Favoritism in Capital Allocation*

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Abstract

Casual observation suggests that capital allocation is often driven by favoritism and connections rather than by information on future expected returns. We investigate when favoritism emerges 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 the pool of saving increases, information production and the identification of distant investment opportunities become crucial for efficient investment decisions. Nevertheless, favoritism may emerge in equilibrium and investors may find it optimal to fund low quality entrepreneurs if they are familiar with them. Since competition for capital is low in an equilibrium with favoritism, entrepreneurs enjoy high rents. Thus, even high quality entrepreneurs may have no incentive to join markets with standards that foster information acquisition, but rather run inefficiently small firms.

Keywords: Finance and growth; Information production; Competition for capital; Relationship-based vs. arm's length financial systems.

JEL Codes: G1; G3

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 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 those of family members (Almeida and Wolfenzon, 2006); and that a large number of firms around the world choose not to be listed on a stock market but 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.

In this paper, we aim to develop an equilibrium theory of favoritism in capital allocation. Instead of examining favoritism based on financiers' prejudice against socially or geographically distant entrepreneurs, we follow sociologists and psychologists studying labor market discrimination and concentrate on financiers' discriminatory behavior originated from their ignorance of the true productivity of entrepreneurs (Becker, 1971). Hence, favoritism in capital allocation arises if investors are reluctant to acquire information because the available information is imprecise, unreliable or costly. Financiers' discriminatory behavior is accentuated if they enjoy non-pecuniary benefits – which may be associated with weak corporate governance or corruption – when funding close entrepreneurs.

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 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 captures traditional and well-known activities and is not subject to information asymmetry – offers a relatively high rate of return when saving is low. 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 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, favoritism may still be the only equilibrium even though information production and the identification of distant investment opportunities are crucial for achieving an efficient capital allocation. A high level of initial investment drives down the return of the general technology. Without information acquisition, financiers lack alternative investment opportunities and fund close entrepreneurs even if they have low productivity. High-productivity entrepreneurs under-invest 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. This is consistent with empirical evidence suggesting that capital allocation based on personal connections spurs growth in capital-scarce economies, but leads to progressively less efficient investment as the economy accumulates capital (see, for instance, Lamoreaux, 1996).

We show that in addition to capital allocation, information production dramatically affects financiers' returns and entrepreneurial rents. Financiers have limited investment opportunities if they do not acquire information, and may 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 to enjoy high rents per unit of capital invested (*rent effect*). On the other hand, if financiers do not acquire information, high-productivity entrepreneurs receive funding only from close financiers and run inefficiently small firms (*capital supply effect*).

The capital supply effect prevails over the rent effect and high-productivity entrepreneurs benefit from information acquisition only if they can attract a sufficiently large pool of capital. When the supply of capital increases, for example, triggered by a financial liberalization, high-productivity entrepreneurs may favor mechanisms that reduce information acquisition costs, such as an improvement in disclosure. This is consistent with the empirical evidence documenting that financial liberalization not only brings more funds to capital-poor countries, but also improves corporate governance (Stulz, 2005). This evidence is often interpreted to be the result of more sophisticated

foreign financiers' monitoring. We highlight another reason why financial liberalization may spur an improvement in corporate governance: As the gain from attracting distant financiers increases, entrepreneurs are willing to renounce some rents in order to invest more. In particular, our results suggest that in capital-rich economies entrepreneurs may voluntarily increase disclosure.

In economies with intermediate level of capital, however, the rent effect prevails and mandatory disclosure standards are crucial. In this case, the initial saving is high enough to drive down the return of the general technology to the point that even low-productivity entrepreneurs receive funding. However, financiers' information acquisition does not bring sufficiently large investment to high-productivity entrepreneurs to compensate for lower rents. Hence, high quality entrepreneurs have no incentives to voluntarily improve disclosure.

We also show that in economies with mature markets, in which all financiers acquire information, an increase in the average quality of entrepreneurs decreases entrepreneurial rents by boosting competition for capital. This mechanism provides an alternative explanation for why underpricing (a measure of financiers' returns) is higher during "hot markets", when there is a large number of IPOs and the average quality of firms raising capital is expected to be high. Additionally, our results shed light on why firms abandon markets where disclosure and listing standards have become too demanding, as is currently happening in the United States.

This paper contributes to the literature analyzing how different financial systems and institutions affect economic performance at different stages of development (Allen and Gale, 2000; Boot and Thakor, 1997).[1] The most of the literature focuses on the economic roles of financial intermediaries. Instead, we abstract from whether capital is allocated through intermediaries or directly by investors, but investigate when financiers can move away from allocating capital on the basis of connections. In this respect, we contribute to the literature on relationship-based vs. arm's length financial systems by showing under what conditions financiers allocate capital only if they have close ties with the borrowers (relationship-based financial system) and when instead entrepreneurs are able to tap a wider circle of financiers (arm's length financial system). In this respect, our model is related to Rajan (1992) who explores a similar issue in a partial equilibrium framework. In his model, relationships confer an informational monopoly power to financiers and lead to a lower

[1] Bhattacharya and Ravikumar (2001) also study the relation between capital market development and investment. They show that families have an incentive to sell their companies to outsiders only after companies have reached a certain size. Instead, we show that an economy's initial saving – not entrepreneurial firms' size – has an effect on the efficiency of capital allocation and on whether markets emerge.

payoff for entrepreneurs than arm's length financial transactions. We show in a general equilibrium framework that when capital is scarce, this effect is reversed. In particular, financiers earn higher returns if they are able to choose among a wider range of entrepreneurial ventures.

In our model, information acquisition allows financiers to engage in winner-picking, similarly to headquarters in internal capital markets (Stein, 1997). Differently from 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 investment 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 entrepreneurial rents.

Finally, our model is related to the literature on the economics of discrimination initiated by Becker (1971), which has analyzed the effects of tastes for discrimination originated from exogenous non-pecuniary benefits or information on labor markets. We make a first attempt to extend these theories to financial markets.

The rest of the paper is organized as follows. Section II describes the model. Sections III and IV derive the equilibrium implications. Sections V and VI provide some extensions and empirical evidence. Section VII concludes. All the proofs are in the Appendix.

II The Model

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

A Financiers

Each financier is endowed with initial capital $k > 0$. Hence, the total capital (initial saving) of 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 because of geographical proximity or personal connections. 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. This is necessary to distinguish between real entrepreneurs, which we describe in the next section, and an infinite number of impostors who would just run away with the money. In this way, we capture that expanding the investment horizon beyond one's own neighborhood entails a cost. It will be clear later that spending τ also involves benefits whose magnitude depends on entrepreneurs' competition for capital.

Financiers maximize their final wealth net of the information acquisition cost. We do not explicitly consider that financiers may enjoy private benefits from funding close entrepreneurs. Exogenous private benefits can, however, be easily incorporated in our model as their effect is equivalent to increase the cost of information acquisition.

Finally, all financiers can invest in a general technology, which we describe in the next subsection, at no cost.

In what follows, we show that two different regimes of capital allocation may emerge. In the first regime, financiers, without knowing any alternatives, invest in the close entrepreneur or the general technology. Since financiers allocate capital on the basis of pre-existing social or geographical ties, this mechanism of capital allocation resembles a relationship-based financial system. We label such situations as *favoritism*. In the second regime, financiers acquire information about some distant entrepreneurs and consider funding them. These situations resemble arm's length financial systems as a financier's primary source of information is not from personal relations in the surrounding community.

Arm's length transactions may characterize intermediaries or markets, which are generally taken as the main example of the latter.[2] For brevity, we label situations in which financiers' funding decisions are not based on personal connections but on information acquisition as *markets*.

Under *favoritism*, financiers behave as if they were willing to forfeit returns to avoid transactions with distant entrepreneurs. Similarly to the literature on labor market discrimination (see Becker, 1971), agents are not necessarily prejudiced, but are ignorant of the productivity of distant entrepreneurs. Financiers are more inclined to fund close entrepreneurs because they have access to costless information. For this reason, local markets for capital remain completely segmented. The segmentation in the local market for capital is partially overcome by *markets* because capital allocation is, to some extent, driven by distant and close entrepreneurs' relative productivities.

For tractability we make the following assumptions. First, each financier has only one close entrepreneur and evaluates at most one distant entrepreneur.[3] Second, if financiers evaluate a distant entrepreneur, all financiers close to entrepreneur i evaluate the same entrepreneur j (and *vice versa*). That is, we posit that financiers belonging to a given clientele evaluate the same entrepreneurs. This technical assumption is not crucial for our results and simply ensures that financiers are equal *ex ante* and *ex post*. It is consistent with the empirical evidence suggesting that different companies cater to clienteles of investors who select companies with similar characteristics in terms of size, stock liquidity or dividend yields (Falkenstein, 1996).

B 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 $A^H \geq A^L$. Productivity defines the entrepreneur's type. The fraction of H (L) entrepreneurs is α^H (α^L), where $\alpha^L \equiv 1 - \alpha^H$.

Entrepreneurs have no capital endowment. All entrepreneurs have the same mass of close financiers and compete to attract capital from close and distant financiers that are aware of them. The more capital an entrepreneur attracts, the larger the investment and thus the size of the firm he runs.

[2] See Rajan and Zingales (2003) for a detailed description of relationship based and arm's length financing.

[3] The mechanisms we illustrate generalize readily to the case in which financiers acquire information about a finite number of distant entrepreneurs.

The entrepreneurs' payoff is the share of project output they can appropriate. Their payoff is zero if they do not receive funding.

Entrepreneurs bid sequentially by offering a fraction of the output produced per unit of capital invested. We assume that entrepreneurs can discriminate between financiers with different evaluation strategies.[4] Financiers who acquire information are willing to invest only if they are guaranteed a higher return than financiers who do not and who, consequently, can invest only in the close entrepreneur and the general technology. The assumption that financiers are offered differential treatment is likely to be satisfied at early stages of development as there are few market participants whose identities are well known to entrepreneurs. The assumption also finds support in the empirical evidence on the IPO process. Institutional investors that are part of an underwriter's network are expected to participate repeatedly and indiscriminately to deals and to contribute to information production. In exchange for this commitment, these investors are allocated stocks in the pre-IPO market at a better price than retail investors and other institutional investors that are not part of the network (who can buy stocks only at the first day trading price).[5] Investors 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).[6] Finally, investors 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 bargaining game between an entrepreneur and a financier is as follows: An entrepreneur is randomly selected to make a first offer which is observed by other entrepreneurs and all financiers who are aware of the entrepreneur. Other entrepreneurs can counter-offer. Financiers accept the offer that implies a higher return to investment. Offering a fraction of the output produced per unit of capital invested is equivalent to say that entrepreneurs offer equity in the project at a price that guarantees a given return. In equilibrium, entrepreneurs end up offering a return that is at most equal to the return of the alternative investment opportunities available to the financier. Thus, the outcome of the multi-period bargaining is the same of (one-period) Bertrand competition with symmetric information.[7] For this reason, to simplify the exposition, in what follows we often write

[4] This ensures that financiers do not free-ride in their decisions to acquire information.

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

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

[7] To see this, consider the following game. Two entrepreneurs whose types can be either H or L are competing

that entrepreneurs offer financiers a return per unit of capital invested.

Similarly to Almeida and Wolfenzon (2005 and 2006), all financiers can invest in a general technology, which provides a return per unit of capital invested $g(\omega)$, where ω is the aggregate capital invested. This 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). The return to the general technology is decreasing, for instance because the price of crops drops if too much is produced. To ensure that the output of the general technology increases in the invested capital, we assume that $\frac{\partial(\omega g(\omega))}{\partial \omega} > 0$. 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.

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 assume that financiers choose whether to acquire information before observing the close entrepreneur's productivity.[8] After observing the productivity of the close entrepreneur and of the distant entrepreneur should information acquisition occur, financiers decide how to allocate their capital between entrepreneur(s) and the general technology. At time 1, returns are realized and payoffs are distributed.

Definition 1 *An equilibrium consists of financiers' beliefs, information acquisition decisions, cap-*

to attract a financier (the game is easily generalized to include the return of the general technology). Consider the strategy of an H entrepreneur who bids first by offering a share of the output. By bidding $\frac{A^L}{A^H} + \varepsilon < 1$, where ε is infinitesimally larger than zero, he can win at the first offer if the competing entrepreneur is L type. In fact, his bid guarantees financiers a return $A^L + A^H \varepsilon$, which is marginally larger than A^L, the maximum return the L entrepreneur can offer by bidding 1. Also note that any bid corresponding to a return below A^L cannot be an equilibrium because the competing entrepreneur can counter-offer with probability 1. If the competing entrepreneur is H type, he can win by bidding 1. This leaves the entrepreneur who bids first with a payoff of zero (which is the same payoff from winning when competing with an H entrepreneur). Hence, bidding $\frac{A^L}{A^H} + \varepsilon$ is a weakly dominant strategy for an H entrepreneur who bids first. It guarantees financiers a return that is equivalent to the return of their second-best investment opportunity. Now consider an L entrepreneur who bids first. Since the lowest return financiers accept is A^L, the L entrepreneur will bid 1. He receives funding and enjoys zero payoff if the competing entrepreneur is L type. The L entrepreneur is not funded if the competing entrepreneur is H type and can bid $\frac{A^L}{A^H} + \varepsilon$. Also in this case, the payoff of the L entrepreneur is zero. Financiers' equilibrium return is equal to the return of their second-best investment opportunity.

[8] In this way, financiers are equal when we analyze their decision to acquire information. This assumption does not affect the results of the model because, as will be clear later, incentives to acquire information are particularly strong when financiers are close to an H entrepreneur.

ital allocations, and returns, 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 of the general technology and the other entrepreneur's expected offer (if financiers acquire information), entrepreneurs offer financiers a fraction of the output that maximizes their payoffs;*
- *Financiers allocate their initial capital in order to maximize the expected return on their capital endowment and take 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 who wish to fund a given entrepreneur or the general technology do so.*

III Benchmark Case: Perfect Markets

We start by describing a benchmark case in which evaluating a distant entrepreneur involves no cost ($\tau = 0$). Financiers can thus identify all H entrepreneurs, regardless of whether they are close or distant. Since financiers have access to all investment opportunities, there are no market segmentations. We refer to this situation as *perfect markets.* The resulting capital allocation represents the first best that an economy with the investment opportunities described in the previous section can achieve.

In equilibrium, L entrepreneurs are never funded. When the economy's initial capital (kI) is lower than $g^{-1}\left(A^H\right)$, even H entrepreneurs are not funded. This is because for such low levels of initial capital, the general technology can employ all the capital endowment and yet generate a return higher than A^H – the highest possible return an entrepreneur can offer. Therefore, financiers allocate no capital to either close or distant entrepreneurs despite the fact that they are aware of them. Since no capital is invested in distant entrepreneurs, the equilibrium resembles favoritism. However, as financiers allocate capital on the basis of the relative returns of different investment

opportunities, markets are perfect (meaning that information is costless) even if financiers only invest in the general technology.

When the initial capital exceeds the threshold $g^{-1}\left(A^H\right)$, the return of the general technology falls to A^H, and H entrepreneurs receive funding from close and distant financiers. Since entrepreneurs compete to attract capital, they end up offering return A^H per unit of capital invested. Hence, ω_0 such that $g\left(\omega_0\right) = A^H$ is invested in the general technology, whereas H entrepreneurs attract the rest of the capital, $kI - g^{-1}\left(A^H\right)$. On average, each of them invests $\frac{kI - g^{-1}\left(A^H\right)}{\alpha^H N}$.

For given initial capital and investment opportunities, this capital allocation yields the highest possible return to investment, which is never lower than A^H.

Definition 2 *A capital allocation is efficient if the average productivity of capital is at least* A^H.[9]

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

The distance between $\frac{kI - g^{-1}\left(A^H\right)}{\alpha^H N}$ and the capital actually allocated to H entrepreneurs 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 overinvest in the general technology and because they fund L entrepreneurs.

If $\tau = 0$, capital allocation is always efficient. In the next section, we discuss how markets emerge in equilibrium, but fail to lead to an efficient capital allocation if $\tau > 0$.

IV On the Emergence of Markets

Perfect markets are an extreme case of markets with freely available information. To explore under what conditions markets emerge if information acquisition is costly, we start by examining the equilibrium under favoritism. We then derive conditions under which financiers find it optimal to acquire information about a distant entrepreneur.

[9] Since the general technology and the entrepreneurial investment opportunities are linear, average and marginal returns to capital are equal. Therefore, we use "average" and "marginal" returns interchangeably.

A Favoritism

Here, we characterize the equilibrium in which financiers do not acquire information about distant entrepreneurs and therefore invest only in the close entrepreneur or the general technology. This describes the equilibrium in the game subtree in which capital is allocated through favoritism.[10]

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

- *Financiers' equilibrium return decreases in* kI *for* $kI \leq \frac{g^{-1}\left(A^L\right)}{\alpha^L}$ *and is* A^L *for* $kI > \frac{g^{-1}\left(A^L\right)}{\alpha^L}$*.*

Case A of Figure 1 summarizes the different outcomes of favoritism for different levels of initial capital. When financiers do not acquire information, entrepreneurs face no competition for capital from other entrepreneurs and offer financiers at most the return of the general technology (g). If the initial capital is small, the general technology attracts all capital because of its high return and no entrepreneur receives funding. Notwithstanding the positive cost of information acquisition and the fact that financiers are not aware of distant entrepreneurs, investment decisions are identical to the ones observed with perfect markets. Hence, 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 initial capital is lower than $\frac{g^{-1}\left(A^L\right)}{\alpha^L}$, the marginal return to investment of the general technology remains higher than A^L. Since L entrepreneurs cannot offer the return of the general technology, they are not funded. Only when the economy's initial capital exceeds $\frac{g^{-1}\left(A^L\right)}{\alpha^L}$, L entrepreneurs receive funding.

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

Favoritism leads to increasingly inefficient investment decisions as the initial capital 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 over-invest in the general technology. In equilibrium, H entrepreneurs invest less than the optimal level $\frac{kI - g^{-1}(A^H)}{\alpha^H N}$ and the productivity of the general technology is lower than A^H. For even higher levels of initial capital, not only over-investment in the general technology occurs, but also lower productivity entrepreneurs receive funding. The average productivity of capital and financiers' equilibrium return thus decrease in the economy's initial capital.

We can obtain interesting insights by comparing different agents' payoffs under favoritism and perfect markets.

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

Financiers are better off when information is freely available, as they can obtain at least return A^H. Under favoritism, financiers' 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 can be invested with return A^H because the entrepreneurial technology is constant return to scale. A lower equilibrium return is due to market segmentation. In some instances, financiers are not aware of any H entrepreneur. In other cases, H entrepreneurs, being aware that financiers' only alternative investment opportunity is the general technology, offer low returns.

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

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

With perfect markets, since information is freely available, L entrepreneurs are not funded as any amount of capital can be invested with return A^H. With favoritism, L entrepreneurs receive funding if $kI \geq \frac{g^{-1}(A^L)}{\alpha^L}$. However, as shown in the proof of Proposition 1, due the constant return to scale entrepreneurial technology assumption, their payoff remains zero as they have to distribute all the output to external financiers.

In contrast, H entrepreneurs strictly prefer favoritism to markets because competition for capital is lower when information is costly. If information is freely available, H entrepreneurs can invest more. Their payoff, however, is zero, as competition with other H entrepreneurs drives financiers' return to A^H. When financiers do not acquire information, H entrepreneurs can offer financiers the return of their second-best investment opportunity. If $kI > \frac{g^{-1}\left(A^H\right)}{\alpha^L}$, H entrepreneurs' payoff is positive as $A^H - \max\left(g, A^L\right) > 0$. This implies that H entrepreneurs prefer to run smaller firms in order to be able to offer lower returns to financiers.

B Markets

In this section, we investigate under what conditions markets emerge and to what extent they improve capital allocation with respect to favoritism. Markets emerge if financiers find it optimal to acquire information. In turn, information acquisition is optimal for financiers only if the expected return from evaluating a distant entrepreneur is sufficiently large to compensate the cost of information acquisition.

Unlike the benchmark case of perfect markets ($\tau = 0$), we recognize that in the real world financiers spend $\tau > 0$ to investigate distant investment opportunities and that the cost of information acquisition prevents them from evaluating all distant entrepreneurs. For simplicity, we capture this by assuming that financiers evaluate at most one distant entrepreneur.

When financiers are unable to evaluate all distant entrepreneurs, markets are imperfect as they remain segmented and fail to spur an efficient capital allocation. The extent to which markets are imperfect depends on the stage of development of the economy and financiers' incentives to acquire information. As will be clear later, although imperfect, markets significantly improve the allocation of capital if they emerge at an early stage of development. Markets mostly affect how financiers and entrepreneurs share projects' output at later stages of development.

B.1 Early Markets

We first consider a situation in which markets emerge at an early stage of development (low initial capital). We refer to this type of equilibrium as *early markets*. In early markets, the return of the general technology is so high that L entrepreneurs cannot attract funding. Hence, only H entrepreneurs are funded.

The following proposition describes at which level of initial capital early markets emerge. Cases B and C of Figure 1 present the relevant intervals.

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

An implication of Proposition 2 is that markets do not emerge for low levels of initial capital. When the initial capital is low ($kI < \frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)} + I\tau$), favoritism is the only equilibrium. Expanding the investment opportunity set by observing a distant entrepreneur does not significantly improve the expected return, as the general technology already offers high return at no cost. Hence, financiers have no incentive to acquire information and invest in close entrepreneurs only if they can offer a return higher than the general technology. The equilibrium is the same as described in Proposition 1. As pointed out before, when the initial capital is low, an efficient capital allocation can be achieved with favoritism.

For higher levels of initial capital, larger investment decreases the return of the general technology. Since entrepreneurs, aware of this, offer a low return to financiers, the payoff from spending τ and investigating a distant entrepreneur becomes attractive enough that some financiers acquire information. When markets first emerge, not all financiers acquire information. Some of them invest in their close entrepreneurs or in the general technology without evaluating distant investment opportunities. The mass of financiers acquiring information increases in the level of initial capital. Favoritism and markets thus coexist at early stages of development.

Another implication of Proposition 2 is that some financiers acquire information and fund exclusively H entrepreneurs only if the interval $\left(\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)} + I\tau, \frac{g^{-1}(A^L)}{(\alpha^L)^2} + I\tau\right)$ is well-defined. This implies that the following condition must hold: $A^L < g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H-A^L}\right)$. Otherwise, markets do not emerge at early stage of development and capital continues to be allocated through favoritism.

The above condition indicates that the emergence of early markets is favored by certain characteristics of the economy: a high proportion of H entrepreneurs; a large difference in productivity between H and L entrepreneurs; and/or a low cost of information acquisition relatively to financiers' capital endowment. In particular, a higher proportion of H entrepreneurs strengthens incentives to acquire information for the following reason. Financiers benefit from discovering a distant H

entrepreneur only if they are close to an H entrepreneur as competition for capital allows them to obtain return A^H. Otherwise, financiers are offered only the return of their second-best investment opportunity, to which they have access without incurring the information acquisition cost.

With the emergence of early markets, capital market segmentations are partially overcome: Financiers who acquire information allocate capital to the entrepreneurs with highest productivity, whether distant or close. While capital allocation is improved in comparison to favoritism, it is less efficient than under perfect markets. Since with probability $\left(\alpha^L\right)^2$ some financiers do not identify any H entrepreneur, for high levels of initial capital, there is over-investment in the general technology.

It is interesting to note that if $A^L \leq g\left(\frac{\alpha^L}{(\alpha^H)^2}\frac{I\tau A^L}{A^H-A^L}+\alpha^L I\tau\right) < g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2\frac{I\tau A^L}{A^H-A^L}\right)$, a more restrictive condition than the one necessary for markets to emerge early, some financiers acquire information for $\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau \leq kI \leq \frac{g^{-1}\left(A^L\right)}{\alpha^L}$ even though with no information acquisition they would still fund only H entrepreneurs (Case B of Figure 1). They do so in order to improve their outside options and obtain return A^H if they 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. On average, investment in the general technology decreases while H entrepreneurs invest more.

If instead, $g\left(\frac{\alpha^L}{(\alpha^H)^2}\frac{I\tau A^L}{A^H-A^L}+\alpha^L I\tau\right) < A^L < g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2\frac{I\tau A^L}{A^H-A^L}\right)$, 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 exceeds the threshold $\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau$, they acquire information and stop funding L entrepreneurs (Case C of Figure 1). In this case, information acquisition improves capital allocation to an even larger extent, as L entrepreneurs would receive funding if financiers did not acquire information.

B.2 Late Markets

We now study markets at a late stage of development (high initial capital). We refer to this type of equilibrium as *late markets*. In late markets, the return of the general technology is so low that even L entrepreneurs can attract external capital.

The following proposition describes at which level of initial capital late markets emerge. Cases B, C and D of Figure 1 present the relevant intervals.

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

As shown in Proposition 2, if $A^L < g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H - A^L}\right)$, financiers acquire information for levels of initial capital below $\frac{g^{-1}(A^L)}{(\alpha^L)^2} + I\tau$. Proposition 3 implies that as capital exceeds this threshold, financiers continue to acquire information, but fund both H and L entrepreneurs (Cases B and C of Figure 1). This is because the initial capital is so high that the return of the general technology is below A^L when all financiers who identify two L entrepreneurs invest in the general technology. Financiers thus acquire information in equilibrium because fostering competition between L entrepreneurs can improve their return. Even if incentives to acquire information are strong and the local market segmentation is reduced, markets become progressively more inefficient as capital increases. This result, however, depends on the simplifying assumption that financiers acquire information about only one distant entrepreneur. In Section V, we discuss how the implications of the model can be generalized if this assumption is relaxed.

If instead $A^L \geq g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H - A^L}\right)$ and conditions are less favorable to information acquisition, as proved in Proposition 2, early markets do not emerge. As capital grows, financiers choose not to evaluate any distant entrepreneur and fund the close entrepreneur whatever his type is. Favoritism thus remains an equilibrium and capital allocation is less efficient than the one to which (early) markets would lead for the same level of capital. Only once $kI \geq \frac{I\tau A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau > \frac{g^{-1}(A^L)}{(\alpha^L)^2} + I\tau$, financiers acquire information and markets emerge (Case D of Figure 1).[11] At this late stage of development, spurring competition between L entrepreneurs benefits financiers because the return of the general technology is low. The only function that markets serve, however, is creating competition for capital. Since L entrepreneurs continue to be funded, the emergence of late markets leads to a far smaller output growth than in the case in which markets emerge early.

[11] As is clear from Figure 1, if $A^L \geq g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H - A^L}\right)$ (Case D), $\frac{I\tau A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau$ implies a higher level of capital than in the case in which $A^L < g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H - A^L}\right)$ (Cases B and C).

B.3 Discussion

Favoritism is an equilibrium for low initial capital. Markets are a sort of luxury good that materializes only when economies reach a minimum level of development. Moreover, markets do not necessarily appear for a given level of initial capital. In economies with conditions favorable to information acquisition, markets emerge for intermediate levels of initial capital and significantly improve capital allocation by preventing low-productivity projects from being funded. Early markets prosper until the economy accumulates a high level of capital. Only when initial capital becomes very large, if investors continue to investigate at most one distant entrepreneur, low productivity projects receive funding.

In economies with conditions less favorable to information acquisition, complete segmentation of local markets persists until initial capital is far larger. Favoritism is an equilibrium outcome even if it leads to significant capital misallocation. When markets ultimately emerge, they only marginally improve capital allocation and have small positive effects on domestic output growth as L entrepreneurs continue to be funded.

Our model implies that institutions fostering information acquisition are unimportant at early stages of development when favoritism prevails. These institutions lead to divergent development paths only once countries have reached an intermediate level of initial capital. Furthermore, our model suggests caution in interpreting the results of the finance and growth literature (Levine, 2006). The proportion of financiers acquiring information may be seen as a measure of financial development. In our model, financial development is partly an endogenous institution that follows economic development rather than fostering it. When markets emerge, however, they do have a positive effect on investment efficiency. This effect may be under-estimated, as shown by Beck, Levine and Loyaza (2000), if econometricians do not consider that favoritism is efficient at early stages of development.

C Welfare Effects

So far we have shown that by creating market segmentation, costly information acquisition decreases the average productivity of investment. Different equilibrium configurations also have dramatic effects on agents' payoffs. The following proposition compares financiers' returns in (imperfect) markets with their returns under two special cases: perfect markets ($\tau = 0$) and favoritism ($\tau =$

∞).[12]

Proposition 4 *Perfect markets lead to (weakly) higher financiers' returns than imperfect markets. The latter in turn lead to (weakly) higher financiers' returns than favoritism.*

The intuition of Proposition 4 is straightforward. Being information freely available under perfect markets, financiers can identify all available investment opportunities. Competition among high-productivity entrepreneurs drives up the return necessary for attracting funds. In equilibrium, financiers' return per unit of capital invested is at least A^H, the highest attainable return in a capital-abundant economy.

When information is costly and initial saving is high, financiers' expected return is lower than A^H. Even though spending τ and observing the productivity of a distant entrepreneur increase the return to investment in some states of the world, it does not warrant an expected payoff of A^H. Financiers obtain return A^H only if they identify two high-productivity entrepreneurs. Whenever financiers identify entrepreneurs with different productivities, they are offered only the return of their second-best investment opportunity.

Nevertheless, compared to favoritism – under which financiers have even more limited investment opportunities – markets lead to higher financiers' returns. Information acquisition expands financiers' investment opportunities, increases competition for funds, and drives up equilibrium returns. Even if only a subset of financiers acquires information, those who do not enjoy higher returns thanks to smaller investment in the general technology.

While a reduction in market segmentation increases financiers' payoffs, it may increase or decrease the payoffs of entrepreneurs.

Proposition 5 *H entrepreneurs are better off with imperfect markets than with perfect markets. H entrepreneurs can be either better off or worse off with imperfect markets in comparison to favoritism. The payoff of L entrepreneurs is always zero.*

Information asymmetry has two opposite effects on entrepreneurs' payoffs. First, an improvement in the quality of information – due to financiers' evaluating distant entrepreneurs or freely available information – allows financiers to identify a larger set of investment opportunities and

[12] In Subsection IV.B, we have shown that favoritism may be an equilibrium outcome for a finite τ.

capital to flow to more productive entrepreneurs. This benefits high-productivity entrepreneurs because a reduction in capital misallocation allows them to run larger projects. Hence, a reduction of information asymmetry causes a positive *capital supply effect*.

Second, an improvement in the quality of information brings an expansion of financiers' investment opportunities and an increase in competition for funds. Competition forces entrepreneurs to offer financiers higher returns and decreases the rent that entrepreneurs can enjoy per unit of capital invested. Given the negative *rent effect*, entrepreneurs may prefer a higher level of information asymmetry in order to enjoy a higher rent on a smaller scale project.

The net effect of a reduction in information asymmetry on H entrepreneurs' payoff depends on the relative magnitude of the rent and capital supply effects. L entrepreneurs' payoff is not affected by the extent of financiers' information because their rent is always zero.

Proposition 5 suggests that the rent effect always prevails when information is freely available because with probability 1 H entrepreneurs compete with other H entrepreneurs and their expected payoff is zero. Entrepreneurs are unable to enjoy any benefits from larger investment and therefore prefer imperfect market.

When information is costly ($\tau > 0$), depending on the relative magnitude of the capital supply effect and the rent effect, H entrepreneurs may be either worse or better off. The following two corollaries consider special cases under which either the capital supply effect or the rent effect prevails.

Corollary 3 *H entrepreneurs prefer favoritism to early markets if $\alpha^H \geq \frac{1}{2}$.*

Corollary 3 establishes that for intermediate levels of capital, $\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)} + I\tau < kI < \frac{g^{-1}(A^L)}{(\alpha^L)^2} + I\tau$, H entrepreneurs always prefer favoritism to markets if competition for funds from other H entrepreneurs is high enough $\left(\alpha^H \geq \frac{1}{2}\right)$. In this case, the negative effect on entrepreneurs' payoff derived from a reduced rent per unit of capital invested prevails over the positive capital supply effect.

Corollary 4 *If $kI \geq \max\left(\frac{2\alpha^L}{2\alpha^L-1}I\tau, \frac{g^{-1}(A^L)}{(\alpha^L)^2} + I\tau, \frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)} + I\tau\right)$, H entrepreneurs always prefer late markets to favoritism.*

The intuition behind Corollary 4 is the following: For high levels of initial capital, the return of the general technology is low in equilibrium. Financiers are offered low returns unless they evaluate

two H entrepreneurs. Hence, H entrepreneurs expect to enjoy high rents even if financiers acquire information. In comparison to favoritism, markets allow H entrepreneurs to invest more as less capital is employed by L entrepreneurs. Under these conditions, Corollary 4 establishes that the capital supply effect prevails and H entrepreneurs prefer markets to favoritism.

The relative importance of the rent and capital supply effects is ambiguous in more general cases. Figure 2 shows with some numerical examples how entrepreneurs' payoffs under markets vary with the level of initial capital. When initial capital is relatively low, H entrepreneurs' payoff may decrease in the level of initial capital. This depends on the fact that as capital increases more financiers acquire information. More information acquisition decreases the rent per unit of capital invested, without allowing a large increase in investment. This effect is more pronounced if the proportion of H entrepreneurs is larger as information acquisition increases to a larger extent competition for capital. When initial capital is sufficiently high, all financiers acquire information. Hence, further increases in capital can only benefit entrepreneurs as they are able to invest more.

V Extensions

A Desirability of Disclosure

The welfare analysis has implications for the desirability of disclosure for investment efficiency. At early stages of development, disclosure is unnecessary because capital allocation is efficient even without information acquisition. As capital increases, information acquisition improves capital allocation. Since greater transparency (lower τ) gives financiers an incentive to acquire information for lower levels of capital, it may be desirable. However, H entrepreneurs may not want to lower τ, for instance by voluntarily improving disclosure, because they prefer favoritism to markets. Hence, at this stage of development, mandatory disclosure may be necessary. As capital rises further, the capital supply effect eventually dominates the rent effect on H entrepreneurs' payoffs. Entrepreneurs' resistance to markets diminishes. Mandatory disclosure becomes secondary because entrepreneurs find it optimal to voluntarily disclose information.

B Choosing a Market

So far, we have analyzed financiers' incentives to acquire information about distant investment opportunities. The most straightforward interpretation of the model is that the mechanisms for capital allocation vary across economies at different stages of development.

Our model also proposes that the distinction between favoritism and markets is not dichotomic. In the equilibrium with markets, financiers' investment opportunities depend on the cost of information acquisition and especially, on the average quality of entrepreneurs. In what follows, we explain how these institutional features affect entrepreneurial rents and, ultimately, entrepreneurs' preferences over different markets. Since their payoffs depend on the institutional environment, entrepreneurs may choose to raise capital in markets where they expect to obtain larger payoffs.

The crucial factors affecting entrepreneurs' payoffs in an equilibrium of markets are the amount of capital that entrepreneurs expect to attract and the probability of having to compete with other H entrepreneurs. The latter can be interpreted as a market's listing standards, which affect the average quality of entrepreneurs, but may also be related to the level of disclosure that makes it easier to identify good investment opportunities.

A larger proportion of H entrepreneurs increases competition for capital. In turn, this decreases entrepreneurial rents and increases financiers' returns. Nevertheless, it may affect favorably entrepreneurs' payoffs if the economy has relatively low initial capital and only a subset of financiers acquires information. In this case, a marginal increase in α^H induces a larger set of financiers to produce information. If this set is sufficiently large, an improvement in listing standards may increase the capital supply to the entrepreneurial sector so much that the ability to invest a larger amount of capital more than compensates the lower rent.

As shown in the numerical examples presented in Figure 2, the increase in the supply of capital brought by an increase in α^H is captured by the curvature of the function $g(.)$. *Ceteris paribus*, the flatter the function $g(.)$ is, the larger the set of financiers who have to start producing information for a given level of initial capital. The amount of capital that each entrepreneur is able to invest may increase in a way that more than compensate the reduced rent, as in Panel A of Figure 2. An increase in the incentive to acquire information, induced by an increase in α^H, raises the supply of capital to the entrepreneurial sector. Therefore, if only a subset of financiers acquires information, H entrepreneurs may favor an improvement in listing standards (higher α^H).

Proposition 6 *When all financiers acquire information, H entrepreneurs' payoff decreases in α^H.*

In a mature market, all financiers acquire information and an increase in α^H cannot bring a large increase in the supply of capital. Hence, H entrepreneurs are adversely affected by an improvement in listing standards, as is proved in Proposition 6.

C Robustness

For tractability, we have imposed several simplifying assumptions that are not crucial for our findings. We now discuss the general implications if some of these assumptions are relaxed.

Our model assumes that financiers evaluate at most one distant entrepreneur. This implies that in any economy, as initial capital increases, markets become progressively more inefficient. In a more general version of the model, financiers would have an incentive to evaluate more than one distant entrepreneur as their capital endowment goes up. Hence, L entrepreneurs would not necessarily be funded in late markets. The economy would exhibit properties that resemble those of early markets. If the institutional environment is favorable to information acquisition, financiers would start evaluating more distant entrepreneurs, without ever funding low productivity entrepreneurs. If the environment is instead somewhat less favorable to information acquisition, financiers fund low-productivity entrepreneurs and only when their capital endowment increases sufficiently, they choose to further expand their investment opportunities. Similarly to the current version of the model, this extension implies that economies with an institutional environment favoring information acquisition maintain a relatively high productivity of capital as they grow, while productivity decreases as the economy accumulates capital in environments that are less favorable to information acquisition. Finally, if the environment is even more averse to information acquisition, an equilibrium with information acquisition in which only H entrepreneurs are funded never emerge.

Our model also assumes that the expected quality of entrepreneurs is the same regardless of their location. This is a simplifying assumption that does not affect the main message of our analysis. To illustrate, let's take the perspective of a financier who expects that a close (distant) entrepreneur has high productivity with probability α_1^H (α_2^H). For given k and τ, such a financier's incentive to acquire information is stronger and early markets emerge earlier if $\alpha_1^H < \alpha_2^H$. The analysis is otherwise identical to the one performed in Sections III and IV.

So far, we have assumed that financiers cannot invest in a distant entrepreneur without spending

τ because distant entrepreneurs are unknown. The implications of our model would be unchanged if financiers had the option to invest in distant entrepreneurs without spending τ and therefore expected a return $\alpha^H A^H + (1-\alpha^H)A^L$. Also in this case, for low levels of initial capital, financiers would have no incentive to fund a distant entrepreneur as long as the expected return of a distant entrepreneur of unknown type is less than that of the general technology. Additionally, incomplete information about entrepreneurs' type leads to an inefficient allocation of capital similarly to the version of the model we solve here.

Finally, we have assumed that entrepreneurial projects are constant return to scale and therefore, any amount of capital can be invested by high quality entrepreneurs. Our results would hold, however, if high quality entrepreneurs were able to invest at most a finite amount of capital as long as capital is scarce with respect to their investment opportunities. We believe that this captures the situation of developing economies. Interestingly, if a minimum level of investment is required to undertake an entrepreneurial project**,** it may not be possible to fund entrepreneurial activity in capital-scarce economies. In this case, favoritism would lead to an inefficient allocation of capital even at early stages of development.

D Allocation of Capital between Real and Financial Sectors

So far, we have shown that, as capital increases above a certain threshold, information acquisition allows to allocate capital more efficiently across entrepreneurs and between entrepreneurial and general technologies. However, information acquisition entails a cost as some capital must be devoted to learn about distant investment opportunities.

Since information acquisition is related to the emergence of markets, we interpret the cost of information acquisition as investment in the financial sector. Hence, the financiers' problem can be viewed as the decision to allocate capital between the real (entrepreneurial or general technologies) sector and the financial sector in order to maximize expected returns.

By investing in information acquisition, financiers may increment their expected wealth to a lower (or higher) extent than the economy's aggregate output. This implies that financiers' decisions whether to acquire information do not necessarily increase the economy's aggregate output (net of the information acquisition costs) and therefore are not always efficient from a social welfare point of view.

The following proposition gives conditions under which acquiring information about distant investment opportunities would increase the aggregate output of the economy, but favoritism prevails in equilibrium, preventing such a social gain from being realized. In other words, the fact that markets fail to emerge results in under-investment in information acquisition.

Proposition 7 *In equilibrium, there is under-investment in information acquisition if* $\frac{\tau I}{\alpha^L \alpha^H (A^H - g(\alpha^L kI))} < \min\left(\frac{\tau I A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau, \frac{g^{-1}(A^L)}{\alpha^L}\right)$ *when* $g^{-1}(A^H) < kI < \min\left(\frac{\tau I A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau, \frac{g^{-1}(A^L)}{\alpha^L}\right)$, *or if* $\frac{\tau I}{\alpha^L \alpha^H (A^H - A^L)} < \frac{\tau I A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau$ *when* $\frac{g^{-1}(A^L)}{\alpha^L} < kI < \frac{\tau I A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau$.

Proposition 7 implies that favoritism prevails despite the fact that information acquisition improves social welfare for intermediate levels of capital. As capital increases, financiers' individual gain from acquiring information eventually exceeds the cost, and markets emerge.

Proposition 7 also suggests that whether there is under-investment in information acquisition depends on certain characteristics of the economy. For example, the condition $\frac{\tau I}{\alpha^L \alpha^H (A^H - A^L)} < \frac{\tau I A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau$ is more likely to be satisfied if the fraction of L entrepreneurs is relatively high. In this case, information acquisition has only a small effect on entrepreneurs' competition for capital, resulting in a small increase in financiers' expected wealth. Hence, a high fraction of L entrepreneurs leads to under-investment in the financial sector.

In equilibrium, there may also be over-investment in the financial sector. In this case, markets emerges but information acquisition lowers the economy's aggregate output, net of information acquisition costs. The following proposition describes this situation.

Proposition 8 *In equilibrium, there is over-investment in information acquisition if* $\frac{\tau I}{\alpha^L \alpha^H (A^H - g(\alpha^L kI))} > \frac{\tau I A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau$ *when* $kI < \frac{g^{-1}(A^L)}{\alpha^L}$, *or if* $\frac{\tau I}{\alpha^L \alpha^H (A^H - A^L)} > \max\left(\frac{\tau I A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau, \frac{g^{-1}(A^L)}{(\alpha^L)^2} + I\tau\right)$ *when* $\frac{g^{-1}(A^L)}{\alpha^L} < kI < \frac{\tau}{\alpha^L \alpha^H (A^H - A^L)}$.

Proposition 8 implies that when the fraction of H entrepreneurs is high, financiers have an incentive to invest in information acquisition even if this has only small positive effects on the aggregate output. They do so because by acquiring information they can appropriate a larger share of the entrepreneurial output. Interestingly, there is never over-investment in information acquisition at late stages of development (higher levels of initial capital).

Under the conditions of Proposition 8, markets are welfare-decreasing even if they improve capital allocation in the real sector of the economy. This implies that pursuing policies that limit favoritism and stimulate information acquisition – without taking into account the costs – may be detrimental from a social welfare point of view.

VI Empirical Implications

In this section we discuss our theory's implications and provide some supporting empirical evidence.

Implication 1 *Allocation of capital based on personal connections leads to an efficient allocation of capital 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 them high and steady earnings. Local banks thus fueled the region's economic growth and development. As the century progressed, bank performance declined. In order to attract savers, banks started to issue deposits and developed new credit standards for evaluating the creditworthiness of distant 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 it 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 nineteenth century. 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 only affect bank lending. Business groups, consisting of legally independent firms bound together by formal and informal ties, may be viewed as a way to fund close entrepreneurs without recurring to information acquisition. Consistently with our model, business groups are often believed to enhance economic performance in early phases of development and to hamper growth later on (Khanna and Yafeh, 2006).

Furthermore, historically, stock markets have emerged as regional exchanges for trading the stocks of local companies. Stock markets evolved and became national exchanges only at later stages of development, when supposedly financiers had incentives to acquire information on distant investment opportunities. Only more recently the stock markets of industrialized economies have been considering further international mergers.

Implication 2 *Countries become financially integrated with the rest of the world only at relatively high stages of development.*

Another interpretation of our model is that financiers bear a cost τ in order to be able to invest in a foreign country. Financiers from capital-poor countries are unlikely to investigate distant investment opportunities. Only when a sufficient amount of capital has been accumulated, investors find it optimal to evaluate foreign investment opportunities and we may observe international capital flows.

This can explain why low-income countries can maintain restrictions to foreign investment for domestic residents. These restrictions become unpopular and are ultimately removed when countries achieve higher level of development (see Abiad and Mody, 2005).

Implication 3 *Financial liberalizations are followed by an improvement in transparency.*

As shown in Subsection IV.C, high-productivity entrepreneurs are more likely to prefer markets to favoritism if initial capital is relatively high. This implies that high-productivity entrepreneurs may prefer disclosure (reducing τ in our model) and favor the emergence of markets only if they anticipate that doing so brings a sufficiently large increase in investment. This generates the following empirical implication. Disclosure improves 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 its support. When companies cross-list in a foreign market, they voluntarily commit to disclose more. Pagano, Röell and Zechner (2002) show that this decision is concomitant to raising more capital, as our model suggests.

Implication 4 *Financiers' expected return is higher when competition for external funds is stronger.*

In our model, financiers' returns are positively affected by competition for capital, which depends on their investment opportunities. This implication is consistent with the empirical evidence showing that international banks charge higher interest rates than domestic banks to similar borrowers (Smith, 2003). Our model suggests that international banks having a wider set of potential borrowers demand higher interest rates.

Furthermore, financiers are likely to have more investment opportunities during IPO's "hot markets", when a larger than usual number of firms raise capital and expectations about the quality of IPOs are high. Hence, our theory implies that financiers should be offered new equity issues at better prices. 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".[13]

Finally, competition for capital has been shown to matter empirically in more general contexts. For instance, a straightforward generalization of our model would imply that financiers with more close entrepreneurs obtain higher returns in equilibrium. Consistently, Hong, Kubik and Stein (2006) find that in U.S. census regions where local firms raise more equity, equity returns are higher.

Implication 5 *Transparency spur information production and improve capital allocation.*

Our model implies that economic agents are more inclined to produce information when information is cheaper. Hence, we should observe that in more transparent countries, more firm-specific information is available. This provides an explanation, alternative to the ones in the existing literature,[14] for the findings of Morck, Yeung and Yu (2000) who show that the firm-specific return

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

[14] See, for instance, Jin and Myers (2006).

variation is positively correlated with transparency. Consistently with our theory, Durnev, Morck and Yeung (2004) also document that firm-specific variation in stock returns is positively associated with a measure of economic efficiency of corporate investment.

Additionally, a straightforward extension of our model implies that countries with better disclosure or a higher proportion of high quality entrepreneurs attract more information acquisition efforts from foreign investors and ultimately larger capital inflows. This implication is consistent with the findings of Leuz, Lins and Warnock (2006).

Implication 6 *Markets fail to attract entrepreneurs if disclosure requirements and listing standards become too demanding.*

Our model has also implications about entrepreneurs' preferences over different markets. In particular, competition for capital, which is crucial for entrepreneurs' payoffs, is affected by the fraction of high-quality entrepreneurs. The latter may depend on several characteristics of a market, such as listing and disclosure standards. Stricter listing standards are equivalent to an increase in the fraction of high-quality entrepreneurs. Disclosure requirements, besides affecting the cost of information acquisition, may have an effect similar to the one of listing standards. First, only the very best firms may be able to list if disclosure increases. This implies a higher fraction of high quality entrepreneurs. Second, a decrease in the cost of information acquisition gives financiers incentives to evaluate more entrepreneurs. As financiers' investment opportunities expand, competition for capital increases.

Our results shed light on the recent experience of the U.S. stock market after the Sarbanes-Oxley Act. The Sarbanes-Oxley Act, introduced in 2002, considerably increased disclosure requirements and listing standards for companies listed on the U.S. markets. Marosi and Massoud (2006) show that as a consequence an increasing number of foreign firms has decided to exit the U.S. market by deregistering. Over the 2001-2005 period, the number of exchange listed ADRs outstanding dropped from 610 to 487. An even larger number of international firms has chosen to list on the London Stock Exchange, which has lower disclosure requirements and listing standards than U.S. stock exchanges. This is somewhat puzzling because direct costs of disclosure are considered too small to fully explain these patterns (Zingales, 2006).

Our model suggests a more subtle reason why a market may fail to attract listings if disclosure and listing standards are set too high: Entrepreneurial rents decrease too much if a market attracts only the highest quality firms or if it becomes too easy for financiers to identify them. As a consequence, high-quality firms may migrate to markets where lower disclosure and listing standards decrease competition for capital.

Furthermore, if high listing requirements cause high quality firms to migrate, entrepreneurial rents in the home market increase as there are fewer H entrepreneurs. In this case, higher disclosure and stricter listing standards are even more counterproductive for the domestic market. In the foreign market, instead, more H entrepreneurs lead to more competition for capital and lower entrepreneurial rents. Hence, firm migration re-equilibrates the relative competitiveness of markets. This explains why several exchanges with different disclosure and listing standards may coexist in equilibrium.

While markets lose competitiveness in attracting listings when the average quality of firms becomes too high, a country's stock market is also adversely affected when too many good firms migrate away, for instance because the best firms choose to list on foreign stock exchanges. If the proportion of good firms decreases too much, foreign investors have weaker incentives to acquire information about the companies that remain listed on the domestic stock exchanges. Consequently, the liquidity of the domestic stock market decreases when the best firms choose to list in a foreign stock market, as shown by Levine and Scmukler (2006).

The welfare effects highlighted by our theory are also consistent with empirical evidence showing that increases in mandated disclosure requirements increase financiers' returns, presumably because they enhance competition for capital. For instance, Bushee and Leuz (2005) find that the sharp increase in disclosure requirements mandated to firms traded on the Over-The-Counter Bulletin Board (OTCBB) by the SEC in 1999 increased financiers' returns while at the same time forcing a substantial number of firms into a less regulated market.

VII Conclusions

This paper examines under which conditions favoritism emerges as an equilibrium mechanism for capital allocation. 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. As the economy accumulates capital, acquisition of information on distant investment opportunities becomes crucial for achieving an efficient capital allocation. Nevertheless, entrepreneurs may favor lower disclosure or less strict listing standards because they enjoy higher rents when financiers have information on a limited sets of investment opportunities. Interestingly, even though in comparison to favoritism, markets allow capital to be allocated to more productive projects, information acquisition is not always desirable from a social welfare point of view. In fact, if transparency is low, the costs of information acquisition have high likelihood to outweigh the benefits of a more efficient capital allocation.

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

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A Appendix

A Proof of Proposition 1

Due to the lack of competition for capital, in equilibrium, entrepreneurs offer financiers at most the return of the general technology. If the general technology has 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 and obtain return $g(kI)$.

If $g(kI) \leq A^H$, H entrepreneurs offer financiers the return of the general technology. As long as $g\left(kI\alpha^L\right) > A^L$, L entrepreneurs do not receive funding. This is because even if all capital of financiers who are not close to an H entrepreneur – $kI\alpha^L$ – is invested in the general technology, the return of the general technology is still higher than the maximum return that L entrepreneurs can offer. So for $g^{-1}\left(A^H\right) \leq kI < \frac{g^{-1}\left(A^L\right)}{\alpha^L}$, only type H entrepreneurs receive funding.

Consider now financiers' investment strategies in the equilibrium in which only H entrepreneurs are funded. If $g(kI) \leq A^H$ but $g\left(kI\alpha^L\right) > A^H$, even financiers who are close to H entrepreneurs find it optimal to invest part of their capital endowment in the general technology up to the point that its return is equal to A^H. Hence, there exists $\omega_1 \in \left(0, kI\alpha^H\right)$ such that $kI\alpha^L + \omega_1$ is invested in the general technology, and the rest of capital, $kI\alpha^H - \omega_1$, is allocated to H entrepreneurs. Financiers' equilibrium return is $g\left(kI\alpha^L + \omega_1\right) = A^H$.

If $A^L < g\left(kI\alpha^L\right) \leq A^H$, then $\omega_1 = 0$, and financiers who are close to H entrepreneurs allocate all their capital to H entrepreneurs. Financiers' equilibrium return is $g\left(kI\alpha^L\right) \in \left(A^L, A^H\right]$.

When $g\left(kI\alpha^L\right) < A^L$, if all 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 A^L. In equilibrium, financiers fund L entrepreneurs and the return to investment is $g\left(\Omega_1\right) = A^L$, where Ω_1 is the capital invested in the general technology, and $kI - \Omega_1$ is allocated to H and L entrepreneurs.

Note that there cannot be an equilibrium with $g\left(\Omega_1\right) < A^L$, as entrepreneurial projects have constant returns to scale, and any entrepreneur can attract funding by offering $g\left(\Omega_1\right) + \epsilon$ with $\epsilon \to 0$. So in equilibrium, $g\left(\Omega_1\right) + \epsilon = A^L$.■

B Proof of Corollaries 1 and 2

The proofs follow readily from the discussion in the text.■

C Proof of Propositions 2 and 3

Propositions 2 and 3 are 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* $g^{-1}\left(A^H\right) \leq kI \leq \min\left(\frac{g^{-1}\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H\right)}{\alpha^L}, \frac{g^{-1}\left(A^L\right)}{\alpha^L}\right)$, *financiers do not acquire information and fund only the close* H *entrepreneurs;*

3. *If* $\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)} + I\tau < kI < \frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2} + I\tau$, *some financiers acquire information, and only* H *entrepreneurs are funded;*

4. *If* $\frac{g^{-1}\left(A^L\right)}{\alpha^L} \leq kI < \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)} + I\tau$ *and* $A^L > g\left(\frac{\alpha^L I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)} + I\tau\right)$, *financiers fund both* H *and* L *entrepreneurs and do not acquire information.*

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

Proof. We consider the five regions for the level of initial capital kI in Lemma 1 in order. Cases B and C of Figure 1 summarize the equilibrium outcome for different levels of initial capitals and different parameter configurations.

Region 1. If $kI < g^{-1}\left(A^H\right)$, then $g\left(kI\right) > A^H$. H entrepreneurs cannot offer the return of the general technology and financiers have no incentives to fund close entrepreneurs. Since $g\left(kI\right)k > A^H k > A^H\left(k-\tau\right)$, no financier has an incentive to acquire information and fund distant entrepreneurs. So $kI < g^{-1}\left(A^H\right)$ ensures that acquiring information and allocating capital to entrepreneurs are never optimal. In equilibrium, all capital is invested in the general technology.

Region 2. An equilibrium in which financiers fund only close H entrepreneurs without acquiring information exists if the following conditions are satisfied: (a) financiers have incentives to fund at least some close H entrepreneurs, (b) no financier has an incentive to acquire information, and (c) no financier has an incentive to fund a close L entrepreneur.

Condition (a) holds if close H entrepreneurs can offer financiers at least the return of the general technology. That is, $A^H \geq g\left(\Omega_2\right)$, where $\Omega_2 \leq kI$ is the amount of capital invested in the general technology. This implies $kI \geq g^{-1}\left(A^H\right)$.

The expected payoff for a financier who acquires costly information is

$$\left(\left(\alpha^H\right)^2 A^H + \left(1-\left(\alpha^H\right)^2\right) g\left(\Omega_2\right)\right)\left(k-\tau\right)$$

This is because a financier who acquires information may receive the following signals and returns:

- With probability $\left(\alpha^H\right)^2$, both entrepreneurs are type H. To attract capital, both entrepreneurs offer return of $A^H > g$.
- With probability of $2\alpha^H\alpha^L$, one entrepreneur is type H and the other is type L. The H entrepreneur offers $g > A^L$ and is funded (The L entrepreneur cannot offer g).
- With probability of $\left(\alpha^L\right)^2$, both entrepreneurs are type L and the general technology offers higher return.

Financiers who *do not* acquire information invest either in the close entrepreneur or in the general technology and have expected payoff $g\left(\Omega_2\right)k$. This is because the close entrepreneur is

aware of her alternative investment opportunities and offers at most the return of the general technology. As long as $A^H > g > A^L$, H entrepreneurs receive capital from financiers who do not acquire information. If the close entrepreneur is type L, financiers invest in the general technology.

Then, financiers have no incentive to acquire information (condition (b)) if

$$g(\Omega_2)\, k \geq \left(\left(\alpha^H\right)^2 A^H + \left(1 - \left(\alpha^H\right)^2\right) g(\Omega_2)\right)(k - \tau)$$

which can be rewritten as

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

Financiers have no incentive to fund L entrepreneurs (condition (c)) if $g(\Omega_2) > A^L$.

Hence, an equilibrium in which financiers do not acquire information and fund only close H entrepreneurs exist if

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

Condition (c) implies that financiers close to L entrepreneurs invest in the general technology. At least *some* financiers fund their close H entrepreneurs instead of the general technology. So the capital invested in the general technology is $\Omega_2 = \alpha^L kI + \omega_2$, where $\omega_2 \geq 0$ is the capital invested in the general technology by financiers who are close to H entrepreneurs.

Substituting $\Omega_2 = \alpha^L kI + \omega_2$ into (1) and re-arranging, we obtain:

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

The equilibrium condition under which financiers do not acquire information and fund only the close H entrepreneurs then becomes

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

To establish the upper bound of (3) for kI, first consider $\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H < A^L$. Then $\frac{g^{-1}\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H\right)}{\alpha^L} > \frac{g^{-1}\left(A^L\right)}{\alpha^L}$. So (3) becomes

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

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 $kI < \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau$. Then (3) becomes

$$g^{-1}\left(A^H\right) \leq kI \leq \min\left(\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau, \frac{g^{-1}\left(A^L\right)}{\alpha^L}\right) \tag{4}$$

Next, consider $\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H > A^L$, which is equivalent to $kI > \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau$. Then (3) becomes

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

Note that this implies that the equilibrium with no information acquisition (in Region 2) and the equilibrium with information acquisition (in Region 3) coexist in the interval $\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau \leq kI \leq \frac{g^{-1}\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H\right)}{\alpha^L}$. This interval is well-defined if $\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau < \frac{g^{-1}\left(A^L\right)}{\alpha^L}$, which is equivalent to $A^L < g\left(\frac{\alpha^L I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} + I\tau\right)$.

Region 3. In the equilibrium with information acquisition and only H entrepreneurs funded, only a subset of financiers may find it optimal to acquire information. So the capital invested into the general technology is

$$\Omega_3 = \alpha^L\omega_3 + \left(\alpha^L\right)^2\left(I - \frac{\omega_3}{k}\right)(k-\tau) \tag{5}$$

where $\alpha^L\omega_3$ is the capital invested into the general technology by those financiers who do not acquire information and are close to L entrepreneurs.

Such an equilibrium exists if the following conditions are satisfied: (a) financiers who acquire information and evaluate a distant 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.

The expected payoff from not acquiring information is $g(\Omega_3)k$, as even H entrepreneurs, being aware of financiers' alternative investment opportunities, offer at most g. The expected payoff from acquiring information and funding only H entrepreneurs is $\left(\left(\alpha^H\right)^2 A^H + \left(1-\left(\alpha^H\right)^2\right) g(\Omega_3)\right)(k-\tau)$.

Condition (a) is met if $\left(\left(\alpha^H\right)^2 A^H + \left(1-\left(\alpha^H\right)^2\right) g(\Omega_3)\right)(k-\tau) \geq g(\Omega_3)k$. This inequality can be rewritten as

$$g(\Omega_3) \leq \frac{\left(\alpha^H\right)^2 (k-\tau)}{\tau + \left(\alpha^H\right)^2 (k-\tau)} A^H \tag{6}$$

If the expected payoff from acquiring information and funding only H entrepreneurs is strictly larger (i.e., if inequality (6) is strictly satisfied), all financiers acquire information and $\omega_3 = 0$. If inequality (6) is weakly satisfied, then some but not all financiers acquire information ($\omega_3 > 0$).

Condition (b) holds if

$$g(\Omega_3) > A^L \tag{7}$$

Finally, since $\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)} A^H < A^H$ for any $\tau > 0$, condition (c) is always satisfied.

To characterize Region 3, first consider $\omega_3 > 0$, which implies $g(\Omega_3) = \frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)} A^H$. Inequality (7) can be written as

$$I(k-\tau) > \frac{I\tau A^L}{\left(\alpha^H\right)^2 \left(A^H - A^L\right)} \tag{8}$$

and (5) becomes

$$\Omega_3 = \alpha^L \omega_3 + \left(\alpha^L\right)^2 \left(I - \frac{\omega_3}{k}\right)(k-\tau) = g^{-1}\left(\frac{\left(\alpha^H\right)^2 (k-\tau)}{\tau + \left(\alpha^H\right)^2 (k-\tau)} A^H\right) \tag{9}$$

Equation (9) can be re-written as

$$I(k-\tau) = \frac{g^{-1}\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)} A^H\right) - \left(\alpha^L - \left(\alpha^L\right)^2\left(\frac{k-\tau}{k}\right)\right)\omega_3}{\left(\alpha^L\right)^2} < \frac{g^{-1}\left(\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)} A^H\right)}{\left(\alpha^L\right)^2} \tag{10}$$

for any $\omega_3 > 0$. Thus, combining (8) and (10) we arrive the condition necessary for an equilibrium with information acquisition and funding of only H entrepreneurs:

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

Next, consider $\omega_3 = 0$. In this case, $g\left(\Omega_3\right) < \frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H$, where $\Omega_3 = \left(\alpha^L\right)^2 I\left(k-\tau\right)$. Together with (7), we have

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

which is equivalent to

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

The interval specified in (12) is well-defined for $\frac{\left(\alpha^H\right)^2(k-\tau)}{\tau+\left(\alpha^H\right)^2(k-\tau)}A^H > A^L$, which is equivalent to $I\left(k-\tau\right) > \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)}$.

Combining (12) and (11), (6) and (7) hold for

$$\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)} < I\left(k-\tau\right) < \frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2} \tag{13}$$

This equilibrium exists if 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: $\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)} < \frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2}$, or $A^L < g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2\frac{I\tau A^L}{A^H-A^L}\right)$. Otherwise, the equilibrium with information acquisition and funding of only H entrepreneurs does not exist.

Region 4. We first consider an equilibrium in which financiers do not acquire information and fund close entrepreneurs of either type. Financiers have an incentive to fund close L entrepreneurs if

$$g\left(\alpha^L k I\right) \leq A^L \tag{14}$$

The expected payoff for financiers who acquire information and fund both H or L entrepreneurs is $(k-\tau)\left(\left(\alpha^H\right)^2 A^H + \left(2\alpha^H\alpha^L + \left(\alpha^L\right)^2\right)A^L\right)$. In this case, only when an H entrepreneur is evaluated with another H entrepreneur, a financier is offered return A^H. When an H entrepreneur is evaluated with an L entrepreneur, or two L entrepreneurs are evaluated together, a financier is offered only A^L.

So a financier has no incentive to acquire information if and only if

$$\left(\left(\alpha^H\right)^2 A^H + \left(2\alpha^H\alpha^L + \left(\alpha^L\right)^2\right)A^L\right)(k-\tau) \leq g(\Omega_4)k \tag{15}$$

where Ω_4 is the equilibrium amount of capital invested in the general technology.

Thus, inequality (15) can be written as

$$g(\Omega_4) = \left(\left(\alpha^H\right)^2 A^H + \left(2\alpha^H\alpha^L + \left(\alpha^L\right)^2\right)A^L\right)\left(\frac{k-\tau}{k}\right) \leq A^L$$

which is equivalent to

$$\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)} \geq I\left(k-\tau\right) \tag{16}$$

Combining (14) and (16), this equilibrium exists for

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

as long as the interval $\left[\frac{g^{-1}\left(A^L\right)}{\alpha^L}, \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)} + I\tau\right]$ is well-defined. In turn, the interval is well defined if $A^L > g\left(\frac{\alpha^L I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)} + I\tau\right)$. Thus, if this condition is satisfied, this equilibrium coexists with the "good" equilibrium in which at least some financiers acquire information and fund only H entrepreneurs (Region 3).

Region 5. Consider an equilibrium in which financiers have incentives to acquire information and to fund both H and L entrepreneurs. Financiers have an incentive to acquire information if

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

Additionally, L entrepreneurs must be able to offer at least the return of the general technology. Hence $A^L \geq g(\Omega_4)$.

Financiers who observe two L entrepreneurs are indifferent between investing in the general technology and funding the entrepreneurs if they earn return A^L. The latter condition is satisfied if $kI \geq \frac{g^{-1}(A^L)}{(\alpha^L)^2} + I\tau$. This in turn implies that information acquisition is optimal.

So all financiers acquire information and fund both H and L entrepreneurs if

$$kI > \frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2} + I\tau.$$

■

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

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

Proof. We consider the three regions in Lemma 2 in order.

Region 1. See the proof of Region 1 in Lemma 1.

Region 2. Similarly to the proof of Region 2 in Lemma 1, we establish that financiers do not acquire information and fund only close H entrepreneurs if inequality (3) is satisfied. Like before, if $\frac{(\alpha^H)^2(k-\tau)}{\tau+(\alpha^H)^2(k-\tau)} A^H < A^L$, then $\frac{g^{-1}\left(\max\left(\frac{(\alpha^H)^2(k-\tau)}{\tau+(\alpha^H)^2(k-\tau)} A^H, A^L\right)\right)}{\alpha^L} = \frac{g^{-1}(A^L)}{\alpha^L}$ and $\frac{(\alpha^H)^2(k-\tau)}{\tau+(\alpha^H)^2(k-\tau)} A^H < A^L$ is equivalent to $kI < \frac{I\tau A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau$. Thus, (3) becomes

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

Condition $A^L \geq g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H - A^L}\right)$ implies that $\frac{g^{-1}(A^L)}{\alpha^L} < \frac{I\tau A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau$. Hence the equilibrium in which financiers do not acquire information and fund only close H entrepreneurs

exists for $g^{-1}\left(A^H\right) \leq kI \leq \frac{g^{-1}\left(A^L\right)}{\alpha^L}$.

Region 3. From the proof of Lemma 1, we know that an equilibrium with information acquisition and funding of only H entrepreneurs (Region 3 in Lemma 1) does not exist if $A^L \geq g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H - A^L}\right)$.

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

This equilibrium exists if no financier finds it optimal to deviate by acquiring information and L entrepreneurs can offer g. Formally, this can be written as:

$$\left(\left(\alpha^H\right)^2 A^H + \left(2\alpha^H\alpha^L + \left(\alpha^L\right)^2\right) A^L\right)(k-\tau) \leq g(\Omega_4)k = A^L k,$$

which implies $\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)} \geq I\left(k-\tau\right)$. Hence, the equilibrium in which no information is acquired and all entrepreneurs are funded exists for $\frac{g^{-1}\left(A^L\right)}{\alpha^L} \leq I\left(k-\tau\right) \leq \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)}$. The condition $A^L \geq g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H - A^L}\right)$ ensures the interval is well-defined.

In the second equilibrium, financiers find it optimal to acquire information and fund both H and L entrepreneurs. In particular, L entrepreneurs are funded if $g(\Omega_5) \leq A^L$. Additionally, financiers find it optimal to acquire information if

$$\left(\left(\alpha^H\right)^2 A^H + \left(2\alpha^H\alpha^L + \left(\alpha^L\right)^2\right) A^L\right)(k-\tau) \geq g(\Omega_5)k$$

Together these two conditions imply $I\left(k-\tau\right) \geq \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)}$.

Financiers who acquire information have an incentive to fund L entrepreneurs if $kI \geq \frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2} + I\tau$. Note that condition $A^L \geq g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2 \frac{I\tau A^L}{A^H - A^L}\right)$ implies $\frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2} \leq \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)}$. Therefore this equilibrium exists if $I\left(k-\tau\right) \geq \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)}$. In equilibrium, all financiers acquire information. ■

It follows readily that from Region 3 of Lemma 1, we obtain Proposition 2. From Region 5 of Lemma 1 and Region 3 of Lemma 2, we obtain Proposition 3. This completes the proof of Propositions 2 and 3.■

D Proof of Propositions 4 and 5

The proofs follow readily from the discussion in the text.■

E Proof of Corollary 3

First, recall that early markets emerge only if $\left(\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)} < \frac{g^{-1}(A^L)}{(\alpha^L)^2}\right)$ and $\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau < kI < \frac{g^{-1}(A^L)}{(\alpha^L)^2}+I\tau$. We want to show that under these conditions H entrepreneurs always prefer favoritism to early markets if $\alpha^H \geq \frac{1}{2}$.

In order to compare the payoffs of H entrepreneurs under favoritism and early markets for intermediate levels of capital, we need to establish the relevant entrepreneurs' payoffs under early markets and favoritism. These in turn depend on which types of entrepreneurs receive funding.

Case A If $\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau < \frac{g^{-1}(A^L)}{\alpha^L} < \frac{g^{-1}(A^L)}{(\alpha^L)^2}+I\tau$, then

A.1 For $\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau < kI < \frac{g^{-1}(A^L)}{\alpha^L}$, financiers do not acquire information and fund only H entrepreneurs under favoritism, and at least some of them acquire information and fund only H entrepreneurs under early markets;

A.2 For $\frac{g^{-1}(A^L)}{\alpha^L} < kI < \frac{g^{-1}(A^L)}{(\alpha^L)^2}+I\tau$, financiers do not acquire information and fund both H and L entrepreneurs under favoritism, and at least some financiers acquire information and fund only H entrepreneurs under early markets.

Case B If $\frac{g^{-1}(A^L)}{\alpha^L} < \frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau < \frac{g^{-1}(A^L)}{(\alpha^L)^2}+I\tau$, then for $\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau < kI < \frac{g^{-1}(A^L)}{(\alpha^L)^2}+I\tau$, financiers do not acquire information and fund H and L under favoritism, and at least some financiers acquire information and fund only H entrepreneurs under early markets.

Notice that H entrepreneurs' payoffs under favoritism and early markets in Case B are the same as their payoffs in A.2 of Case A. So we need to consider only two cases.

First, we compare entrepreneurs' payoffs under early markets with payoffs under favoritism when only H entrepreneurs are funded. In this case, the capital invested in the general technology is $\Omega_1 = \alpha^L k+\omega_1$. From the proof of Proposition 2, we know that if $\omega_1 > 0$, $g(\Omega_1) = A^H$ implies that entrepreneurs' rent and therefore their payoff is zero. Clearly, when financiers acquire information

and fund only H entrepreneurs, $\Omega_3 < \Omega_1$ for any level of kI. This implies that $g(\Omega_3) \geq A^H$. It cannot be individually rational for a financier to acquire information if $\omega_1 > 0$ under favoritism (in the equilibrium in which financiers are assumed not to acquire information.) Hence, we only have to consider $\omega_1 = 0$. H entrepreneurs' expected payoff under favoritism that is relevant for our comparison is $\left(A^H - g\left(kI\alpha^L\right)\right)\frac{kI}{N}$.

When some financiers acquire information and only H entrepreneurs are funded, H entrepreneurs expect to receive a positive rent, $A^H - g\left(\Omega_3\right)$, with probability 1 for attracting capital from financiers who do not acquire information, and with probability α^L for attracting capital from financiers who acquire information. H entrepreneurs can attract capital $\frac{\omega_3}{N}$ from financiers who do not acquire information and $\frac{(k-\tau)\left(I-\frac{\omega_3}{k}\right)}{\frac{N}{2}}$ from financiers who acquire information but observe an L entrepreneur. The 2 at the denominator takes into account that when some financiers acquire information the world is segmented in $\frac{N}{2}$ markets.

Thus, favoritism is preferred to early markets if $\left(A^H - g\left(\Omega_3\right)\right)\left(\frac{2(k-\tau)\left(I-\frac{\omega_3}{k}\right)\left(1-\alpha^H\right)}{N} + \frac{\omega_3}{N}\right) \leq \left(A^H - g\left(kI\alpha^L\right)\right)\frac{kI}{N}$, which is equivalent to

$$\left(\frac{A^H - g\left(\Omega_3\right)}{A^H - g\left(kI\alpha^L\right)}\right)\left(\frac{2\left(k-\tau\right)\left(I-\frac{\omega_3}{k}\right)\left(1-\alpha^H\right)+\omega_3}{kI}\right) \leq 1$$

Note that $g\left(\Omega_3\right) \geq g\left(kI\alpha^L\right)$ as $\Omega_3 = \alpha^L\omega_3 + \left(\alpha^L\right)^2\left(I-\frac{\omega_3}{k}\right)(k-\tau) \leq kI\alpha^L$. The first term is always less than 1. Also, $2\left(k-\tau\right)\left(I-\frac{\omega_3}{k}\right)\left(1-\alpha^H\right)+\omega_3 < kI$ can be rewritten as $2\left(1-\alpha^H\right)(k-\tau)\left(I-\frac{\omega_3}{k}\right) < k\left(I-\frac{\omega_3}{k}\right)$, which is always satisfied if $\alpha^H \geq \frac{1}{2}$. This implies that if $\alpha^H \geq \frac{1}{2}$, favoritism is always preferred to early markets.

Next, consider the case in which only H entrepreneurs are funded under early markets but both H and L are funded under favoritism. H entrepreneurs' expected payoff under favoritism is $\left(A^H - A^L\right)\frac{kI}{N}$. So favoritism is preferred to early markets if $\left(A^H - g\left(\Omega_3\right)\right)\left(\frac{2(k-\tau)\left(I-\frac{\omega_3}{k}\right)\left(1-\alpha^H\right)}{N} + \frac{\omega_3}{N}\right) \leq \left(A^H - A^L\right)\frac{kI}{N}$, which is equivalent to

$$\left(\frac{A^H - g\left(\Omega_3\right)}{A^H - A^L}\right)\left(\frac{2\left(k-\tau\right)\left(I-\frac{\omega_3}{k}\right)\left(1-\alpha^H\right)+\omega_3}{kI}\right) \leq 1$$

H entrepreneurs always prefer favoritism over early markets as each of the components on the left hand side of the inequality is less than one if $\alpha^H \geq \frac{1}{2}$.■

F Proof of Corollary 4

Financiers acquire information and fund both H and L entrepreneurs under two different parameters' configurations. In either case, H and L entrepreneurs are funded under both favoritism and late markets.

First, consider $\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)} > \frac{g^{-1}\left(A^L\right)}{(\alpha^L)^2}$. In this case, financiers acquire information and fund both H and L entrepreneurs if $kI > \frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)} + I\tau$. An H entrepreneur's rent per unit of capital under favoritism is $A^H - A^L$. Under late markets, his rent per capital is $\alpha^L\left(A^H - A^L\right)$ because it is positive only when he is evaluated with an L entrepreneur; when he is evaluated with another H entrepreneur, competition for capital drives his rent to zero.

H entrepreneurs can invest $\frac{kI}{N}$ under favoritism, and $\frac{2(k-\tau)I}{N}$ under late markets if they happen to be evaluated with an L entrepreneur. The expected payoff is then $\left(A^H - A^L\right)\frac{kI}{N}$ under favoritism, and $\alpha^L\left(A^H - A^L\right)\frac{2(k-\tau)I}{N}$ under late markets. So an H entrepreneur's expected payoff under late markets is greater than his payoff under favoritism if and only if $\alpha^L\left(A^H - A^L\right)\frac{2(k-\tau)I}{N} \geq \left(A^H - A^L\right)\frac{kI}{N}$. That is, $\alpha^L \geq \frac{k}{2(k-\tau)}$.

Note that $\alpha^L \geq \frac{k}{2(k-\tau)}$ can be re-written as $kI \geq \frac{2\alpha^L}{2\alpha^L-1}I\tau$. Together with the constraint of information acquisition, an H entrepreneur prefers late markets over favoritism if

$$kI \geq \max\left(\frac{2\alpha^L}{2\alpha^L-1}I\tau, \frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H - A^L\right)} + I\tau\right) \tag{17}$$

Now, consider $\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)} \leq \frac{g^{-1}\left(A^L\right)}{(\alpha^L)^2}$. As above, H entrepreneurs' expected payoffs are $\left(A^H - A^L\right)\frac{kI}{N}$ under favoritism and is $\alpha^L\left(A^H - A^L\right)\frac{2(k-\tau)I}{N}$ under late markets. So an H entrepreneur prefers late markets over favoritism if and only if $kI \geq \frac{2\alpha^L}{2\alpha^L-1}I\tau$. Together with the condition for information acquisition, this implies

$$kI \geq \max\left(\frac{2\alpha^L}{2\alpha^L-1}I\tau, \frac{g^{-1}\left(A^L\right)}{\left(\alpha^L\right)^2} + I\tau\right) \tag{18}$$

Combining inequalities (17) and (18), we obtain Corollary 4.■

G Proof of Proposition 6

If all financiers acquire information, H entrepreneurs' expected rent per unit of investment is $\alpha^L\left(A^H - g\left(\Omega_3\right)\right)$ or $\alpha^L\left(A^H - A^L\right)$ depending on the level of capital in the economy. From the proof of Proposition 2 we know that if all financiers acquire information, $\omega_3 = 0$ and $\Omega_3 = \left(1-\alpha^H\right)^2 I\left(k-\tau\right)$. Clearly, $g\left(\Omega_3\right)$ increases in α^H. So H entrepreneurs' rent per unit of capital invested is decreasing in α^H. The capital allocated to an H entrepreneur in the state of the world in which the rent is expected to be positive is $\left(\frac{2(k-\tau)I\left(1-\alpha^H\right)}{N}\right)$, which is decreasing in α^H.

To summarize, when all financiers acquire information the capital received by an H entrepreneur is decreasing, while the rent per unit of capital invested is either decreasing or unaffected by α^H. If α^H increases, H entrepreneurs receive less capital and keep smaller rent per unit of capital invested, their payoff clearly decreases in α^H.■

H Proof of Proposition 7

In equilibrium, there is under-investment in information acquisition if information acquisition would increase the aggregate output but favoritism prevails.

Let $M \leq I$ be the number of financiers who acquire information. First, consider $kI < \frac{g^{-1}(A^L)}{\alpha^L}$. Under favoritism, financiers who are close to an L entrepreneur invest in the general technology (Case A of Figure 1), which generates an average return of $g\left(\alpha^L kI\right)$. Under early markets, financiers who are close to an L entrepreneur and who, by acquiring information, identify an H entrepreneur can invest in a project with average productivity A^H instead of $g\left(\alpha^L kI\right)$. Hence, the social gain from information acquisition is $\left(\alpha^L kM\right)\alpha^H(A^H - g\left(\alpha^L kI\right))$. Since the aggregate cost of information acquisition is τM, information acquisition enhances social welfare if and only if $\left(\alpha^L k\right)\alpha^H\left(A^H - g\left(\alpha^L kI\right)\right) > \tau$, or

$$k > \frac{\tau}{\alpha^L\alpha^H\left(A^H - g\left(\alpha^L kI\right)\right)} \tag{19}$$

In Case B of Figure 1 $\left(A^L \leq g\left(\frac{\alpha^L}{(\alpha^H)^2}\frac{\tau I A^L}{A^H - A^L} + \alpha^L\tau I\right)\right)$, favoritism is an equilibrium for $g^{-1}(A^H) < kI < \frac{I\tau A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau$. Hence, condition (19) is satisfied and under-investment in information

acquisition occurs if

$$\frac{I\tau}{\alpha^L\alpha^H\left(A^H-g\left(\alpha^L kI\right)\right)}<\frac{I\tau A^L}{\left(\alpha^H\right)^2\left(A^H-A^L\right)}+I\tau. \tag{20}$$

Note that $A^L \leq g\left(\frac{\alpha^L}{(\alpha^H)^2}\frac{\tau I A^L}{A^H-A^L}+\alpha^L\tau I\right)$ can be written as $\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau \leq \frac{g^{-1}(A^L)}{\alpha^L}$. (20) is equivalent to

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

In Cases C and D of Figure 1 $\left(g\left(\frac{\alpha^L}{(\alpha^H)^2}\frac{\tau I A^L}{A^H-A^L}+\alpha^L\tau I\right)<A^L\right)$, favoritism is an equilibrium for $g^{-1}(A^H)<kI<\frac{g^{-1}(A^L)}{\alpha^L}$. Hence, condition (19) is satisfied and under-investment in information acquisition occurs if

$$\frac{\tau I}{\alpha^L\alpha^H\left(A^H-g\left(\alpha^L kI\right)\right)}<\frac{g^{-1}(A^L)}{\alpha^L} \tag{21}$$

Note that $g\left(\frac{\alpha^L}{(\alpha^H)^2}\frac{\tau I A^L}{A^H-A^L}+\alpha^L\tau I\right)<A^L$ can be written as $\frac{g^{-1}(A^L)}{\alpha^L}<\frac{I\tau A^L}{(\alpha^H)^2(A^H-A^L)}+I\tau$. (21) is equivalent to

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

This proves the first part of Proposition 7.

Next, consider $kI>\frac{g^{-1}(A^L)}{\alpha^L}$. Under favoritism, financiers who are close to L entrepreneurs fund the L entrepreneurs (Case A of Figure 1). The average productivity of their investment is A^L. Under early markets, some financiers who are close to L entrepreneurs are able to fund H entrepreneurs. The social gain due to financiers' information acquisition is therefore $\left(\alpha^L kM\right)\alpha^H(A^H-A^L)$. Since the aggregate cost of information acquisition is τM, information acquisition improves social welfare if and only if $\left(\alpha^L k\right)\alpha^H(A^H-A^L)>\tau$, or

$$kI>\frac{\tau I}{\alpha^L\alpha^H(A^H-A^L)} \tag{22}$$

Nevertheless, in Cases C and D of Figure 1 $\left(g\left(\frac{\alpha^L}{(\alpha^H)^2}\frac{\tau I A^L}{A^H-A^L}+\alpha^L\tau I\right)<A^L\right)$, favoritism is an

equilibrium for $\frac{g^{-1}(A^L)}{\alpha^L} < kI < \frac{\tau I A^L}{(\alpha^H)^2(A^H - A^L)} + I\tau$. Hence, there is under-investment in information acquisition if

$$\frac{\tau I}{\alpha^L \alpha^H (A^H - A^L)} < \frac{\tau I A^L}{(\alpha^H)^2 (A^H - A^L)} + I\tau$$

This proves the second part of Proposition 7.■

I Proof of Proposition 8

First, consider $kI < \frac{g^{-1}(A^L)}{\alpha^L}$. The social gain and cost of information acquisition are computed as in the proof of Proposition 7. It is straightforward to conclude that information acquisition *reduces* social welfare if and only if

$$k < \frac{\tau}{\alpha^L \alpha^H \left(A^H - g\left(\alpha^L kI\right)\right)} \tag{23}$$

In Case B of Figure 1, financiers acquire information and fund H entrepreneurs in equilibrium if $\frac{\tau I A^L}{(\alpha^H)^2(A^H - A^L)} + \tau I < kI < \frac{g^{-1}\left(A^L\right)}{\alpha^L}$.[15] Hence, condition (23) is satisfied and in equilibrium over-investment in information acquisition occurs if

$$\frac{\tau I A^L}{\left(\alpha^H\right)^2 \left(A^H - A^L\right)} + \tau I < \min\left(\frac{\tau I}{\alpha^L \alpha^H \left(A^H - g\left(\alpha^L kI\right)\right)}, \frac{g^{-1}\left(A^L\right)}{\alpha^L}\right) \tag{24}$$

This proves the first part of Proposition 8.

Next, consider $kI > \frac{g^{-1}\left(A^L\right)}{\alpha^L}$. Following the same reasoning of Proposition 7, we obtain that information acquisition *reduces* social welfare if and only if

$$k < \frac{\tau}{\alpha^L \alpha^H (A^H - A^L)} \tag{25}$$

In Cases B and C of Figure 1, financiers acquire information and fund only H entrepreneurs for $\frac{\tau I A^L}{(\alpha^H)^2(A^H - A^L)} + \tau I < kI < \frac{g^{-1}\left(A^L\right)}{(\alpha^L)^2} + \tau I$. Hence, there is over-investment in information acquisition

[15] Note that for $kI < \frac{g^{-1}(A^L)}{\alpha^L}$ there is no information acquisition in Cases C and D of Figure 1.

for $kI > \frac{g^{-1}\left(A^L\right)}{\alpha^L}$ if

$$\frac{\tau I}{\alpha^L \alpha^H (A^H - A^L)} > \max\left(\frac{\tau I A^L}{(\alpha^H)^2 (A^H - A^L)} + \tau I, \frac{g^{-1}\left(A^L\right)}{\alpha^L}\right). \tag{26}$$

Additionally, (25) may be satisfied in late markets when financiers acquire information and fund both H and L entrepreneurs (Cases B, C, and D of Figure 1). This is the case if either

$$\frac{\tau I A^L}{(\alpha^H)^2 (A^H - A^L)} + I\tau < \frac{g^{-1}\left(A^L\right)}{(\alpha^L)^2} + I\tau < kI < \frac{\tau I}{\alpha^L \alpha^H (A^H - A^L)} \tag{27}$$

or

$$\frac{g^{-1}\left(A^L\right)}{(\alpha^L)^2} + I\tau \leq \frac{\tau I A^L}{(\alpha^H)^2 (A^H - A^L)} + I\tau \leq kI < \frac{\tau I}{\alpha^L \alpha^H (A^H - A^L)} \tag{28}$$

are satisfied. This implies

$$\max\left(\frac{\tau I A^L}{(\alpha^H)^2 (A^H - A^L)} + I\tau, \frac{g^{-1}\left(A^L\right)}{(\alpha^L)^2} + I\tau\right) < \frac{\tau I}{\alpha^L \alpha^H (A^H - A^L)} \tag{29}$$

Further, (29) implies $kI > \frac{g^{-1}\left(A^L\right)}{\alpha^L}$. Then (26), (27), (28), and (29) suggest that when $\frac{g^{-1}\left(A^L\right)}{\alpha^L} < kI < \frac{\tau I}{\alpha^L \alpha^H (A^H - A^L)}$, there is over-investment in information acquisition if (29) is satisfied. This proves the second part of Proposition 8.■

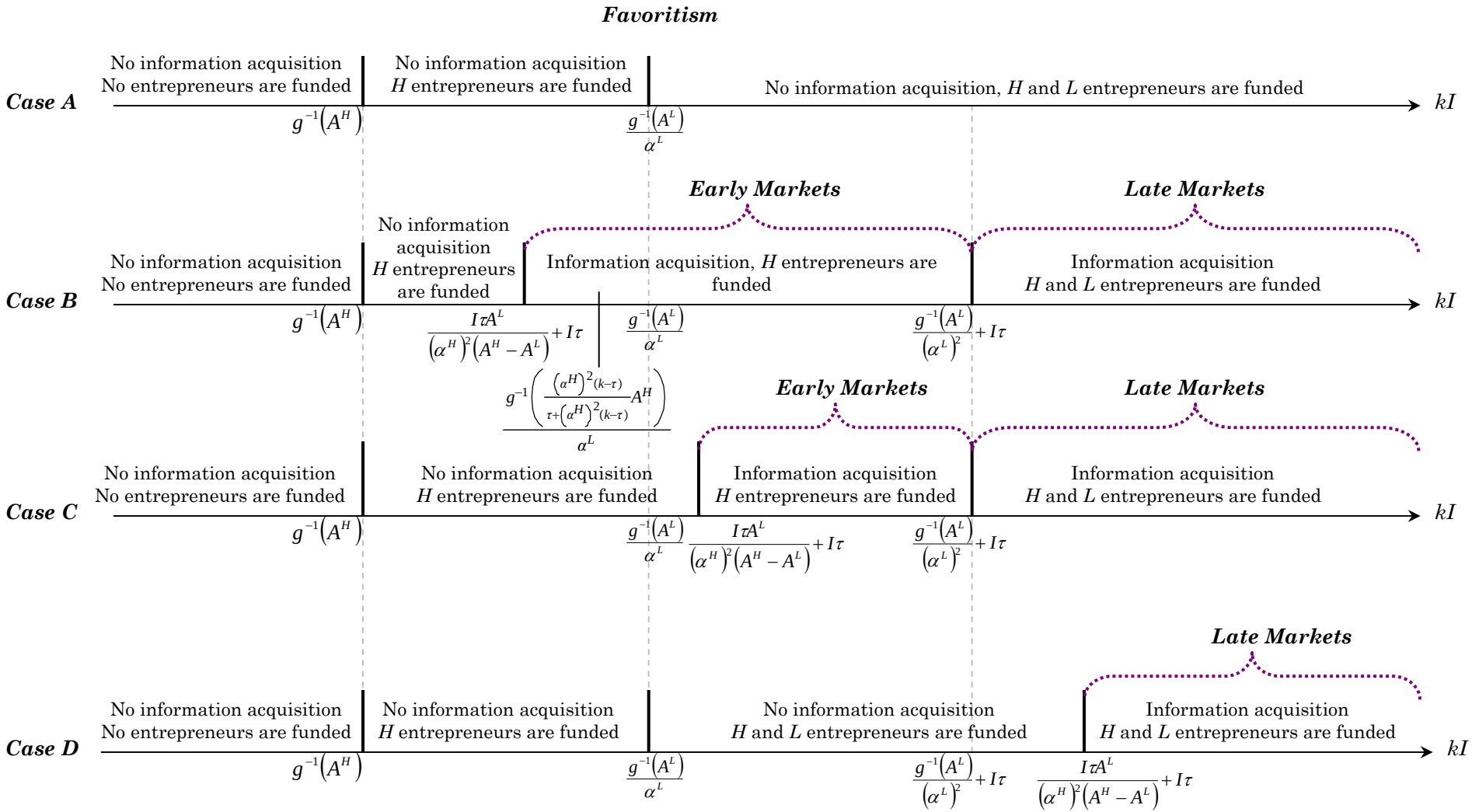


Figure 1.
The figure describes the equilibria for different levels of initial capital (kI). Case A assumes favoritism. Case B refers to $A^L \leq g\left(\frac{\alpha^L}{(\alpha^H)^2}\frac{I\tau A^L}{A^H-A^L}+\alpha^L I\tau\right)$ Case C refers to $g\left(\frac{\alpha^L}{(\alpha^H)^2}\frac{I\tau A^L}{A^H-A^L}+\alpha^L I\tau\right)<A^L<g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2\frac{I\tau A^L}{A^H-A^L}\right)$ and Case D refers to $A^L \geq g\left(\left(\frac{\alpha^L}{\alpha^H}\right)^2\frac{I\tau A^L}{A^H-A^L}\right)$

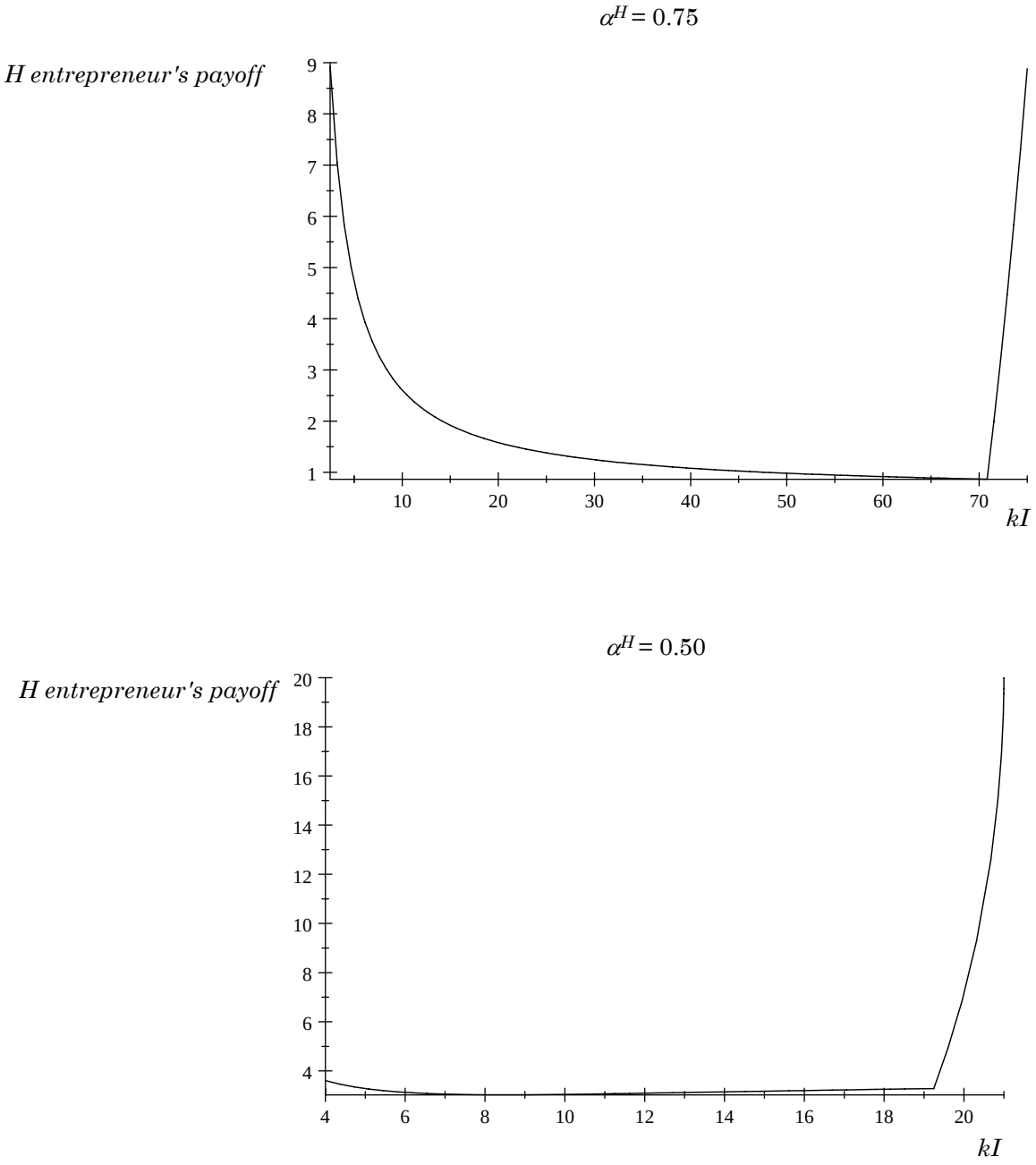
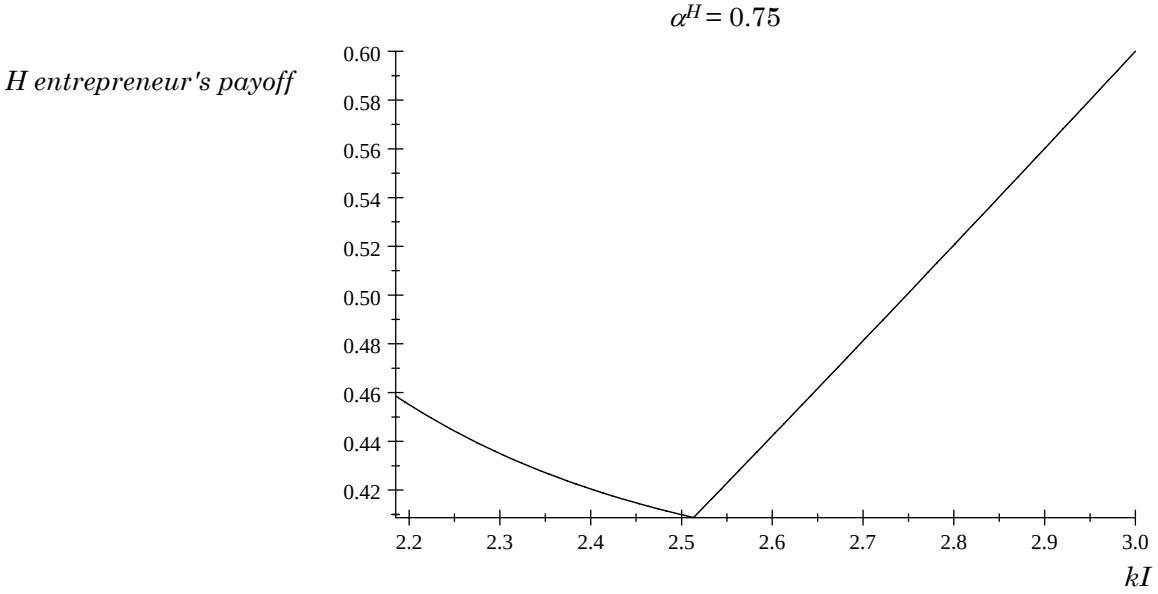
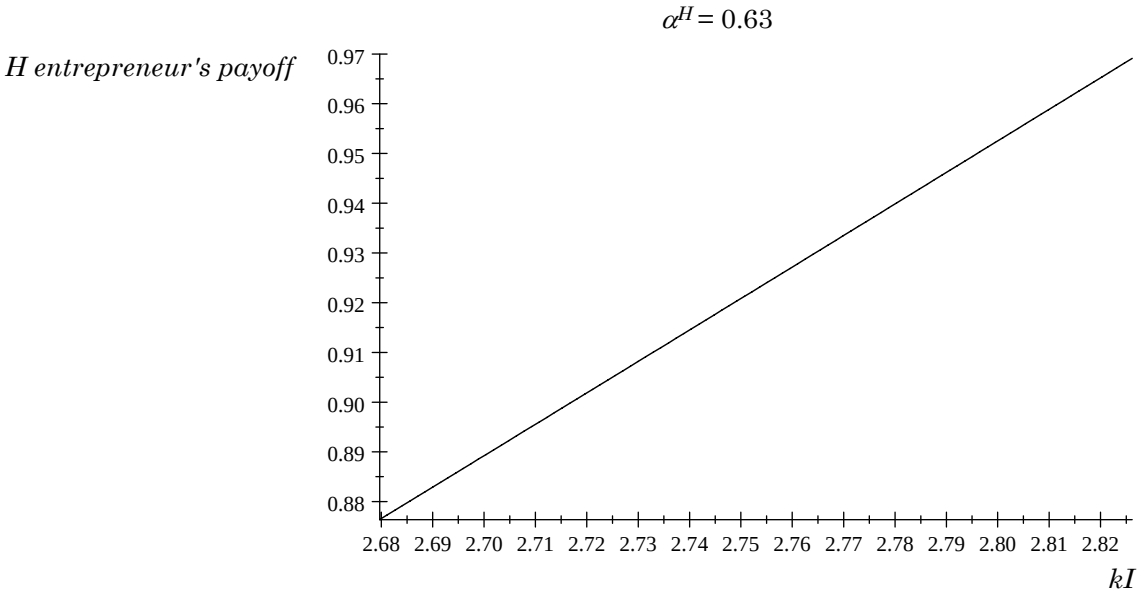


Figure 2. *H* entrepreneur's payoff in early markets
We represent an *H* entrepreneur's expected payoff in early markets as a function of the initial capital (*kI*).
Panel A
We make the following assumptions on functional forms and parameters: $g(\omega) = (100 - \omega^2)^{0.5}$, $A^H = 5$, $A^L = 2$, $N = 10$, and $I = 2$.





Panel B

We make the following assumptions on functional forms and parameters: $g(\omega) = \omega^{0.5}$. $A^H = 5$, $A^L = 2$, $N = 10$, and $I = 2$.