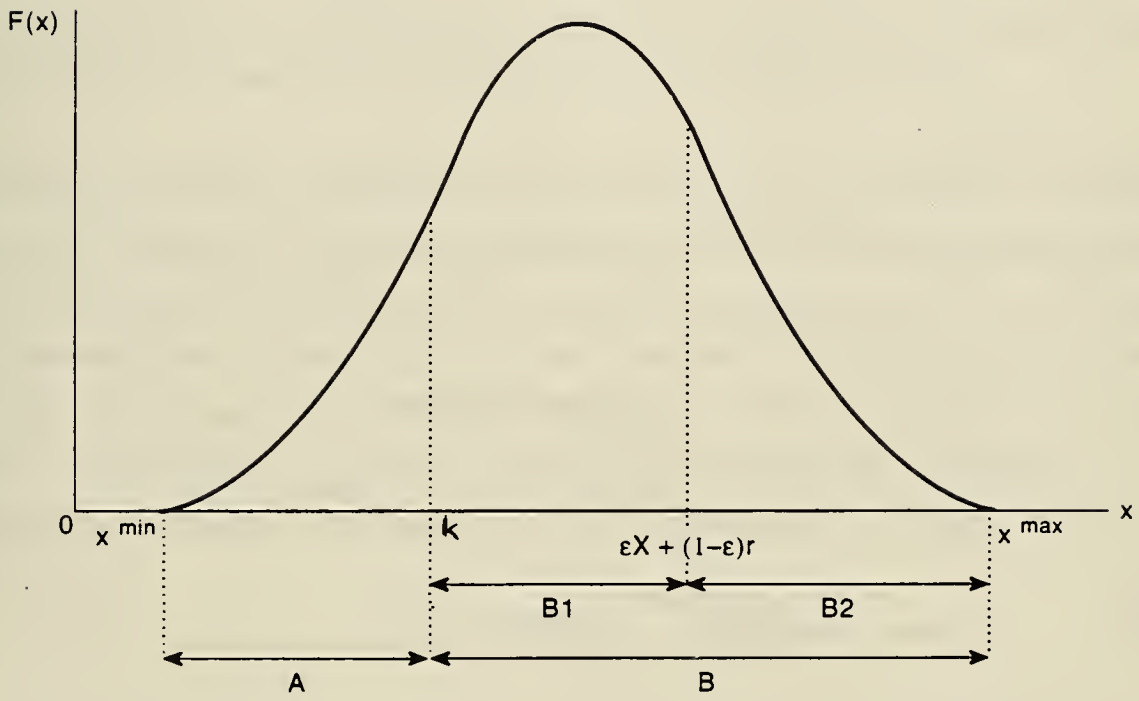
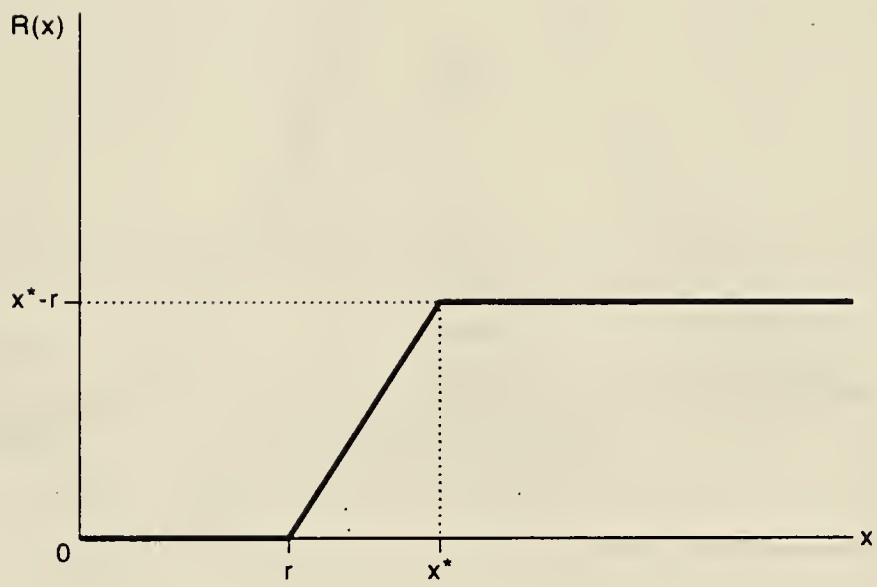


Figure 3



Appendix A: Proofs of Proposition 1-9

Proposition 1: No contract would have $ps > k$ as this would be more attractive for less profitable types and thus reducing s would be profitable for an investor, hence $p = k/s$. All entrepreneurs prefer to offer their stock at all positive prices since $(1-s)x \geq 0$. Suppose there exist two pairs (p_1, s_1) and (p_2, s_2) which are equilibria and assume $p_1 > p_2$. In this case all entrepreneurs would choose the first contract as their return, $(1-s)x$, will be higher. Thus in equilibrium a unique equity contract will be offered. Competition among investors ensures zero profit, thus

$$\int_{x^m}^{x^m} f(x) s x dx = k \quad (A1)$$

for a value of s less than 1, which requires condition (1) to be satisfied. If condition (1) is not satisfied then no investor would be willing to finance the entrepreneurs. QED

Proposition 2: Consider a debt contract with payment level $r < X$. Any entrepreneur can accept this contract choose action 2 and have expected return $\epsilon(X-r) > 0$. Thus all entrepreneurs would always like to accept such a debt contract. Suppose an entrepreneur accepts this debt contract. If he chooses action 1, he would receive x , repay r and make $x-r$. Alternatively action 2 would have expected return $\epsilon(X-r)$. Thus all projects with $x \geq \epsilon(X-r)$ would accept the contract, choose action 1 and repay with probability 1. The rest would accept the contract, choose the risk-shifting option and repay with probability ϵ . Thus the return to the debt-holders would be

$$r \times \left(\int_{\epsilon X + (1-\epsilon)r}^{x^m} f(x) dx + \epsilon \int_{x^m}^{\epsilon X + (1-\epsilon)r} f(x) dx \right) \quad (A2)$$

In equilibrium (A2) needs to equal k because of the competition among investors. If (A2) is equal to k for a unique positive value of r , this constitutes the unique equilibrium debt contract. If this equality holds for more than one positive value of r , the unique equilibrium is given by the lowest positive root as all entrepreneurs prefer to borrow at the lowest r . Thus an investor demanding a higher value will have no borrowers and if all investors are demanding a higher value of r , a deviation by demanding a value of r slightly above the lowest positive root will be profitable. If no positive r satisfies (2), then no project is financed in equilibrium. QED

Proposition 3: First there can be no credit rationing in the sense of a project demanding finance in current terms being turned down, since all projects are observationally equivalent and the supply of funds is unlimited. Thus we only need to show that if a certain type finds a contract profitable all other types do so too. Suppose $R(\cdot)$ is a contract offered in equilibrium and some x^* in $[x^{\min}, x^{\max}]$ it is profitable, i.e. $R(x^*) > 0$. If $R(\cdot)$ is monotonic then $R(X) > 0$ and any type can accept this contract choose action 2 and obtain equilibrium return $\epsilon R(X) > 0$. If $R(\cdot)$ is not monotonic then, any type can accept this contract, choose action 2 and when the return is X destroy $X - x^*$ and receive $R(x^*)$. Thus their expected return would be $\epsilon R(x^*) > 0$. QED

Proposition 4: Given that all projects are financed, social surplus is maximized when all entrepreneurs choose action 1. Pure equity finance ensures this and this social surplus is non-negative when (1) is satisfied. Otherwise, second-best entails no projects being financed. QED

Proposition 5: The proof will have five stages. We will first show that it cannot be the case that all projects choose action 1 in equilibrium. Second that $R(X) = R(x^{\max})$ for all the equilibrium contracts, third that only one type of contract can be offered in equilibrium. Fourth we will show that this unique equilibrium contract will take the form $R(y) = R$ for $y > x^*$ and finally that if $y \leq x^*$, $R(y) = \max \{0, y - k\}$.

Firstly suppose all entrepreneurs choose action 1 and recall that in equilibrium creditors must be making zero profit. However a new creditor can offer a pure debt contract which would be more attractive for the "good" types and break the existing equilibrium, as the existing creditors would now be making negative profit and the new creditor positive profit. Thus in equilibrium some entrepreneurs must be choosing the risk-shifting option.

Second all equilibrium contracts have to be monotonic (non-decreasing) because of the free-disposal. Thus we only need to show that after x^{\max} they cannot be strictly increasing. However, this is straightforward as y can only be larger than x^{\max} if action 2 is chosen. Thus the higher is $R(y)$ for $y > x^{\max}$, the more attractive this contract becomes for risk-shifting. Thus all creditors will try to minimize $R(y)$ for $y > x^{\max}$ thus $R(y)$ will be flat in this region.

Now suppose that there are two different contracts offered in the market R_1 and R_2 . In equilibrium, they should both be making zero profits. Without any loss of generality suppose that $R_1(x^{\max}) > R_2(x^{\max})$. In this case, creditors offering the second contract can increase R_2 in the left-hand neighborhood of x^{\max} which will attract some of the "good" types but as long as

$R_1(x^{\max}) > R_2(x^{\max})$ while types choosing the risk-shifting option would stay with contract 1 and contract 1 would make a loss and contract 2 would make a positive profit. This implies $R_1(x^{\max}) = R_2(x^{\max})$ but suppose that for x in the neighborhood of x^{\max} , $R_1(y) > R_2(y)$. As y is in the neighborhood of x^{\max} , it is a profitable project and creditors offering the second contract would have an incentive to increase $R_2(y)$, thus only $R_1(y) = R_2(y)$ is possible. By a similar argument we can see that $R_1(\cdot)$ and $R_2(\cdot)$ have to be identical and only one contract would be offered to the entrepreneurs in equilibrium.

For the fourth part of the proof take x^* such that $R(x^*) < x^* - k$, thus x^* is a profitable project that subsidizes loss making projects. Such a project must exist by the zero profit condition. Now suppose that $R(x^{\max}) > R(x^*)$ and let r^* be such that $R(x^*) = x^* - r^*$. We can find r in the neighborhood of r^* such that $R(x^*) < x^* - r$ but $\epsilon R(x^{\max}) > \epsilon(x^* - r)$. If a creditor offers the following debt contract with warrant

$$\begin{aligned} y > x^*, R'(y) &= x^* - r \\ y \leq x^*, R'(y) &= \max \{0, y - r\} \end{aligned} \tag{A3}$$

x^* prefers this alternative contract to $R(\cdot)$ but the unprofitable types do not. Thus this contract would make positive profit and break the equilibrium. Therefore we cannot have an equilibrium with $R(x^{\max}) > R(y)$ for $y > k + R(x^{\max})$.

Finally take a type with x in $[k, k + R(x^{\max})]$. If $R(x) > x - k$, then a creditor can offer contract with lower $R(y)$ for y in $[k, k + R(x^{\max})]$ which will attract all other types but not x in this interval. However, as creditors were making losses on types in this interval, this contract would make a positive profit. Alternatively, suppose $R(x) < x - k$ for x in this region, then creditors are making gains from type x . A creditor can offer the same contract as in (3) with $R(x)$ increased by a small amount which would attract x and thus the creditor would make positive profits. To finish we also need to show that $R(y) = 0$ for $y \leq k$. Suppose $R(y) > 0$, a creditor can offer a contract with $R(y)$ lower for $y \leq k$ and $R(y)$ increased by a small amount for $y > k$ and thus attract the profitable projects and make positive profit. This establishes that the unique equilibrium contract must have the form given in (4), given (3) a positive value of R that satisfies (5) can be found. If there are more than one such value, by the argument in the proof of Proposition 2, the smallest value of R will be used in the unique equilibrium contract. QED

Proposition 6: First look at the behavior of the manager. She will always accept the contract offer of an entrepreneur because she has the option of discontinuing the project after accepting the contract and receiving her alternative return. Once she discovers the relevant information she has three options; (i) discontinue the project, (ii) borrow at the terms offered in the market and choose action 1 and (iii) borrow from the market and choose action 2. The return to the first course of option is α , to the second is 0 and to the third is $\epsilon\alpha$. Thus the third course of action, i.e. the risk-shifting option, will never be chosen. The first course of action, i.e. discontinuation will only be preferable if $x < r$. Thus if the project is not sufficiently profitable, the manager will not go ahead, she will borrow, pay herself α and return the rest to the creditors.

Knowing that the manager will not go ahead in the case where $x < r$, entrepreneurs with $x < r$ have no incentive to hire a manager. Hence creditors can make their contracts conditional upon whether the company is run by a manager or by the entrepreneur. All companies run by managers have $x \geq r$. Thus for zero profit r must be equal to k . Therefore entrepreneurs with $x > k + \alpha$ would hire a manager, pay k back to the creditors, α to the manager and make positive profit. Next we need to minimize the cost of hiring a manager which requires her to be paid her reservation return. As α tends to zero we approach the first-best of this economy¹³. QED

Proposition 7: The first best is given when the marginal benefit to society is equalized to the marginal cost of human capital investment. Thus

$$\int_k^{x^*} (x-k) \frac{\partial f(x,e)}{\partial e} dx = \frac{\partial c(e)}{\partial e} \quad (\text{A4})$$

Firstly, when separation of ownership and control is possible, as α tends to zero, the equilibrium pay-off to entrepreneurs tends to $\max\{0, x-k\}$. Thus entrepreneurs' profit maximizing choice will coincide with the socially optimal level of human capital investment. In the case without managers we are back to Proposition 5, the profit maximizing human capital investment decision will be given by

¹³ If α is large, companies without a manager may also obtain some finance but as α tends to zero only unprofitable projects fail to hire a manager thus they are not offered finance.

$$\epsilon R \frac{\partial F(k+\epsilon R, e)}{\partial e} + \int_{k+\epsilon R}^{k+R} (x-k) \frac{\partial f(x, e)}{\partial e} dx + R \left(1 - \frac{\partial F(k+R, e)}{\partial e}\right) = \frac{\partial c(e)}{\partial e} \quad (\text{A5})$$

The first term in (A5) is negative by assumption and the sum of the second two terms is less than the LHS of (A4). Thus the LHS of (A5) is less than that of (A4) which implies e has to be lower, thus underinvestment. QED

Proposition 8: (5) implies that if the agent works for free the principals make positive profit thus $R(y) > 0$ for some y . However all $\mu(x, \cdot)$ must be positive at this y by assumption, thus

$$\int_{y^{\min}}^{y^{\max}} U(R(y)) \mu(x, y) dy > 0 \quad (\text{A6})$$

This proves that all types get positive return. But we also have to show that they undertake the task rather than accept the contract and take a certain payment without going ahead with the project. However, this cannot be an equilibrium; suppose the payment for accepting the contract but discontinuing the project is δ . A principal can offer $\delta - \epsilon$ and higher rewards for good outcomes. This will attract good types and bad types will prefer the existing contracts, thus this new contract would make positive profit. Therefore, the return to discontinuation must be zero and all agents accept the contract and never discontinue. QED

Proposition 9: Let the payment of the third-party be $s(y) (\geq 0)$. Let x^* be such that

$$\int_{y^{\min}}^{y^{\max}} W(y) \mu(x^*, y) dy = W(k) \quad (\text{A7})$$

Consider the following managerial contract; if the task is undertaken and $y < k$, $s(y) = 0$ and if $y \geq k$, $s(y) = \alpha + \delta$. If the task is not undertaken $s = \alpha$. We can choose δ such that

$$\int_{y^{\min}}^{y^{\max}} V(\alpha + s(y)) \mu(x^*, y) dy = V(\alpha) \quad (\text{A8})$$

This implies that for $x = x^*$, the manager is indifferent between going ahead and not. But for $x > x^*$, $\mu(x, y)$ first-order stochastically dominates $\mu(x^*, y)$, thus the manager would strictly prefer to go ahead. Conversely with $x < x^*$, she would strictly prefer to discontinue the project. Knowing this, creditors would accept all agents who hire a third-party with a similar contract

and as α tends to zero the first-best is implemented. QED

Appendix B: The Intuitive Criterion and Proof of Corollaries to Proposition 6:

The Intuitive Criterion (Cho and Kreps (1987))¹⁴: Let T be the set of all possible types of entrepreneurs, m the action of the entrepreneur, n the action of the investors, $BR(T(m),m)$ the best response set of the investors in response to action m when they believe that this action comes from a type in the set $T(m)$ and $u(\tau,m,n)$ the utility of type τ when m and n are played. Then for each action m , form the set $S(m)$ such that $\tau \in S(m)$ if

$$u^*(\tau) > \max_{n \in BR(T(m),m)} u(\tau,m,n) \quad (\text{B1})$$

where $u^*(\tau)$ is the equilibrium pay-off of type τ in the candidate equilibrium being considered.

If for any m there exists a type τ' not in $S(m)$ such that

$$u^*(\tau') < \min_{n \in BR(T(m) \setminus S(m),m)} u(\tau',m,n) \quad (\text{B2})$$

then the equilibrium does not pass the Intuitive Criterion. In our context, if a type could take an out-of-equilibrium action that could only be profitable for a "good" type and by thus revealing its type, it gets higher returns, the candidate equilibrium does not pass the Intuitive Criterion.

Proof of Corollary 1 to Proposition 6: Consider a candidate equilibrium in which entrepreneurs who do not hire a manager receive finance. This requires that the creditors lending to this group make zero profit thus this group must include some "good" types who are subsidizing the "bad" types. Let us define this group as T . Now consider a deviation at $t=0$ by hiring a manager and signing the contract given in section 2. Define $T(m)$ as the group of types who can take this action. In our problem $T(m) \equiv T$. Now note that no type with $x < k$ will find this profitable since the manager would maximize her return and thus discontinue all projects with $x < k$. Thus $\{x: x < k\} \subseteq S(m)$ where $S(m)$ is the set of types who would be made strictly worse-off by

¹⁴ There may in general be some technical problems when the Intuitive Criterion is applied with a continuum of types. However, the simple form of the Intuitive Criterion is sufficient for us to eliminate unreasonable equilibria.

deviating. Thus after observing m , investors can deduce that this action must be coming from $T \setminus S(m) \subseteq \{x: x \geq k\}$, i.e. the deviation must be coming from a profitable type. Therefore $BR(T \setminus S(m), m)$ will be to offer a debt contract with required return $r=k$. Thus all $x > k$ would prefer this contract to the one which pooled them together with the "bad" types. Thus condition (B2) is satisfied and this candidate equilibrium does not pass the Intuitive Criterion. QED

Proof of Corollary 2 to Proposition 6: There can be no equilibrium in which managers are hired but β is less than the gain to collusion because such separation of ownership from control provides no benefit. There can also be no equilibrium in which no manager is hired, because as in the proof of Corollary 2, a "good" type will deviate and hire a manager with $\beta > \epsilon(X-k)$ which will signal his type conditional upon the manager accepting a debt contract (note that once an entrepreneur signals that his type is good type, r will be set equal to k by competition among creditors). Thus the financial contract should minimize this gain while still making sufficiently good types residual claimant (otherwise another financier can offer a contract that attracts them, for instance equity contracts cannot be used because of this reason). Contract (3) with $R = x^{\max} - k$ is the contract that achieves these two objectives best. All good types (i.e. $x > k + \epsilon(x^{\max} - k)$) are residual claimants and β takes the lowest possible value (it cannot be less than $\epsilon R(x^{\max})$ and $R(x^{\max})$ cannot be smaller than $x^{\max} - k$ otherwise an alternative contract would attract x^{\max}). Next we need to ask whether there can be managerial contracts other than the one above. The answer is no because we need to punish the manager as severely as possible when x is less than $r (=k)$. Thus only types which have returns greater than total cost, i.e. with $x > k + \epsilon(x^{\max} - k)$, will hire a manager and receive finance. Other projects are not financed. QED

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