Favoritism or Markets in Capital Allocation?*

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Abstract

Casual observation suggests that capital allocation is often driven by favoritism and connections rather than by market mechanisms and information on future expected returns. We investigate when favoritism or markets emerge as an equilibrium outcome in the allocation of capital. We show that when information is unreliable and costly, financiers do not have incentives to investigate distant investment opportunities and allocate capital to entrepreneurs they are familiar with (favoritism). If the pool of saving is relatively small, favoritism can lead to an efficient allocation of investment. As the economy develops and its pool of saving increases, information production and the identification of distant investment opportunities (markets) become crucial for efficient investment decisions. Nevertheless, favoritism may still emerge in equilibrium. Since competition for capital is lower in an equilibrium with favoritism, entrepreneurs can enjoy high rents. Even high quality entrepreneurs may thus have no incentive to join markets with high disclosure standards that can foster information acquisition, but they rather prefer to run inefficiently small firms. Hence, in equilibrium investors fund even low-quality entrepreneurs if they are familiar with them.

Keywords: Crony capitalism; Information production

I Introduction

One of the main functions of a financial system is to facilitate capital flows from individual savers to the highest return investments (Levine, 2006). It is quite common that the highest return investments are new technologies or opportunities that investors are unfamiliar with. To fund such investment opportunities, financiers need to acquire information. However, financial systems often fail to foster information acquisition and to promote flows of capital to high productivity investments and new technologies. The empirical evidence shows that financial intermediaries often convey funds to their cronies (La Porta, Lopez-de-Silanes and Zamarripa, 2003); that entrepreneurs reinvest funds in their own businesses or in the ones of family members (Almeida and Wolfenzon, 2006); and that a large number of firms around the world choose not to be listed in a stock market and raise capital only from a narrow circle of family and friends (Pagano, Panetta and Zingales, 1998).

Capital allocation thus seems to be driven by favoritism and connections more than by market mechanisms and information on future expected returns. Favoritism in capital allocation may arise if investors are reluctant to acquire information because the available information is imprecise, unreliable or costly. High information acquisition costs as well as lack of disclosure can make the return to information acquisition so unattractive that financiers save the cost and pass on potentially good investment opportunities; instead, they choose to fund entrepreneurs whom they are already familiar with because of geographical proximity or personal connections. Increasing disclosure may not necessarily alleviate the problem, as disclosure quality depends on the reliability of information and the corporate governance environment.

In this paper, we explore the conditions under which financiers find it optimal to identify distant investment opportunities instead of favoring close entrepreneurs; we also analyze the implications of information acquisition (or the lack thereof) for capital allocation, investment returns and entrepreneurial rents. We show that when the pool of saving is relatively small, an efficient allocation of resources can be achieved even if financiers do not investigate new investment opportunities and fund only entrepreneurs they are familiar with. This is because the general technology, which is not subject to information asymmetry, offers a relatively high rate of return to financiers when the pool of saving is small. To receive funding, a close entrepreneur has to compete with the general technology by offering an even higher return, a return that low-productivity entrepreneurs

typically cannot afford. Hence, even in the absence of information acquisition, capital is allocated efficiently to the most productive investment opportunities. The only constraint to the growth of high-productivity entrepreneurs is the low level of saving in the economy.

As the economy develops and its pool of saving increases, information production and the identification of distant investment opportunities become crucial for achieving an efficient allocation of capital. A high level of initial saving drives down the return to the general technology. In the absence of information acquisition, financiers lack alternative investment opportunities and fund close entrepreneurs even if they have low productivity. High-productivity entrepreneurs' investment instead is lower than optimal as they receive funding only from close financiers; had they also employed distant financiers' capital, their and the whole economy's aggregate output would have been higher.

In addition to capital allocation, information production also dramatically affects entrepreneurial rents and the equilibrium return to financiers' investment. Financiers have limited investment opportunities if they do not acquire information, and thus end up funding even low-productivity entrepreneurs. Further, information acquisition has two opposite effects on the payoffs of high-productivity entrepreneurs. On the one hand, lack of information acquisition reduces competition to attract capital, allowing high-productivity entrepreneurs to offer low returns to financiers and thus to enjoy higher rents per unit of capital invested. This implies that in equilibrium high-productivity entrepreneurs may not have incentives to induce information acquisition by establishing higher disclosure standards. On the other hand, if financiers do not acquire information, high-productivity entrepreneurs can be funded only by close financiers and thus run inefficiently small firms. This should induce them to voluntarily improve disclosure.

We show that high-productivity entrepreneurs favor stricter – though lower than optimal – disclosure standards only if they can attract a sufficiently large pool of capital. That high-productivity entrepreneurs may favor an improvement in disclosure standards when the supply of capital increases, for example, triggered by a financial liberalization, is consistent with the empirical evidence. Stulz (1999) notices that often, financial liberalization not only brings more funds to capital-poor countries, but also improves corporate governance, as more sophisticated foreign financiers start monitoring and domestic companies become targets of potential foreign takeovers. In this paper, we highlight another reason why financial liberalization may spur an improvement in corporate

governance and especially disclosure: The gain from attracting distant financiers increases and entrepreneurs are willing to renounce to some rents in order to be able to invest more.

Interestingly, the incentive to increase disclosure by a few high-quality entrepreneurs may generate spillover effects in the capital market. High disclosure increases financiers' equilibrium return to investment. Hence, entrepreneurs that increase their disclosure standards, for instance by listing in an exchange with higher disclosure requirements, attract all external financiers. Since financiers have no incentive to evaluate entrepreneurs that are known to have low disclosure standards, entrepreneurs with lower productivity can only choose to adopt the same disclosure standards in order to attract external funds. In this respect, our model implies that higher disclosure standards are "contagious".

Mandatory disclosure standards are instead crucial in economies with intermediate level of saving and with a closed capital market. In this case, the initial saving is high enough to drive down the return of the general technology so that even low productivity entrepreneurs are funded. However, financiers' information acquisition does not bring sufficiently larger investment to high productivity entrepreneurs to compensate for lower rents. Hence, high quality entrepreneurs would not have an incentive to voluntarily join an exchange that requires higher disclosure standards.

This paper contributes to the literature analyzing how different financial systems and institutions may affect economic performance at different stages of development (Allen and Gale, 2000). We show that institutions fostering information acquisition are unimportant for an efficient allocation of saving at early stage of development (low domestic saving). Mandatory disclosure becomes crucial at intermediate stages of development as even high quality entrepreneurs may not have incentives to improve disclosure. When an economy reaches high level of development (high domestic saving) or liberalizes capital flows, entrepreneurs may voluntarily improve disclosure, even though to a level that does not completely eliminate inefficiency in capital allocation.

In our model, information acquisition allows financiers to engage in winner-picking, similarly to headquarters in internal capital markets (Stein, 1997). Contrary to Stein however, we do not assume that some financiers (the headquarter in his model) have better information; instead, we endogenously model the incentives to produce information and analyze the (general) equilibrium implications of the "winner-picking" effect. The inefficiency of the equilibrium in which financiers allocate funds based on closeness and personal ties, rather than acquiring information on distant in-

vestment opportunities, is similar to the one highlighted by Almeida and Wolfenzon (2006). Almeida and Wolfenzon show that, because of the limited pledgeability of externally funded projects' output, conglomerates may choose to fund mediocre projects internally when other firms in the economy have higher productivity projects that are in need of external capital. We abstract from problems of enforcement affecting the pledgeability of output and show that inefficiencies in investment allocation may arise also if financiers do not have an incentive to investigate new investment opportunities. Additionally, we explore the conditions under which financiers have incentives to produce information, the consequences on financiers' equilibrium return to investment, and entrepreneurs' incentives to improve disclosure standards.

Our paper is also related to a vast literature on disclosure (Healy and Palepu, 2001). This literature generally analyzes the disclosure decisions of a firm in isolation. We analyze incentives to disclose and the effects of disclosure in a (general) equilibrium model. We show that disclosure affects competition for external funds, and consequently financier's equilibrium returns. Like Fishman and Hagerty (1989), we propose that greater disclosure may improve investment efficiency. This arises however for very different reasons. Fishman and Hagerty, like most of the papers in the disclosure literature, analyze a secondary equity market. Disclosure improves efficiency only to the extent that gives stronger incentives to management. We analyze a primary equity market. In this context, disclosure improves efficiency because it allows a more efficient allocation of investment across entrepreneurs with different productivity.

The rest of the paper is organized as follows. Section II describes the model. Section III derives the equilibrium implications. Section IV derives the level of disclosure that stock exchanges competing for attracting entrepreneurs would set. Section V concludes. All proofs are in the Appendix.

II The Model

In this section, we first describe the essentials of the model. We then present the timing and finally define the equilibrium. The model presented here is the most tractable framework in which we can obtain our results. Technical assumptions are relegated to Section III in which we derive the equilibrium. All proofs are in the Appendix.

We consider an economy with two types of risk neutral agents: a number N of penniless entrepreneurs and a continuum I of financiers.

A Entrepreneurs and Technologies

Each entrepreneur is endowed with a project. We think of projects as new ideas with different return to investment. For simplicity, we assume that entrepreneurial projects have a constant return to scale technology with productivity A^H or A^L, where $A^H \geqslant A^L$. The productivity level defines the entrepreneur type. The prior probabilities of A^H and A^L are α^H and $\alpha^L \equiv 1 - \alpha^H$, respectively.

Entrepreneurs have no capital endowment. They compete to attract capital from financiers. The more capital an entrepreneur attracts, the larger the investment and thus the size of the firm he runs.

We assume that entrepreneurs compete *a la* Bertrand to attract capital from financiers by offering a return per unit of capital invested that is at most equal to the return of alternative investment opportunities available to the financiers. This is equivalent to say that entrepreneurs offer financiers equity in the project at a price that guarantees a given return. Therefore, if an H entrepreneur offers return A^L, financiers will receive a fraction $\frac{A^L}{A^H}$ of the output produced per unit of capital invested. Similarly, an L entrepreneur offering return A^L promises 100 per cent of the output produced per unit of capital invested.

Similarly to Almeida and Wolfenzon (2005 and 2006), we assume that capital can also be invested in a general technology. The general technology captures any well-known activities that do not require new entrepreneurial skills (e.g., agriculture and any traditional sector in which innovation is not important). We assume that the general technology can be operated by any agent and provides a return per unit of capital invested $g(\omega)$, where ω is the total capital invested in the general technology. The return to the general technology is decreasing in the total capital invested (for instance, because the price of crops drops if too much of a crop is produced) and $\frac{\partial \omega g(\omega)}{\partial \omega} > 0$. The latter assumption captures that the total output from the general technology increases in the invested capital. For simplicity, we also assume $g(0) > A^H$, which ensures a positive investment in the general technology in equilibrium, and $\lim_{\omega \to \infty} g(\omega) < A^L$, which implies that even L entrepreneurs can be more productive than the general technology for a sufficiently large level of ω.

B Financiers

Each financier is endowed with initial capital $k > 0$. Hence, the total capital available in the economy is kI. Financiers can fund the entrepreneurs or the general technology up to their endowment.

An entrepreneur can be either "close" or "distant" to a financier. An entrepreneur is close to a financier because of geographical proximity or personal connections. In this paper, we model "closeness" from the perspective of the ex ante information acquisition and normalize other costs (such as monitoring costs) to zero. In particular, we assume that financiers are aware of close entrepreneurs and can evaluate their type at no cost.

To be able to fund a distant entrepreneur, financiers have to acquire information at cost τ. One can interpret τ as the cost of becoming aware of new investment opportunities and evaluating a distant entrepreneur's business. In this way, we intend to capture that expanding the investment horizon beyond one's own neighborhood and close investment opportunities entails a cost. It will be clear later that spending τ also involves benefits the magnitude of which depends on entrepreneurs' competition for capital.

Alternatively, all financiers can invest in the general technology that provides return per unit of capital invested – $g(\omega)$ – at no cost.

In what follows, we refer to situations in which financiers do not acquire information on any distant entrepreneur and, without knowing any alternative, invest in the close entrepreneur or the general technology as *favoritism*. In this case, local markets for capital remain completely segmented.

Segmentation in the local market for capital is partially overcome if financiers acquire information about some distant entrepreneurs. In this case, capital allocation is driven to a larger extent by information about distant and close entrepreneurs' relative returns. We thus refer to such a situation as *markets*.

C Timing and Definition of Equilibrium

The timing of the events is as follows: At time 0, financiers choose whether to acquire information on a distant entrepreneur. For tractability, we make the following assumptions: 1) each entrepreneur has the same mass of close financiers; 2) each financier has only one close entrepreneur; 3) financiers can evaluate at most one distant entrepreneur; and 4) financiers choose whether to

acquire information before observing the close entrepreneur's productivity. These are technical assumptions that significantly simplify the derivations without affecting the qualitative implications of our results. In particular, the mechanisms we illustrate generalize readily to the case in which financiers acquire information about a finite number of distant entrepreneurs.

After observing the productivity of the close entrepreneur and of any distant entrepreneur they have evaluated, financiers decide how to allocate their capital between entrepreneur(s) and the general technology. At time 1, the returns are realized and payoffs are distributed.

Definition 1 *An equilibrium consists of financiers' beliefs, information acquisition decisions and capital allocations between the general technology and entrepreneurs, and returns offered by entrepreneurs, such that:*

- *Financiers decide whether to acquire information in order to maximize the expected return on their capital endowment net of the information acquisition cost;*
- *Taking as given the return offered by the general technology and the other entrepreneur when the financier evaluates a distant entrepreneur, entrepreneurs offer financiers a return that maximizes their payoffs;*
- *Financiers allocate their initial capital in order to maximizes the expected return on their capital endowment taking as given the return offered by the entrepreneur(s) and the general technology;*
- *All agents' beliefs are realized in equilibrium;*
- *At given returns, all financiers that wish to fund a given entrepreneur or the general technology do so.*

III Information Acquisition and Competition for Capital

A Benchmark Case: Efficient Markets

We first describe a benchmark case in which evaluating a distant entrepreneur involves no cost ($\tau = 0$). In this case, information is symmetric as any financier can identify *all* H entrepreneurs, regardless whether they are close or distant, at no cost.

In equilibrium, L entrepreneurs are not funded. When the economy's capital supply (kI) is lower than $g^{-1}\left(A^H\right)$, no entrepreneurs are funded. This is because the capital supply is so low that even if the entire capital endowment is invested in the general technology, the return of the general technology is higher than A^H – the highest possible return an entrepreneur can offer.

If the capital supply exceeds the threshold level $g^{-1}\left(A^H\right)$, H entrepreneurs receive funding by close and distant financiers. In this case, the initial saving of the economy is large enough that the return of the general technology falls to A^H. Since entrepreneurs compete *a la* Bertrand to attract capital, they end up offering return A^H per unit of capital invested. Then, ω_0 such that $g(\omega_0) = A^H$ is invested in the general technology, whereas the rest of the capital, $kI - \omega_0$, is invested in H entrepreneurs. On average, an H entrepreneur invest $\frac{kI-\omega_0}{\alpha^H N}$.

This implies that markets – interpreted as some investors funding distant entrepreneurs – emerge only if the capital supply of the economy is larger than $g^{-1}\left(A^H\right)$. For any level of initial saving below this threshold, financiers invest directly in the general technology. Hence, favoritism can be an equilibrium outcome even without capital market imperfections. For low levels of initial capital, financiers optimally choose to directly invest only in the general technology. This leads to an efficient capital allocation. Markets are thus unnecessary because entrepreneurs do not receive funding in equilibrium. As soon as capital exceeds the threshold $g^{-1}\left(A^H\right)$, the productivity of the general technology decreases below A^H, if entrepreneurs are not funded. Thus, financiers start funding H entrepreneurs. The possibility of identifying distant entrepreneurs affect the equilibrium in two important ways. First, all financiers are able to identify all H entrepreneurs. This prevents the productivity of the general technology to drop below A^H. Second, entrepreneurs have to compete for capital with other H entrepreneurs. In equilibrium, financiers receive return A^H.

Definition 2 *A capital allocation is efficient if the average productivity of capital is at least* A^H.[1]

The above definition of "efficient" capital allocation implies that (1) less productive entrepreneurs – L types – do not receive funding, and (2) investment in the general technology is not larger than $g^{-1}\left(A^H\right)$. This is because any amount of capital can be employed at A^H with a constant return to scale entrepreneurial technology. Therefore, if the capital allocation is efficient, on average each H entrepreneur should invest $\frac{kI-\omega_0}{\alpha^H N}$, if the initial capital is greater than $g^{-1}\left(A^H\right)$.

[1]Note that in our model both traditional and entrepreneurial technologies are linear. Therefore, average and marginal returns on capital are equal. Therefore, we use "average" and "marginal" returns interchangeably.

The distance between the efficient capital allocation and the actual capital allocated on average to an H entrepreneur captures the extent of the deviation from the efficient capital allocation. As will be clear later, the capital allocated to H entrepreneurs may be lower than optimal in equilibrium because financiers allocate too much capital to the general technology and fund L entrepreneurs.

When distant entrepreneurs can be evaluated without cost, markets are efficient as there is no excessive capital allocation in the general technology. In the next section, we discuss how inefficient markets can emerge in equilibrium if $\tau > 0$.

B Inefficient Markets

In what follows, we explore the equilibrium implications of costly information acquisition ($\tau > 0$). We start by examining the equilibrium under favoritism. We then consider under what conditions financiers may want to acquire information about a distant entrepreneur. The latter exercise characterizes *inefficient markets* (i.e., equilibria in which some financiers fund distant entrepreneurs, but local capital markets are still partially segmented because of the information acquisition cost).

B.1 Favoritism

Here we characterize the equilibrium in which financiers do not acquire information about distant entrepreneurs[2] and can invest only in the close entrepreneur or the general technology. In other words, we describe an economy in which capital is allocated through favoritism.

The following proposition states the conditions under which different types of entrepreneurs are funded.

Proposition 1 *Suppose that financiers do not invest in information acquisition.*

- *Then, in equilibrium,*

  1. *if* $kI \leq g^{-1}\left(A^H\right)$, *no entrepreneur is ever funded and financiers return to capital is* $g(kI)$;
  2. *if* $g^{-1}\left(A^H\right) < kI \leq \frac{g^{-1}\left(A^L\right)}{\alpha^L}$, *only* H *entrepreneurs are funded and financiers' return to capital is* $g\left(kI\alpha^L\right)$;

[2] This also describes the equilibrium of the model if $\tau \to \infty$.

3. *if* $kI > \frac{g^{-1}(A^L)}{\alpha^L}$, *both types of entrepreneurs are funded and financiers' return to capital is* A^L.

- *Additionally, financiers' equilibrium return decreases in* kI.

Since there is no competition for capital, entrepreneurs offer at most the return of the general technology.[3] If an economy's initial capital is relatively small, no entrepreneur receives funding and the general technology attracts all investment because its return is relatively high. The equilibrium is thus the same regardless of the cost of information acquisition as entrepreneurs are not funded. The resulting capital allocation is efficient.

As the amount of capital grows, the return to the general technology decreases and eventually falls to A^H; H entrepreneurs can thus attract capital by offering return g. As long as the total capital supply is lower than $\frac{g^{-1}(A^L)}{\alpha^L}$, the marginal return to investment in the general technology remains relatively high. Since L entrepreneurs cannot offer a return higher than the general technology, they are not funded. When the economy's initial capital is larger than $\frac{g^{-1}(A^L)}{\alpha^L}$, even L entrepreneurs receive funding.

Favoritism leads to an increasingly inefficient allocation of capital as the initial saving grows. Capital allocation may be inefficient even if only H entrepreneurs are funded. Without information acquisition, many financiers are unable to identify H entrepreneurs and thus overinvest in the general technology. In equilibrium, H entrepreneurs' investment is below the optimal level and the productivity of the general technology lower than A^H. For higher levels of initial capital, not only is there overinvestment in the general technology, but also lower productivity entrepreneurs receive funding since the return of the general technology decreases. The average productivity of capital and financiers' equilibrium returns decrease in the economy's initial capital.

We can obtain interesting insights on different agents' welfare by comparing the payoffs in the equilibrium with favoritism and efficient markets.

Corollary 1 *(Financiers' welfare) Efficient markets lead to higher financiers' returns than favoritism.*

Financiers are clearly better off when markets are efficient and information is freely available, as they can obtain at least return A^H . If capital allocation is driven by favoritism, financiers'

[3] This may be thought as if the entrepreneur competed *a la* Bertrand with the traditional technology.

equilibrium return decreases in the initial capital of the economy. This effect is not due to a large amount of capital chasing limited investment opportunities – under our assumptions, any amount of capital could be invested with return A^H. A lower equilibrium return is due to asymmetric information leading to market segmentation. In some instances, financiers are not aware of any H entrepreneur. In other cases, H entrepreneurs, being aware that financiers do not have investment opportunities alternative to the general technology, offer low returns to financiers.

Contrary to financiers, entrepreneurs are better off with favoritism than with markets.

Corollary 2 *(Entrepreneurs' welfare) Both types of entrepreneurs are (weakly) better off with favoritism than with efficient markets. In particular, the payoff of H entrepreneurs is strictly larger when financiers are not aware of distant entrepreneurs.*

When information is freely available, L entrepreneurs are not funded as any amount of capital can be invested with return A^H. With no information acquisition, if $kI > \frac{g^{-1}\left(A^L\right)}{\alpha^L}$, L entrepreneurs invest the same amount of capital of H entrepreneurs. However, the payoff to L entrepreneurs remains zero as they have to distribute all the output to external financiers.

More interestingly, even H entrepreneurs prefer favoritism to markets. Although H entrepreneurs are funded in both cases, they are better off with asymmetric information due to reduced competition for capital. When information is freely available, H entrepreneurs are funded with a larger amount of capital. The payoffs of H entrepreneurs, however, are zero, as competing with other H entrepreneurs, they end up offering return A^H to financiers. When financiers do not acquire information, H entrepreneurs can offer financiers the return of their best alternative investment opportunity. H entrepreneurs' payoff is thus positive as $\left(A^H - \max\left(g, A^L\right)\right) > 0$. This implies that H entrepreneurs prefer to run smaller firms but offer lower returns to attract external capital.

B.2 Inefficient markets

In this section, we show that if acquiring information involves a cost, markets arise but remain inefficient. Besides deriving the conditions under which some financiers find it optimal to acquire information about a distant entrepreneur, we also characterize to what extent acquiring information about one distant entrepreneur improves the capital allocation with respect to favoritism.

For simplicity, we assume that when financiers evaluate two entrepreneurs, all financiers close

to entrepreneur i evaluate the same entrepreneur j (and vice versa) if they choose to acquire information on a distant entrepreneur. That is, we posit that financiers belonging to a given clientele evaluate the same entrepreneurs. This technical assumption is not crucial to our results and simply ensures that financiers are equal *ex ante* and *ex post*. It is, however, consistent with empirical evidence suggesting that different companies cater to clienteles of financiers who select companies with similar characteristics in terms of size, stock liquidity or dividend yields (Falkenstein, 1996).

In addition, we assume that entrepreneurs can offer different returns to financiers with different evaluation strategies: Financiers who acquire information can be offered a return different from that of the financiers who do not and, consequently, can invest only in the close entrepreneur and the general technology. The fact that financiers are offered differential treatment finds support in the empirical evidence on the IPO process. Institutional financiers that are part of an investment bank's network are expected to participate repeatedly and indiscriminately to an investment bank's deals and to contribute to produce information. In exchange for this commitment, financiers that are part of the network are allocated stocks in the pre-IPO market at a better price than retail financiers and other institutional financiers that are not part of the network (who can buy stocks only at the first day trading price).[4] Financiers can also buy stocks at different prices in the grey market for IPOs (a when-issued market for IPO shares active before the subscription period, especially in European countries).[5] Finally, financiers are offered similar securities at different prices depending on their information when companies (or more often banks) raise funds through securitization (Firla-Cuchra and Jenkinson, 2006).

The cost of information acquisition τ induces a segmentation in the market for capital thus potentially decreasing competition among entrepreneurs in order to attract external funds. The extent of competition depends on financiers' actual decisions to acquire information and the average quality of the available investment opportunities. A financier evaluates a distant entrepreneur only if she expects a return sufficiently larger than the return of the general technology that she can cover the cost of information acquisition. By acquiring information, a financier can improve her expected return to investment because entrepreneurs face more competition for attracting capital from financiers with more investment opportunities and thus offer a higher fraction of

[4] The discretionary allocation of IPOs to institutional investors is believed to promote information production (Ljungqvist and Wilhelm, 2002)

[5] See Cornelli, Goldreich and Ljungqvist (2006).

future expected cash flows.

Some financiers find it optimal to acquire information only if the expected return from evaluating a distant entrepreneur is sufficiently large to cover the cost of information acquisition. We derive the equilibrium in the Appendix by comparing a financier's expected payoffs from acquiring information and from not doing so.

In equilibrium, favoritism is overcome and inefficient markets emerge only as capital increases. In fact, no financier acquires information when the initial capital is low and, thus, the expected return from investing in the general technology is close to A^H. In this case, expanding the investment opportunity set by observing a distant entrepreneur does not improve significantly the expected return because the general technology already offers high return at no cost. Close entrepreneurs are able to attract capital only if they can compete with the general technology. The equilibrium is thus described by Proposition 1. If capital is relatively low, the efficient capital allocation can be achieved even with segmented markets (favoritism).

As capital grows, more capital is allocated to the general technology. The consequent decrease in financiers' expected return to capital eventually makes the return from spending τ and investigating a distant entrepreneur attractive enough that some financiers start acquiring information.

The following Proposition derives conditions under which it is optimal to acquire information and fund only H entrepreneurs.

Proposition 2 *Some financiers acquire information and fund only H entrepreneurs if* $\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau < kI < \frac{g^{-1}(A^L)}{(\alpha^L)^2}+I\tau$.

Given the investment opportunities of the economy, return to capital is higher if financiers have an incentive to acquire information for relatively low levels of initial saving, as H entrepreneurs can attract funding from distant financiers. Hence, less capital is inefficiently allocated to the general technology. Whether it is optimal for some financiers to acquire information and fund only H entrepreneurs depends on certain exogenous characteristics of the economy. In particular, some financiers begin to acquire information for a relatively low level of initial capital and fund only H entrepreneurs until when the stock of capital becomes relatively large, if (1) there are sufficiently many high productive entrepreneurs (2) the difference between the productivities of H and L entrepreneurs is relatively high (3) the cost of information acquisition is low relative to

financiers' capital endowment. Under these conditions, markets emerge for relatively low levels of initial saving.

Proposition 2 states more formally the conditions under which this is the case. From a formal point of view, these conditions are equivalent to require that the interval $\left(\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau, \frac{g^{-1}\left(A^L\right)}{(\alpha^L)^2}+I\tau\right)$ is well-defined (and thus the condition $A^L < g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H-A^L}\right)$ holds). Intuitively, a lower proportion of L entrepreneurs affects incentives to acquire information because financiers benefit from discovering an H entrepreneur only if they are close to an H entrepreneur. Only in this case, competition for capital allows them to obtain return A^H. Otherwise, they are offered only the return of their next best investment opportunity, to which they have access without incurring the information acquisition cost. Similarly, financiers are more inclined to acquire information if this can yield them a relatively higher return, which, for given A^L, depends positively on A^H, or if the cost of information acquisition is relatively low. Then, if $kI \in \left[\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau, \frac{g^{-1}\left(A^L\right)}{(\alpha^L)^2}+I\tau\right]$, an equilibrium in which some financiers acquire information and fund only H entrepreneurs exists.

Under the condition in Proposition 2, markets emerge for relatively low levels of initial saving. Capital market segmentations are thus partially overcome: Financiers allocate capital to the entrepreneur with highest productivity, whether distant or close. Markets remain inefficient however because with probability $\left(\alpha^L\right)^2$ some financiers do not identify any H entrepreneur. This leads to overinvestment in the general technology and drive down its return.

It is interesting to note that if $A^L \leq g\left(\frac{\alpha^L}{(\alpha^H)^2}\frac{I\tau A^L}{A^H-A^L}+\alpha^L I\tau\right)$, a more restrictive condition than the one necessary for the above interval to be well-defined, some financiers acquire information even though with no information acquisition they would fund only H entrepreneurs. They do so in order to improve their outside options and thus obtain return A^H if they happen to discover two H entrepreneurs (with probability $\left(\alpha^H\right)^2$). Also in this case, information acquisition improves the efficiency of capital allocation as more H entrepreneurs are identified. Thus, on average, investment in the general technology decreases while H entrepreneurs invest more.

If $g\left(\frac{\alpha^L}{(\alpha^H)^2}\frac{I\tau A^L}{A^H-A^L}+\alpha^L I\tau\right) < A^L < g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H-A^L}\right)$, instead, financiers fund both H and L entrepreneurs without acquiring information for any level of capital in the interval $\left[\frac{g^{-1}\left(A^L\right)}{\alpha^L}, \frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau\right]$ Only when capital reaches the threshold $\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau$, they acquire information and stop funding L entrepreneurs. Information acquisition improves capital allocation even to a larger extent in

this case, as L entrepreneurs would receive funding if financiers did not acquire information.

Proposition 3 *Some financiers acquire information and fund both H and L entrepreneurs if $kI >$* $\max\left(\frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2}+I\tau, \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)}+I\tau\right)$.

Proposition 3 describes the conditions under which funding both H and L entrepreneurs is optimal. First, consider the scenario described above, in which conditions are favorable to information acquisition for low levels of initial saving. In this case, Proposition 3 implies that as capital exceeds the threshold $\frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2}+I\tau$, financiers continue to acquire information, but fund both H and L entrepreneurs. This depends on the fact that the initial capital is so high that when all financiers who identify two L entrepreneurs invest in the general technology, the return of the general technology is below A^L. Financiers thus acquire information in equilibrium because even fostering competition between low quality entrepreneurs can improve their return. Even if market segmentation is partially overcome, markets are clearly inefficient.

If $A^L \geq g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H-A^L}\right)$, conditions are less favorable to information acquisition. Hence, an equilibrium in which financiers acquire information for intermediate levels of capital and fund only H entrepreneur does not emerge. In this case, the probability of encountering an H entrepreneur and/or the difference in productivity between H and L entrepreneur are too low, and the information acquisition cost too high, in order to spur information acquisition. When the initial capital of the economy grows above $\frac{g^{-1}\left(A^L\right)}{\alpha^L}$, financiers choose not to evaluate any distant entrepreneur and fund the close entrepreneur whatever its type is. Favoritism thus remain an equilibrium and leads to an allocation of capital that is less efficient than the one markets, even though imperfect, would lead to for the same level of initial capital.

Some financiers acquire information and market emerge only if $kI \geqslant \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)}+I\tau$ (note that under this second scenario this condition implies a far higher level of capital than other the first scenario), as for this large level of capital the return offered by the general technology becomes very low. Thus, spurring competition between low quality entrepreneurs becomes optimal from the point of view of financiers. As capital becomes sufficiently large markets emerge in this case as well, but they remain far more inefficient. The only function of markets is creating competition for capital among entrepreneurs and drive up financiers' equilibrium returns. However, since L entrepreneurs are funded, the emergence of markets causes a far lower proportional increase in the

level of output than other the first scenario.

To summarize, markets do not emerge for low levels of initial saving. Hence , markets are a sort of luxury good that materializes only when economies reach a minimum level of initial capital. Moreover, markets do not deterministically appear for a given level of initial capital. In some economies with conditions favorable to information acquisition, markets emerge for intermediate levels of initial saving and significantly improve the allocation of capital because they prevent low productivity projects from being funded. In this case, markets cause large increases in domestic output and prosper for relatively high level of capital. Only when the initial saving becomes very large, if investors continue to investigate at most one distant entrepreneur, low productivity projects receive funding. In other economies, with conditions less favorable for information acquisition, segmentations in local markets for capital persist for a significantly larger range of initial saving. Favoritism is an equilibrium outcome even if it leads to a significant capital misallocation. When they ultimately emerge, markets only marginally improve capital allocation and have small positive effects on domestic output as L entrepreneurs continue to be funded. The most significant effect of markets is to create competition for capital and to drive up the return of financiers.

C Welfare effects

Note that since any amount of capital can be invested by H entrepreneurs, the economy could achieve the same productivity per capital as in the case where information is freely available. Market segmentation, however, decreases the average productivity of investment as financiers cannot observe all the investment opportunities when information acquisition is costly and thus end up investing in lower productivity entrepreneurs. If the average quality of the entrepreneurs is high, competition for capital remains relatively strong even if investors observe only a subset of entrepreneurs. Under this condition, an allocation of capital in which only H entrepreneurs are funded can be achieved even though information is costly and markets are segmented.

Different equilibrium configurations have dramatic effects on agents' payoffs. Proposition 2 compares payoffs in the case of costly information acquisition with the costless information acquisition benchmark case.

Proposition 4 *In comparison to the equilibrium with costless information, financiers are offered lower returns and entrepreneurs are better off in the equilibrium with costly information acquisition.*

The intuition of Proposition 4 is straightforward. When information is freely available, financiers can identify all available investment opportunities. Competition for funds among high productivity entrepreneurs drives up the return that must be offered to attract funds. In equilibrium, the return to the financiers is A^H per capital invested, the highest attainable return in a capital-abundant economy (Proposition 1 as discussed previously in such an economy $kI > g^{-1}(A^H)$).

When there is asymmetric information, the expected return of financiers is less than A^H. In a high-saving economy, unless financiers spend a cost of τ to evaluate a distant entrepreneur, they are confined to invest in the general technology and the close entrepreneur. Even if spending τ and observing the productivity of a distant entrepreneur increases the return to investment in some states of the world, it does not warrant an expected payoff of A^H. In fact, financiers' return does not depend only on the type of entrepreneurs that they happen to evaluate, but also on their other investment opportunities. Financiers thus obtain a return A^H only if they have the opportunity of investing in two high productivity entrepreneurs as competition for funds between the two high-productivity entrepreneurs drives up the return to investment. In all remaining cases, financiers identify entrepreneurs with different productivity. In equilibrium, they are offered only the return of their best alternative investment opportunity, which is lower than A^H, and fund the most productive entrepreneurs.

While a reduction in asymmetric information spurs competition for funds and increases the welfare of external financiers who are offered a higher return to investment, it decreases the welfare of entrepreneurs. Information asymmetry affects entrepreneurs' welfare in two ways. First, an improvement in the quality of information (because financiers evaluate distant entrepreneurs or because information is freely available) allows financiers to identify a larger set of investment opportunities and thus allows capital to flow to more productive entrepreneurs. This clearly benefits higher productivity entrepreneurs because a decrease in the misallocation of capital allows them to run larger scale projects.

Second, more information increases competition for external funds. An improvement in the quality of information coincides with an expansion of financiers' investment opportunities. Since entrepreneurs compete to attract external funds, they will have to offer a higher return to external financiers in equilibrium. This decreases the rent entrepreneurs can enjoy per unit of capital invested. Entrepreneurs thus prefer a higher level of information asymmetry in order to enjoy a

higher rent on a smaller scale project.

The capital allocation and the competition effects influence entrepreneurs according to their type: L entrepreneurs's payoff is not affected by the extent of financiers' information. They are never funded if financiers observe a distant entrepreneur. H entrepreneurs are always funded. However, the expected payoff of H entrepreneurs is zero when information is freely available because, with probability 1, they have to compete for funding with other H entrepreneurs. This implies that they enjoy no rents even if they can run larger scale projects. Hence they are better off in the case of information asymmetry.

The rationale behind this is the following: When information is costly, even when only H entrepreneurs are funded (the case in competition for funding is stronger because financiers have better alternative investment opportunities), with some probability, an H entrepreneur offers A^H in competing for capital if evaluated with another H entrepreneur. With positive probability, however, he is evaluated with an M or L entrepreneur. In this case, competition for capital is limited because external financiers lack alternative investment opportunities. Thus, by offering a return lower than A^H per unit of capital invested, an H entrepreneur can attract funding and enjoy a positive rent. This implies that entrepreneurs are better off when information acquisition is costly compared to when information is freely available.

Proposition 5 compares agents' payoffs in the case of costly information acquisition with the no information acquisition benchmark case.

Proposition 5 *In comparison to the equilibrium with no information acquisition, financiers are offered higher returns and entrepreneurs can be either better off or worse off in the equilibrium with costly information acquisition.*

Proposition 5 suggests that financiers' returns are higher with costly information acquisition. Information acquisition expands the set of possible investment opportunities available to financiers, increases competition for funds, and drives up equilibrium returns. Financiers actually find it optimal to acquire information if the increase in expected return is sufficient to compensate the cost τ.

Entrepreneurs however do *not* always benefit from information acquisition. As noted above, L entrepreneurs' payoff does not depend on financiers' quality of information.

More importantly, H entrepreneurs are not necessarily better off in the case of information acquisition than with no information acquisition. Since all firms are funded with no information acquisition, H entrepreneurs benefit from financiers' information acquisition by receiving more funding, as some capital originally initially allocated to L entrepreneurs can now be directed to them. However, H entrepreneurs enjoy a higher rent per unit of capital invested when financiers fund only the close entrepreneurs. Depending on the relative importance of the increased ability to invest in comparison to the lower expected rent per unit invested, H entrepreneurs may be either worse or better off when information is acquired. In some case, they prefer to run smaller scale projects, in order to keep a larger share of the output for each unit invested.

IV Empirical Implications

In this section we discuss our theory's implications and the empirical evidence that appears to be consistent with these implications.

Implication 1 *Allocation of capital based on personal connections is efficient at early stages of development.*

Allocation of capital based on personal connections is widespread at early stages of development. For instance, Lamoreaux (1996) writes that the banks active in New England in the early nineteenth century resembled "investment clubs". Bank directors funneled the bulk of the funds under their control to themselves, their relatives, or others with personal ties to the board. Nevertheless, financiers bought bank stocks as favoritism guaranteed financiers high and steady earnings. Local banks thus fueled the region economic growth and development. As the century progressed, bank performance declined and to attract savers banks started to issue deposits and developed new credit standards for evaluating the creditworthiness of borrowers. These new credit standards fostered an ethic of professionalism that ran counter to the values that originally sustained insider lending. At the same time, they made more difficult for entrepreneurs in the region to obtain funding.

Consistently with our model, during the nineteenth century, New England had transformed from a capital-scarce to a capital-abundant region. We argue that capital accumulation is the main driving force explaining why the performance of credit allocation based on personal ties sharply

deteriorated during the century and why it may have become optimal for financiers (banks in this context) to acquire information on distant investment opportunities.

Favoritism in capital allocation is not restricted to New England in the early ninetieth century as there is plenty of evidence that banks in other parts of the United States and in Britain engaged in similar behavior during this period and that this practice is widespread in emerging markets (Lamoreaux, 1996).

Favoritism does not affect only bank lending. Business groups consisting of legally independent firms that are bound together by formal and informal ties are often thought to be drivers of economic growth in the early phase of development of a country and to hamper further development later on (Khanna and Yafeh, 2006). Business groups may be thought as a way to allocate funding to close entrepreneurs without recurring to information acquisition. As our model shows, this leads to an efficient allocation of investment in early phases of development when saving is low; but it decreases investment aggregate productivity below the optimal level as saving increases.

Implication 2 *Financial liberalizations are followed by an improvement in transparency.*

High productivity entrepreneurs have an incentive to voluntarily increase disclosure only if they anticipate that this brings a large increase in investment. This generates the following empirical implication. Firms should disclose more after financial liberalization because of the possibility of attracting large amounts of capital from foreign financiers. We are not aware of any empirical work testing this implication that is particular to our model. It appears however that such an implication would be testable.

There exists indirect empirical evidence in support of the implication of the model. When companies cross-list in a foreign exchange, especially if in the U.S., they voluntarily commit to disclose more. Pagano, Roell and Zechner (2002) show that this decision is concomitant to raising more capital, as our model suggests.

Implication 3 *financiers' expected return is higher when competition for external funds is strongest.*

This implication is consistent with the findings of Lowry and Schwert (2002) and Benveniste, Ljungqvist, Wilhelm and Yu (2003) who show that financiers have larger initial returns on IPOs during "hot" markets. In other words, financiers are offered new equity issues at better prices when

they have more alternative investment opportunities. This is consistent with the mechanism of our model that suggests that competition for attracting external funds is an important determinant of financiers' returns.[6]

Implication 4 *Transparency and financier protection spur information production and improve capital allocation.*

Our model implies that economic agents are more inclined to produce information when this is cheaper, more precise and reliable. Hence we should observe that in countries where firms (voluntarily or involuntarily) disclose more, more firm-specific information is available. This is consistent with the findings of Morck, Yeung and Yu (2000) who show that the firm-specific return variation is positively correlated with financier protection and propose that financier protection promotes information acquisitions. Durnev, Morck, Yeung and Zarowin (2003) also show that firm-specific return variation is indeed associated with future earnings, indicating that more information about future performance is incorporated in current stock returns. Fox, Durnev, Morck and Yeung (2003) further document that improvements in mandatory disclosure effectively increase price accurateness. Finally, Durnev, Morck and Yeung (2004) find that the firm-specific variation in stock returns is positively associated to a measure of economic efficiency of corporate investment, which is again consistent with the mechanism suggested by our model.

V Conclusions

This paper explains under which conditions favoritism emerges as an equilibrium mechanism for the allocation of capital. It shows that markets in which financiers acquire information and fund distant investment opportunities are unnecessary for reaching an efficient capital allocation at early stages of development when the initial saving is low. As an economy accumulates capital, acquisition of information on distant investment opportunities becomes crucial for achieving an efficient allocation of investment. Nevertheless, entrepreneurs may not have an incentive to join exchanges that require higher disclosure standards because they enjoy higher rents when financiers have information only on a limited sets of investment opportunities.

[6] In this respect we provide an explanation, alternative to prospect theory (Loughran and Ritter, 2002), for why entrepreneurs are generally content to leave money on the table during hot issues.

Our model can explain why favoritism seems to spur growth in developing economies and to hamper the performance of more developed countries. Additionally, it can explain why exchanges tend to lose listed companies and fail to attract new listings if they set disclosure standards too high.

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A Appendix

A Proof of Proposition 1

In equilibrium, entrepreneurs offer financiers at most the return of general technology due to the lack of competition for capital. If the general technology offers a return higher than the most productive entrepreneur $\left(g(kI) > A^H\right)$, no entrepreneur is funded. All financiers invest in the general technology so their return to capital is $g(kI)$.

When $g(kI) < A^H$, if $g(kI\left(1-\alpha^H\right) > A^L$, then only H entrepreneurs are funded. This is because even if all the capital from financiers who are not close to an H entrepreneur $kI\left(1-\alpha^H\right)$ is invested in the general technology, the return of the general technology is still higher than the maximum return that L entrepreneurs can offer. Financiers' equilibrium return is $g(kI\left(1-\alpha^H\right)) = g\left(kI\alpha^L\right) \in \left[A^L, A^H\right]$.

When $g(kI\left(1-\alpha^H\right)) = g\left(kI\alpha^L\right) < A^L$, if all the capital from financiers who are close to an L entrepreneur $(kI\alpha^L)$ is invested in the general technology, the return of the general technology

is lower than the return that L entrepreneurs can offer. Thus in equilibrium financiers fund L entrepreneurs and the return to investment is $g(\omega_1) = A^L$.

Note that there cannot be an equilibrium with $g(\omega_1) < A^L$ as entrepreneur's technology has constant scale of return, and any entrepreneur can compete with other entrepreneurs to attract funding by offering $g(\omega_1) + \epsilon$ with $\epsilon \to 0$. So in equilibrium, $g(\omega_1) + \epsilon = A^L$.■

B Proof of Proposition 2

Proposition 2 is obtained from the following two lemmas.

Lemma 1 *Suppose* $A^L < g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H - A^L}\right)$. *Then*

1. *If* $kI < g^{-1}\left(A^H\right)$, *financiers do not acquire information and invest only in the general technology;*
2. *If* $g^{-1}\left(A^H\right) \leqslant kI \leqslant \min\left(\frac{I\tau A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau, \frac{g^{-1}\left(A^L\right)}{\alpha^L}\right)$, *financiers do not acquire information and fund only the close* H *entrepreneurs;*
3. *If* $\frac{I\tau A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau < kI < \frac{g^{-1}\left(A^L\right)}{(\alpha^L)^2} + I\tau$, *some financiers acquire information, and only* H *entrepreneurs are funded;*
4. *If* $\frac{g^{-1}\left(A^L\right)}{\alpha^L} \leqslant kI < \frac{I\tau A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau$, *financiers fund both* H *and* L *entrepreneurs and do not acquire information if* $A^L > g\left(\frac{\alpha^L I\tau A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau\right)$. *If* $kI > \frac{g^{-1}\left(A^L\right)}{(\alpha^L)^2} + I\tau$, *financiers acquire information and fund both* H *and* L *entrepreneurs.*

B.1 Proof of Lemma 1

Proof of Point 1.

The condition $kI < g^{-1}\left(A^H\right)$ implies $g(kI)\,k \geqslant A^H k$ – even H entrepreneurs cannot afford the return of the general technology. Since $g(kI)\,k \geqslant A^H k > A^H(k - \tau)$, a marginal financier has no incentive to deviate by acquiring information and funding entrepreneurs, as her profit from deviation is capped at $A^H(k - \tau)$. Financiers also have no incentives to fund close entrepreneurs, as doing so yields a profit at most $A^H k$. So the condition $kI < g^{-1}\left(A^H\right)$ ensures that information acquisition and funding entrepreneurs instead of the general technology can never be an optimal strategy. In equilibrium no information is acquired and no entrepreneur is ever funded.

Proof of Point 2

Financiers do not to acquire information and to fund only close H entrepreneurs if the following conditions are satisfied: Given that all financiers do not acquire information and fund only H entrepreneurs, then (a) no financier has an incentive not to fund a close H entrepreneur, (b) no financier has an incentive to acquire information, and (c) no financier has an incentive to fund close L entrepreneurs.

Condition (a) is satisfied if close H entrepreneurs are able to offer financiers at least the return of the general technology when capital is invested in the general technology only: $g(\Omega_2) < A^H$. This implies:

$$kI > g^{-1}\left(A^H\right).$$

Financiers who do not acquire information invest either in the close entrepreneur or in the general technology. The entrepreneur who is close to such a financier is aware of her alternative investment opportunities and offers at most the return of the general technology, g. Hence, only H entrepreneurs receive funding by financiers who do not acquire information and offer return g if $A^H > g > A^L$. If the close entrepreneur is L type, financiers invest in the general technology.

Financiers who acquire costly information may receive the following signals and returns:

- Both entrepreneurs are type H, with probability of $\left(\alpha^H\right)^2$. In this case, due to competition, both entrepreneurs offer return of $A^H > g$, and are funded.
- One entrepreneur is type H and the other is type L, with probability of $2\alpha^H\alpha^L$. In this case, the H entrepreneur offers $g > A^L$ and is funded. The L entrepreneur is not funded (it cannot offer g).
- Both entrepreneurs are type L, with probability of $\left(\alpha^L\right)^2$, the financier invests in the general technology.

Hence, financiers have no incentive to acquire information and fund only H entrepreneurs (i.e., conditions b) and c) are satisfied) if $\left(\left(\alpha^H\right)^2 A^H + \left(1 - \left(\alpha^H\right)^2\right) g(\Omega_2)\right)(k - \tau) \leqslant g(\Omega_2)\, k$, which

can be rewritten as:

$$g\left(\Omega_2\right) \geqslant \frac{\left(\alpha^H\right)^2\left(k-\tau\right)}{\tau+\left(\alpha^H\right)^2\left(k-\tau\right)}A^H$$

and $g\left(\Omega_2\right) > A^L$.

Hence, an equilibrium in which financiers acquire information and fund only H entrepreneurs exist if:

$$\Omega_2 \leqslant \min\left(g^{-1}\left(\frac{\left(\alpha^H\right)^2\left(k-\tau\right)}{\tau+\left(\alpha^H\right)^2\left(k-\tau\right)}A^H\right), g^{-1}\left(A^L\right)\right) \tag{1}$$

When financiers have no incentive to acquire information, they either fund the close entrepreneurs or invest in the general technology. Since $g\left(\Omega_2\right) > A^L$, financiers who find the close entrepreneur to be type L invest in the general technology. Financiers who find the close entrepreneurs to be type H are weakly better off funding H entrepreneurs instead of investing in the general technology. So the capital poured into the general technology is $\Omega_2 = \alpha^L kI + \omega_2$, where $\omega_2 \geqslant 0$ is the capital invested in the general technology from some of the financiers whose are close to H entrepreneurs.

Using the definition of Ω_2, (1) can be rewritten as:

$$kI \leqslant \frac{\min\left(g^{-1}\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H\right), g^{-1}\left(A^L\right)\right)-\omega_2}{\alpha^L} \tag{2}$$

So the equilibrium condition under which financiers do not acquire information and fund only the close H entrepreneurs is:

$$0 \leqslant kI \leqslant \frac{\min\left(g^{-1}\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H\right), g^{-1}\left(A^L\right)\right)-\omega_2}{\alpha^L} \tag{3}$$

where $\frac{\min\left(g^{-1}\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H\right), g^{-1}\left(A^L\right)\right)-\omega_2}{\alpha^L} = \frac{g^{-1}\left(\max\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H, A^L\right)\right)-\omega_2}{\alpha^L} < \frac{g^{-1}\left(\max\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H\right.\right.$

.

To establish the upper bound of this interval for kI, first consider that $\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H < A^L$, which implies $\frac{g^{-1}\left(\max\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H, A^L\right)\right)}{\alpha^L} = \frac{g^{-1}\left(A^L\right)}{\alpha^L}$.

Note that $\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H < A^L$ is equivalent to $kI < \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau$. Thus, interval (3) is:

$$0 \leqslant kI \leqslant \min\left\{\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau, \frac{g^{-1}\left(A^L\right)}{\alpha^L}\right\}$$

If $\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H > A^L$, which is possible only if $kI > \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau$, such an equilibrium exists in the interval $\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau \leqslant kI \leqslant \frac{g^{-1}\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H\right)}{\alpha^L}$.

Since $\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H > A^L$ implies $\frac{g^{-1}\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H\right)}{\alpha^L} < \frac{g^{-1}\left(A^L\right)}{\alpha^L}$, we can rewrite the interval as: $\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau \leqslant kI \leqslant \frac{g^{-1}\left(A^L\right)}{\alpha^L}$ provided that $\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau < \frac{g^{-1}\left(A^L\right)}{\alpha^L}$. The latter condition can be rewritten as $A^L < g\left(\frac{\alpha^L I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + \alpha^L I\tau\right)$

The latter implies that for $A^L < g\left(\frac{\alpha^L I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + \alpha^L I\tau\right)$, equilibria with information acquisition and no information acquisition coexist in the interval $\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau \leqslant kI \leqslant \frac{g^{-1}\left(A^L\right)}{\alpha^L}$.

Putting the two subintervals together, the equilibrium described at Point 2 exists if:

$$0 \leqslant kI \leqslant \frac{g^{-1}\left(A^L\right)}{\alpha^L}$$

Proof of Point 3.

Consider the equilibrium in which some financiers acquire information and only H entrepreneurs are funded.

In such an equilibrium, some financiers may find it optimal to acquire information, and other financiers may find it optimal not to do so. So the capital poured into the general technology should be

$$\Omega_3 = \alpha^L\omega_3 + \left(\alpha^L\right)^2\left(I - \frac{\omega_3}{k}\right)(k-\tau) \tag{4}$$

where $\alpha^L\omega_3$ is the capital invested into the general technology by those financiers who choose not to acquire information and find out that the close entrepreneur is type L.

For such an equilibrium to exist, three conditions must be satisfied: (a) financiers who acquire information and evaluate one more entrepreneur have no incentive to deviate by not acquiring information; (b) financiers have no incentive to deviate by funding an L entrepreneur; (c) financiers have an incentive to fund H entrepreneurs.

In equilibrium, the expected dollar payoff from acquiring information and funding only type H entrepreneurs is $\left(\left(\alpha^H\right)^2 A^H + \left(1-\left(\alpha^H\right)^2\right) g\left(\Omega_3\right)\right)(k-\tau)$. The expected payoff from not acquiring information is: $g\left(\Omega_3\right)k$. This is the case because even H entrepreneurs, being aware of the alternative investment opportunities of the financiers, offer at most g.

At least some financiers have an incentive to acquire information and fund only H entrepreneurs if:

$$\left(\left(\alpha^H\right)^2 A^H + \left(1-\left(\alpha^H\right)^2\right) g\left(\Omega_3\right)\right)(k-\tau) \geqslant g\left(\Omega_3\right)k.$$

So (a) is met if

$$g\left(\Omega_3\right) \leqslant \frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)} A^H. \tag{5}$$

Clearly, if the expected payoff from acquiring information and funding only H entrepreneurs is strictly larger (i.e., if inequality (5) is strictly satisfied), then all financiers prefer costly information acquisition, so $\omega_3 = 0$. If inequality (5) is weakly satisfied, then some financiers find it optimal not to acquire information, so $\omega_3 > 0$.

It is not optimal for any financier to deviate and fund an L entrepreneur (condition (b)) if:

$$g\left(\Omega_3\right) > A^L. \tag{6}$$

Finally, our assumptions guarantee that H entrepreneurs are able to offer return g (condition (c)).

Notice that $\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)} A^H < A^H$ for any $\tau > 0$.

To show (6), first, if $g(\Omega_3) = \frac{(\alpha^H)^2(k-\tau)}{\tau+(\alpha^H)^2(k-\tau)}A^H$, then $\omega_3 > 0$. So $g(\Omega_3) > A^L$ implies

$$I(k-\tau) > \frac{I\tau A^L}{(\alpha^H)^2(A^H - A^L)} \tag{7}$$

and (4) is equivalent to

$$\alpha^L\omega_3 + (\alpha^L)^2\left(I - \frac{\omega_3}{k}\right)(k-\tau) = g^{-1}\left(\frac{(\alpha^H)^2(k-\tau)}{\tau + (\alpha^H)^2(k-\tau)}A^H\right) \tag{8}$$

Note that (8) can be re-written as

$$I(k-\tau) = \frac{g^{-1}\left(\frac{(\alpha^H)^2(k-\tau)}{\tau+(\alpha^H)^2(k-\tau)}A^H\right) - \left(\alpha^L - (\alpha^L)^2\left(\frac{k-\tau}{k}\right)\right)\omega_3}{(\alpha^L)^2} < \frac{g^{-1}\left(\frac{(\alpha^H)^2(k-\tau)}{\tau+(\alpha^H)^2(k-\tau)}A^H\right)}{(\alpha^L)^2}$$

for any $\omega_3 > 0$. Then, information acquisition and funding only H entrepreneurs are optimal in equilibrium if and only if

$$\frac{I\tau A^L}{(\alpha^H)^2(A^H - A^L)} < I(k-\tau) < \frac{g^{-1}\left(\frac{(\alpha^H)^2(k-\tau)}{\tau+(\alpha^H)^2(k-\tau)}A^H\right)}{(\alpha^L)^2} \tag{9}$$

Next, consider $g(\Omega_3) < \frac{(\alpha^H)^2(k-\tau)}{\tau+(\alpha^H)^2(k-\tau)}A^H$. In this case, $\omega_3 = 0$. Then (4) and $g(\Omega_3) > A^L$ imply

$$g^{-1}\left(\frac{(\alpha^H)^2(k-\tau)}{\tau + (\alpha^H)^2(k-\tau)}A^H\right) < \Omega_3 = (\alpha^L)^2 I(k-\tau) < g^{-1}(A^L)$$

That is

$$\frac{g^{-1}\left(\frac{(\alpha^H)^2(k-\tau)}{\tau+(\alpha^H)^2(k-\tau)}A^H\right)}{(\alpha^L)^2} < I(k-\tau) < \frac{g^{-1}(A^L)}{(\alpha^L)^2} \tag{10}$$

if $\omega_3 = 0$. This interval is well-defined if $\frac{(\alpha^H)^2(k-\tau)}{\tau+(\alpha^H)^2(k-\tau)}A^H > A^L$, which in turn implies $I(k-\tau) > \frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}$.

Combining (10) and (9), (6) holds if and only if

$$\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} < I\left(k-\tau\right) < \frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2} \tag{11}$$

This equilibrium exists if

$$\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} < \frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2} \tag{12}$$

Hence, Assumption 1 ensures that the interval $\left[\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)}, \frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2}\right]$ is well-defined. Otherwise, the equilibrium of information acquisition and funding H entrepreneurs does not exist.

Proof of Point 4.

We now consider equilibria in which financiers fund both H and L entrepreneurs. First, we consider an equilibrium in which financiers do not acquire information. Financiers have an incentive to fund L entrepreneurs only if $\alpha^L kI \geqslant g^{-1}\left(A^L\right)$. It is actually optimal not to acquire information if:

$$g(\Omega_3) = \left(\left(\alpha^H\right)^2 A^H + \left(2\alpha^H\alpha^L + \left(\alpha^L\right)^2\right)A^L\right)\frac{k-\tau}{k} \leqslant A^L$$

which implies: $\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} \geqslant I\left(k-\tau\right)$. So this equilibrium exists only for $kI \in \left[\frac{g^{-1}\left(A^L\right)}{\alpha^L}, \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau\right]$ if the interval is well defined.

Second, we consider an equilibrium in which financiers have incentive to acquire information and to fund both H and L entrepreneurs. It is individually rational to acquire information if:

$$\left(\left(\alpha^H\right)^2 A^H + \left(2\alpha^H\alpha^L + \left(\alpha^L\right)^2\right)A^L\right)\left(k-\tau\right) \geqslant g(\Omega_3)k,$$

which can be rewritten as $\left(\left(\alpha^H\right)^2 A^H + \left(2\alpha^H\alpha^L + \left(\alpha^L\right)^2\right)A^L\right)\frac{(k-\tau)}{k} \geqslant g(\Omega_3)$.

Additionally, it is optimal to fund L entrepreneurs in equilibrium if $A^L \geqslant g(\Omega_3)$.In this equilibrium, financiers who observe two L entrepreneurs actually invest in the general technology or in the entrepreneurs and earn return A^Lif $kI \geqslant \frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2} + I\tau$.

The latter inequality and the Proof of Point 3 imply that $kI > \frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)} + I\tau$.

Hence $\left(\left(\alpha^H\right)^2 A^H + \left(2\alpha^H\alpha^L + \left(\alpha^L\right)^2\right) A^L\right) \frac{(k-\tau)}{k} \geqslant A^L \geqslant g(\Omega_3)$,

which implies that it is indeed optimal to acquire information in equilibrium. ■

Lemma 2 *Suppose* $A^L \geqslant g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H-A^L}\right)$. *Then*

1. *If* $kI < g^{-1}\left(A^H\right)$, *financiers do not acquire information and invest only in the general technology;*
2. *If* $g^{-1}\left(A^H\right) \leqslant kI < \frac{g^{-1}\left(A^L\right)}{\alpha^L}$, *financiers do not acquire information and fund only H entrepreneurs;*
3. *If* $kI \geqslant \frac{g^{-1}\left(A^L\right)}{\alpha^L}$, *both types of entrepreneurs are funded. In equilibrium, some financiers invest in information acquisition if* $kI \geqslant \frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)} + I\tau$.

B.2 Proof of Lemma 2

Proof of Point 1.

See Lemma 1.

Proof of Point 2.

Like in the proof of Point 2 in Lemma 1, we establish that it is an equilibrium not to acquire information and to fund only H entrepreneurs if (3) is satisfied:

$$g^{-1}\left(A^H\right) \leqslant kI \leqslant \frac{g^{-1}\left(\max\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H, A^L\right)\right)}{\alpha^L}.$$

To establish the upper bound of the interval for kI, first consider $\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H < A^L$, which implies $\frac{g^{-1}\left(\max\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H, A^L\right)\right)}{\alpha^L} = \frac{g^{-1}\left(A^L\right)}{\alpha^L}$.

Note that $\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H < A^L$ is equivalent to $kI < \frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)} + I\tau$. Thus, interval (3) is:

$$0 \leqslant kI \leqslant \min\left\{\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau, \frac{g^{-1}\left(A^L\right)}{\alpha^L}\right\}.$$

Assumption 2 implies that $\frac{g^{-1}\left(A^L\right)}{\alpha^L} < \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)} + I\tau$.

If $\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H > A^L$, then $\frac{g^{-1}\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H\right)}{\alpha^L} < \frac{g^{-1}\left(A^L\right)}{\alpha^L}$. The equilibrium describe in Point 2 exists in the interval: $\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)} + I\tau \leqslant kI \leqslant \frac{g^{-1}\left(A^L\right)}{\alpha^L}$, which is not defined under our assumptions.

Hence the equilibrium exists in the interval $0 \leqslant kI \leqslant \frac{g^{-1}\left(A^L\right)}{\alpha^L}$.

Proof of Point 3.

Based on the proof of Lemma 1, Assumption 2 guarantees that an equilibrium with information acquisition and funding of H entreprenurs only does not exist.

If $\frac{g^{-1}\left(A^L\right)}{\alpha^L} \leqslant kI$, there are two equilibria. In the first equilibrium investors do not acquire information and invest in the general technology to the point that $g(\Omega_4) = A^L$. All investors earn return A^L and all types of entrepreneurs are funded.

It is not optimal to deviate and acquire information on a distant entrepreneur if

$$\left(\left(\alpha^H\right)^2 A^H + \left(2\alpha^H\alpha^L + \left(\alpha^L\right)^2\right)A^L\right)(k-\tau) < g(\Omega_4)k.$$

which implies $\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)} \geqslant I\left(k-\tau\right)$. Hence, the interval in $\frac{g^{-1}\left(A^L\right)}{\alpha^L} \leqslant I\left(k-\tau\right) \leqslant \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)}$, which is always well defined under Assumption 2 no information is acquired and all entrepreneurs are funded.

In the second equilibrium, some financiers find it optimal to acquire information and to fund both H and L entrepreneurs. In such an equilibrium, financiers who do not acquire information earn at most return g by investing either in the general technology or in the close entrepreneur (who is aware of the lack of alternative investment opportunities and offers at most g).

L entrepreneurs are funded in equilibrium if $g(\Omega_4) < A^L$: Thus, financiers who acquire information have an incentive to fund L entrepreneurs if : $kI \geqslant \frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2} + I\tau$.

If $g(\Omega_4) < A^L$, the expected payoff from acquiring information is: $\left(\left(\alpha^H\right)^2 A^H + \left(2\alpha^H\alpha^L + \left(\alpha^L\right)^2\right)A^L\right)(k -$

For an equilibrium where some financiers acquire information to exist, at least some financiers need to find optimal to acquire information:

$$\left(\left(\alpha^H\right)^2 A^H + \left(2\alpha^H\alpha^L + \left(\alpha^L\right)^2\right)A^L\right)(k-\tau) \geqslant g(\Omega_4)k.$$

Since $2\alpha^H\alpha^L + \left(\alpha^L\right)^2 = 1 - \left(\alpha^H\right)^2$, $g(\Omega_3) < A^L$ is equivalent to

$$\left(\alpha^H\right)^2 A^H - \left(\alpha^H\right)^2 + 1 = \left(\alpha^H\right)^2 \left(\frac{A^H - A^L}{A^L}\right) + 1 \leqslant \frac{k}{k-\tau}$$

Re-arranging, we have

$$\frac{I\tau A^L}{\left(\alpha^H\right)^2 \left(A^H - A^L\right)} \leqslant I\left(k-\tau\right)$$

Now note that Assumption 2 implies $g^{-1}\left(A^L\right) \leqslant \frac{\left(\alpha^L\right)^2 I\tau A^L}{\left(\alpha^H\right)^2 (A^H - A^L)}$. Therefore this equilibrium exists if $I\left(k-\tau\right) \geqslant \frac{I\tau A^L}{\left(\alpha^H\right)^2 (A^H - A^L)}$.■