Making Partner: How it Influences Business Risk Strategy and Execution Effort

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Abstract

Associates need reputation and financial resources to make partner at law firms, consultancies or venture capital organizations. We provide a theory for how the prospect of making partner influences the business risk they take and their execution effort. In our model, business risk affects (i) how reputation evolves and (ii) the benchmark reputation for making partner through the impact of execution effort on the financial resources accumulated. Our work invalidates some intuitions. We show good-reputation professionals can take on high business risk to protect their reputation; the prospect of making partner can decrease effort incentives; the fact that business risk strategies are observable does not necessarily change behavior.

Key words: Career Concerns, Risk, Reputation, Entrepreneurship

JEL codes: D83, L14, L26, G30

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1 Introduction

Partnerships have long been playing a major role in the economy. They represent a prominent form of organization for most professional services (e.g., law, architecture, accounting, advertising and consulting firms, medical practices, venture capital and buy-out organizations) and used to be dominant among investment banks until the 1980s.[1] The partnership form allows organizations to assemble (Gaynor and Gertler, 1995; Lang and Gordon, 1995; Levin and Tadelis, 2005), motivate (Alchian and Demsetz, 1972), and employ to their most efficient use (Garicano and Santos, 2004) a unique pool of high-skilled resources in human-capital-intensive sectors.

At the partner level, "rainmaking" ability, that is, the ability to originate worthwhile clients and source worthwhile deals is essential. Thus, below-partners employees (associates) are tested on this dimension before they can make partner. This gives them a great deal of autonomy in terms of clients or patients to serve, cases to handle, projects to realize, investments to undertake, etc. In particular, they can choose more versus less risky cases, projects or investments. Another feature of partnerships is that promotion to partner level goes hand in hand with a change in compensation structure and level: Associates earn wages; partners are residual claimants of the cash flows they generate, and there is a pay gap since partners access a more efficient production technology. To illustrate, at U.S. law firms, the compensation of associates (and non-equity partners) rises from \$340,0000 to \$980,000 when they make equity partners according to BCG Attorney Search (2014).

In this paper, we examine the consequences of associate autonomy on the one hand and pay change upon promotion on the other hand on two important dimensions of associates' job: Choosing a business risk strategy in their area of expertise and exerting subsequent execution

[1] Salomon Brothers, Lehman Brothers, Bear Stearns, Dean Witter and Morgan Stanley sold their partnerships between 1981 and 1986. Goldman Sachs (in 1999) was the latest leading investment bank to go public.

effort.[2]

A career concerns model allows us to embed these features in a simple framework. Specifically, we modify the canonical model of Holmström (1999, part I: page 170 to 177) along two dimensions. In the canonical model, risk-neutral agents whose real talent is incompletely known to themselves and the labor market exert unobservable costly effort, period after period.[3] Their output is the sum of actual talent, effort, and a random shock. In each period, agents receive a wage equal to their expected output (in monetary value).[4] They exert effort to gain a better reputation, which translates into higher wages in the next period. In our model, before exerting effort, associates choose the risk profile of their activity. We consider two strategies: Taking on high business risk or low business risk. High business risk increases the variance, but not the expectation of the shock to the firm's output. Also in our two-period model, we introduce the opportunity to make partner in the second period. Partners' output depends on actual talent and behavior.

We focus on the case in which the financial investment required to make partner exceeds the associate's personal wealth.[5] Thus, because of moral hazard the would-be partner is faced with a credit constraint. Both financial capital and reputation help alleviate this constraint. Financial capital reduces the amount to be borrowed from financiers. Reputation, because it is correlated with talent, increases expected profits, and thus also reduces the bite of moral hazard. It leads

[2] For instance, venture capitalists choose to invest in early versus later-stage firms (i.e., a business risk strategy) before deciding how much resources to spend on providing portolio firms with advice, contacts, etc. (i.e., execution effort).

[3] Associates are under the scrutiny of their peers, partners, headhunters, and sometimes the specialized press. Thus, there is common—although imperfect—information about their talent.

[4] In practice, associates' compensation is not formally tied to realized performance through equity-like claims. The bonus they receive is considered for its most important part as a compensation that remains identical from one year to the next.

[5] In practice, to buy a stake in the partnership, years of cumulated wages are necessary. The financial contribution from a new equity partner is viewed as a commitment to be diligent. This "skin in the game" pattern reflects the moral hazard problem facing partners (i.e., they can indulge in pursuing personal objectives).

the associate to optimize his strategy along these two dimensions.

Beforehand, we need to determine whether the associate prefers reputation status quo or revision. To do so, note that business risk affects the associate's financial capital because, in equilibrium, low business risk implies that markets will use observed output to a larger extent to revise reputation. Intuitively, output is then less a matter of luck, and thus a more precise measure of talent. This motivates the associate to work hard in order to make a good impression. Hence, taking on low business risk increases expected output, and thus the wage earned. This augments the financial resources available for making partner and in turn decreases the reputation needed.

The consequence is the existence of two reputation thresholds—rather than one in the case of standard promotions: A lower one if the low business risk strategy is followed in equilibrium and a higher one if otherwise. Accordingly, associates whose initial reputation is above (respectively, below) the two thresholds will (respectively, will not) make partner if they keep that reputation. Associates whose initial reputation is in between the two thresholds and who keep that reputation will make partner if in equilibrium they choose the low business risk strategy in the first period, but will not if they choose the high business risk strategy.

What strategy is followed? Suppose first that the strategy is not observable. Holding fixed the extent to which markets use output to revise reputation, taking on low business risk *reduces* the variance of the distribution of posterior reputation since the variance of the output distribution is smaller. It benefits associates looking for reputation status quo. Hence, when reputation is high, only a low business risk equilibrium is possible. The symmetric argument implies that lower-reputation associates looking for reputation revision take on high business risk in equilibrium. Also for the same reason, there are two equilibrium candidates for associates of intermediate reputation. Competition in the labor market pushes firms to maximize the associates' intertemporal utility. We show that they offer a wage which induces the low business risk equilibrium. To summarize, when strategies are not observable, lower-reputation associates take on high business risk, whereas intermediate-to-higher reputation associates take on low business risk.

Suppose now that the strategy is observable. Now taking on low busines overall *increases* the variance of the distribution of posterior reputation in equilibrium. Indeed, markets use first-period output to a larger extent to revise reputation. This effect more than balances the fact that taking on low business risk reduces the variance of the output distribution. Also, a second factor, that is, the cost of effort affects the associate's decision. The associate must exert the effort expected of him given the strategy he actually pursues. Thus, taking on low business risk raises the cost of effort born by the associate.

Thus, in equilibrium, higher-reputation associates take on high business risk both to limit reputation revision and save on effort costs. Associates whose reputation is such that the probability of making partner is low whatever the business risk they take on high business risk since what they economize on effort costs more than balances the expected lack of reputation revision. Finally, intermediate-reputation associates face a trade-off between maximizing the probability of making partner and saving on effort costs. We show that although the two business risk strategies are equilibrium candidates, the low business risk strategy again maximizes the associate's intertemporal utility. To summarize, when strategies are observable, lower- and higher-reputation associates take on high business risk, whereas intermediate-reputation associates take on low business risk.

Overall, this work invalidates some intuitions. The fact that the best-reputation associates can take on high risk contrasts with the conventional wisdom in the sport fields that laggards choose riskier strategies than leaders at an interim period. In our framework, "leaders", that is, associates whose initial reputation is such that they are quite likely to maker partner, follow the high business risk strategy when strategies are observable.

Also, one could expect that the trend towards greater transparency in the labor market, thanks to new technology, professional social networks such as LinkedIn, etc., would change associate behavior. Though we obtain that choices can be reversed as one goes from unobservable strategies to observable strategies for higher-reputation associates, this result does not hold true in general. For instance, poor-reputation associates take on high business risk whether the strategy is observable or not.

Finally, some associates exert less effort when confronted with the prospect of becoming partners than when this prospect is absent. In particular, associates who are almost sure to make partner have little incentive to exert effort during their employment period since their next-period compensation does not depend on the conjecture the labor market forms about their talent (i.e., the structure of compensation changes between the associate and partner levels).

The risk-and-effort issue we consider here differs from previous research for two reasons. It has long been recognized that the non-linearities of and discontinuities in compensation schemes created by firms' use of explicit incentive instruments such as bonus contracts can lead to distorted risk and/or effort choices (see, e.g. Jensen, 2003, for a discussion). Here in contrast, the prospect of making partner—an intrinsic feature of partnerships—creates implicit incentives which derive from labor market forces alone. Also, this paper is by no means the first to study distortions in the behavior of agents facing promotions. However, in our context associates need both reputation and financial resources to achieve their objective—in contrast to managers obtaining a standard promotion where reputation alone matters.

By studying behavior at the below-partner level, our paper relates to that of Morrison and Wilhelm (2004, 2008) and Bar-Issac (2007) who examine the interaction between partners and junior professionals. Morrison and Wilhelm (2004, 2008) argue that a partnership allows partners to commit to provide junior professionals with adequate mentoring since the former need to sell their stakes to the latter at the highest possible price to capitalize on their past effort to develop the firm. Bar-Issac (2007) argues that the partnership structure allows senior partners of established reputation to commit to hard work by forming a team with junior associates of unproven quality. We complement their analyses by acknowledging that associates choose their cases, projects and clients, and that this choice also impacts on their diligence.

By relating business risk to output precision, the present paper belongs to the strand of the career concerns literature which studies how agents manipulate information accuracy to obtain a better compensation.[6] Our paper is most closely related to research which studies agents who choose the risk of the project they realize (Hermalin, 1993; Holmström, 1999). However, it differs for three reasons. First, the present paper examines the interaction between risk and effort. Second, we do not posit risk aversion. Third, agents not only take care of their reputation but also of their financial resources. The only theory paper we are aware of which studies entrepreneurial objectives in a career concern framework is that of Loss and Renucci (2013). However, in their framework agents choose their employer (one who makes the talent of agents transparent versus one who does not). Thus, agents commit to a given, observable transparency level. We complement their analysis by considering that the choice of output precision can occur after being hired so that there is no commitment, and that this choice can

[6] Different strategies are studied: Avoiding to undertake projects that would deliver information about talent (Holmström and Ricart I Costa, 1986), over-reacting or under-reacting to new information when making investment decisions (Prendergast and Stole, 1996), herding (Scharfstein and Stein, 1990), hedging (DeMarzo and Duffie, 1995; Breeden and Viswanathan, 1998), and selecting the accuracy of the screening procedures (Carillo, 2003).

be non-observable.

Finally, by comparing risk-taking decisions of agents whose relative chances to obtain a substantial rise in revenue differ, the paper relates to the tournament literature.[7] It shares with Hvide's (2002) research that agents who take higher risk exert lower effort, but for different reasons. In Hvide's (2002) paper—where there is no uncertainty regarding talent—effort has little impact on outcome when the risk taken is high, whereas here markets then use output to a lesser extent to revise reputation. Keeping in mind that we ignore interactions between competing agents here, our results contrast with the standard conclusion of the tournament literature that laggards take more risk than leaders at an interim period (Brown et al., 1996; Chevalier and Ellison, 1997).[8]

The rest of the paper proceeds as follows. Section 2 presents the model. Section 3 characterizes the conditions under which an associate makes partner. Section 4 examines the associate's choice of strategy. Section 5 discusses the results. Section 6 concludes. Proofs are in the Appendix.

2 The Model

We consider a two-period setting. In the first period, agents work as associates (i.e., employees). At the beginning of the second period, partner positions are available. The labor and capital markets are competitive. There is no discounting of the future. Everybody is risk neutral. In the following, we focus on a representative agent.

[7] Different contexts are examined: The mutual fund industry (Brown et al., 1996; Chevalier and Ellison, 1997; Hvide, 2002), R&D competition (Cabral, 2003; Axelson and Cabral, 2007), and sports.

[8] As for the race for innovation between firms (Cabral, 2003; Anderson and Cabral, 2007), the same result holds true in the general case, but other equilibria can exist under very specific assumptions (see the discussion in Section 5).

2.1 The Agent

The agent has zero financial wealth at the beginning of the first period. The agent's talent θ is unknown to all parties (including the agent). However, it is common knowledge that θ is normally distributed with mean m (i.e., initial reputation) and variance σ_θ^2. The assessment about the mean and dispersion of θ is updated at the end of the first period to account for new information.

When working as an associate, the agent receives a wage equal to his expected output. This wage is fixed at the beginning of the period and saved. The agent prefers working as an associate rather than being jobless since being jobless yields $-\infty$.

When making partner, the agent becomes residual claimant of the cash flows. Making partner requires a financial investment I. Partners are protected by limited liability.[9]

2.2 Output

Output as an associate is

$$\pi(\theta, r, e) = \theta + r + e, \text{ where} \tag{1}$$

- r results from the choice of business risk strategy $s \in \{L, H\}$ by the associate. Specifically, r is drawn from a normal distribution of mean 0 and variance σ_L^2 if taking on low business risk or variance σ_H^2 $(> \sigma_L^2)$ if taking on high business risk. We allow the choice of strategy to be unobservable (section 4.1) or observable (section 4.2).

- e is the unobservable effort exerted by the associate to execute the strategy. The cost of effort is $\psi(e) = \frac{k}{2}(e)^2$.

Output as an associate is observable but not contractible.

[9] This is a simplifying assumption to reflect that even before the introduction of Limited Liability Partnerships in 1991, partners were able to purchase liability insurance.

Output as a partner reflects the additional productivity Δ that comes with a higher position in the hierarchy, together with the different nature of the job. Specifically, output is

$$\Pi(\theta, \Delta) = \theta + \Delta \tag{2}$$

if the partner is successful. The probability that the partner be successful is 1 if the partner "behaves", that is, efficiently allocates his time across different tasks. This probability is 0 if the partner shirks. Then, the partner enjoys a private benefit, whose monetary equivalent is B. Output is 0 if the partner is unsuccessful. The output generated by a partner takes the form of cash flows. Cash flows are contractible.

2.3 Additional Assumptions

We are interested in the case in which making partner is a potent career concern, that is, making partner is preferred to remaining an associate.[10] Under the condition that the credit market is competitive, a partner who behaves earns the net present value of his investment. Thus, our assumption boils down to $\Delta - I > e^{FB} - \psi(e^{FB}) = \frac{1}{2k}$, where the superscript refers to the effort exerted in the first-best case. We further assume that $\Delta - I > \underline{\zeta}$ (specified in the Appendix) to limit the number of cases to be considered. Therefore,

$$\Delta - I > \max\{\frac{1}{2k}, \underline{\zeta}\}. \tag{3}$$

Finally, to ensure that the associate's maximization program is concave in effort, we assume that $k > \underline{k}$ (specified in the Appendix).

[10] A recent trend within law firms (and in other professional services) is to create permanent associate or non-equity partner positions. This relaxes the up-or-out system. Consistent with this feature, we allow associates who do not make partner to remain at the associate level.

3 Making Partner

In this section, we determine the conditions under which the associate can make partner. To make the problem interesting we focus on the case in which the associate needs external finance because the required financial contribution I is greater than the first-period equilibrium wage W_{s^*}. The index s^* is used to specify that this wage is based on the equilibrium business risk strategy since wages are fixed at the beginning of the period. Since the labor market is competitive, the associate's first-period equilibrium wage is the associate's first-period expected output, that is $W_{s^*} = m + e^*(s)$.

Inducing the partner to behave is necessary to obtain financing in equilibrium since shirking yields no cash flows. When behaving, expected cash flows depend on the posterior estimate of the associate's talent. The procedure used by the labor and credit markets to form this estimate works as follows. Markets make inferences about talent by (i) anticipating the first-period equilibrium effort e^* and (ii) anticipating s^* if the business risk strategy is not observable or observing s if otherwise. Observing π boils down in equilibrium to observing $\pi - e^* = \theta + r_s$. Thus, posterior reputation is $m^p \overset{d}{=} E(\theta \mid \pi, e^*, s^*)$ when strategies are not observable and $m^p \overset{d}{=} E(\theta \mid \pi, e^*, s)$ when strategies are observable.

Eq. (2) implies that the partner behaves rather than shirks if $m^p + \Delta - (I - W_{s^*}) \geq B$, where $I - W_{s^*}$ is the expected payment to the competitive investors in exchange for their investment of $I - W_{s^*}$ since the firm succeeds for sure when the partner behaves. Thus,

$$m^p \geq \underline{m^p_{s^*}} \overset{d}{=} B - \Delta + I - W_{s^*} \tag{4}$$

is required to make partner. The intuition is the following. For given Δ, expected cash flows increase with m^p. Thus, the higher the reputation, the larger the difference in the cash flows' expected value between behaving and shirking, which fosters incentives to behave. It facilitates access to financing. Importantly, the lower the first-period wage, the higher the (posterior) reputation required. This feature will partially determine the associate's risk-taking strategy.

Observe that condition (4) on m^p is equivalent to

$$\pi \geq \underline{\pi} \overset{d}{=} E(\pi) - \frac{\sigma_\theta^2 + \sigma_s^2}{\sigma_\theta^2}\left(m - \underline{m_{s^*}^p}\right), \tag{5}$$

since the posterior distribution of θ stays normal.

Since the first-period wage depends on the expected first-period effort, we need to determine how effort varies with first-period business risk strategies. When deciding on how much effort to supply, the associate knows the procedure used to form a posterior estimate of his talent. Suppose that the wage is fixed and the choice of strategy is made. Thus, the only purpose of exerting effort is to raise next-period expected gains. Indeed, it increases the probability to make partner as well as the second-period wage if the associate keeps the same job. Eq. (1) and (2) imply that second-period expected gains write

$$\Pr(\pi < \underline{\pi}) \times E_\pi\left[m^p \mid \pi < \underline{\pi}\right] + \left(1 - \Pr(\pi \leq \underline{\pi})\right) \times E_\pi\left[m^p + (\Delta - I) \mid \pi \geq \underline{\pi}\right], \tag{6}$$

where E_π reflects that the expectation is taken with respect to π.

To summarize, the associate's effort decision rule, known to the markets, verifies

$$e^* = \arg\max_e \Pr(\pi < \underline{\pi}) \times E_\pi\left[m^p \mid \pi < \underline{\pi}\right] + \left(1 - \Pr(\pi \leq \underline{\pi})\right) \times \left[m + \sigma_\theta^2 \frac{f(\underline{\pi})}{1 - F(\underline{\pi})} + (\Delta - I)\right] - \frac{k}{2}e^2, \tag{7}$$

(with $m + \sigma_\theta^2 \frac{f(\underline{\pi})}{1-F(\underline{\pi})} + (\Delta - I) = E_\pi\left[m^p + (\Delta - I) \mid \pi \geq \underline{\pi}\right]$). Denote f and F the density function and the cumulative distribution function of π. The first-order condition for an equilibrium satisfies

$$ke^* = \left[\frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_s^2}F(\underline{\pi}) - \underline{m_{s^*}^p}\, f(\underline{\pi})\right] + f(\underline{\pi})\left[m + \sigma_\theta^2\frac{f(\underline{\pi})}{1-F(\underline{\pi})} + (\Delta - I)\right]. \tag{8}$$

Eq. (8) equates the marginal cost of effort (LHS) and the marginal gain from effort (RHS). The first term in the RHS derives from the opportunity to earn a higher wage if remaining an associate.[11] The second term derives from the opportunity to earn a higher revenue due to the possibility of making partner.

Associates exert less effort when the high business risk strategy is chosen. Indeed, more extraneous noise enters the output equation. Thus, output is less informative about talent, and exerting effort has a less positive impact on the revision of reputation.[12]

This implies that expected output is higher when the associate follows a low business risk strategy in equilibrium. Thus, the associate earns a higher wage: $W_{L^*} = m + e^*(L) > m + e^*(H) = W_{H^*}$. In turn, it increases the financial capital available for making partner in the next period, so that less reputation is needed as shown by (4). These results are stated below.

Lemma 1 *The associate's equilibrium effort is a strictly decreasing function of business risk σ_s^2. Accordingly, the associate needs a strictly lower posterior reputation to make partner if he takes on low business risk rather than high business risk: $\underline{m_{L^*}^p} < \underline{m_{H^*}^p}$.*

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[11] Note that the negative term $\left(-\underline{m_{s^*}^p} \times f(\underline{\pi})\right)$ reflects that by exerting effort, the associate increases the probability to switch from an employee position for which the wage is fixed ex ante and is a function of the first-period output to a residual claimant position (a partner) for which the revenue earned at the end of the second period is independent of the first-period output.

[12] We show in the appendix that there exists an offsetting effect affecting associates characterized by $m < \underline{m_{s^*}^p}$. The latter are faced with additional incentives to exert effort in order to obtain a better wage in the second period when σ_s^2 increases since the chances to make partner decrease. However, because making partner is sufficiently attractive, i.e., $\Delta - I > \underline{\zeta}$, this effect is dominated by the reduction in incentives resulting from the lower probability that the preferred outcome, i.e., making partner, occurs when σ_s^2 increases.

The existence of two reputation thresholds contrasts with the case of a standard promotion. As the next section shows, this impacts on the choice of a business risk strategy.

4 Business Risk Strategy

In this section, we determine the associate's business risk strategy during the first, employment period. As a benchmark for the analysis, we first consider the case in which partner positions are *not* available. Then, we turn to the full version of the model.

4.1 No Partner Positions Available

Assuming that associates do not have the opportunity to make partner adds to Holmström's (1999, part I) seminal model the possibility of choosing a business risk strategy before executing it. It amounts to setting $F(\underline{\pi}) = 1$ and $f(\underline{\pi}) = 0$ in (8), which leads to:

$$ke^* = \frac{\sigma_\theta^2}{\sigma_\theta^2 + \sigma_s^2}. \tag{9}$$

First, suppose that the business risk strategy cannot be observed. Assume that markets anticipate s^* as the equilibrium strategy (and accordingly pay a wage W_{s^*}). This fixes to what extent the first-period output is used for revising reputation. Thus, whatever actual s, the associate will have to exert the equilibrium effort corresponding to s^*. Indeed, exerting less effort than $e^*(s^*)$ would make the associate appear less talented than what he actually is. And exerting more effort than $e^*(s^*)$ would make the cost of effort exceed the benefits of appearing more talented than what the associate actually is. In sum, effort being fixed at the time when the associate makes the business risk strategy decision, the associate is only concerned with the impact of such a choice on the second-period wage. Since the latter is linear in posterior reputation, the associate has no reason to deviate from s^* whatever his initial reputation is: In equilibrium, expected posterior reputation is the same whatever strategy is followed, that is, $E[E(\theta \mid \pi, e^*, s)] = m$—only the dispersion around the mean differs.

Thus, there are two equilibrium candidates (one in which the low business risk strategy is pursued and one in which the high business risk strategy is pursued). However, competition in the labor market pushes firms to offer the associate the wage which maximizes his intertemporal utility (computed at the beginning of the first period). Since effort is lower than the first-best level $e^{FB} = \frac{1}{k}$ whatever strategy is chosen—see (9)—but deviation from the first best is smaller under the low business risk strategy because $\sigma_H > \sigma_L$, the resulting equilibrium is (W_{L^*}, L^*).

Next, suppose that the business risk strategy can be observed. This case reflects the general trend towards more transparency in the labor market. For instance, firms such as Whole Foods, Buffer, SumAll recently initiated an open book strategy through which they reveal the wages of employees on their payroll, in some cases even to outsiders (Nisen, 2013; Weissmann, 2014). Transparency can also derive from new technology. For instance, professional social networks such as LinkedIn, Opportunity, VisualCV, etc., make employees' achievements public information. Thus, it is quite likely that in some occasions the strategy pursued by the associate is observed by the markets.[13]

Two consequences follow: (i) Markets now adapt to what extent they use the first-period output in the revision process to the strategy actually pursued by the associate; (ii) accordingly, the associate must exert $e^*(L)$ if low business risk is taken on and $e^*(H)$ if otherwise. Again the associate's choice is independent of his initial reputation. The resulting—unique—equilibrium is the one which reduces the cost of effort to be born, that is (W_{H^*}, H^*). These results are summarized below.

[13] Note that even though strategy choices are observable, the fact that they are not verifiable by uninformed third parties (e.g., a court of law) renders contingent contracts impossible.

Proposition 1 *Suppose that partner positions are not available. Any associate takes on low business risk in equilibrium if business risk strategies are not observable and high business risk if otherwise.*

Two remarks are in order here. First, choices are reversed as one goes from unobservable to observable business risk strategies. Second, transparency diminishes the associate's intertemporal utility since the equilibrium effort is then lower.

In the next section, we consider the full version of the model in which partner positions are available.

4.2 Partners Positions Are Available

Before examining the cases of unobservable versus observable business risk strategies, we distinguish between associates who are likely to make partner if the status quo in terms of reputation prevails and associates who are not likely to do so.

Consider an associate whose initial reputation is equal to the reputation threshold above which making partner is possible if this associate takes on high business risk and maintains his reputation, i.e., $m = \underline{m_{H*}^{p}}$.[14] Any associate pursuing the same business strategy and whose initial reputation is strictly higher than m can make partner if he maintains that reputation. By contrast, any associate pursuing the same strategy and whose initial reputation is strictly lower than m cannot make partner if he keeps that reputation. Let $\underline{M_{H*}^{p}}$ denote the threshold which verifies $m = \underline{m_{H*}^{p}}$. The same line of reasoning allows us to define $\underline{M_{L*}^{p}}$ as the threshold which verifies $m = \underline{m_{L*}^{p}}$. Lemma 1 implies that $\underline{M_{H*}^{p}} > \underline{M_{L*}^{p}}$.

Thus, if the status quo in terms of reputation prevails, any associate—not just our representative associate—characterized by $m < \underline{M_{L*}^{p}}$ will not make partner; any associate characterized

[14] We show in the Appendix that this associate is unique.

by $m \geq \underline{M^p_{H^*}}$ will make partner; and any associate characterized by $\underline{M^p_{L^*}} \leq m < \underline{M^p_{H^*}}$ will make partner if he follows the low business risk strategy in equilibrium, but will not if otherwise. This distinction will help understand the associate's choice of a business risk strategy.

4.2.1 Unobservable Business Risk Strategy

Since partner positions are available, the second-period revenue is not anymore linear in posterior reputation. Thus, the associate must now consider the impact of the business risk strategy pursued on the probability that his posterior reputation ends up above $\underline{m^p_{s^*}}$, the relevant threshold given s^*. Strategy s is pursued in equilibrium if and only if

$$\Pr\left(m^p(s^*, s) \geq \underline{m^p_{s^*}}\right) \geq \Pr\left(m^p(s^*, -s) \geq \underline{m^p_{s^*}}\right), \tag{10}$$

where $m^p(s^*, s)$ denotes posterior reputation when markets anticipate strategy s^* and the associate actually pursues this strategy, while $m^p(s^*, -s)$ denotes posterior reputation when the associate deviates.

First, suppose that reputation status quo is detrimental to the associate for sure, that is, $m < \underline{m^p_{L^*}}$. An equilibrium in which the associate takes on low business risk is impossible. To see this, note that the wage would be W_{L^*} and the reputation threshold $\underline{m^p_{L^*}}$. Then, taking on high business risk maximizes the chances that m^p ends up above $\underline{m^p_{L^*}}$. Indeed, for given use of the first-period output in the revision process,

$$Var\left(m^p(s^*, H)\right) = \frac{\sigma_\theta^4}{\left(\sigma_\theta^2 + \sigma_{s*}^2\right)^2}\left(\sigma_\theta^2 + \sigma_H^2\right) > \frac{\sigma_\theta^4}{\left(\sigma_\theta^2 + \sigma_{s*}^2\right)^2}\left(\sigma_\theta^2 + \sigma_L^2\right) = Var\left(m^p(s^*, L)\right) \tag{11}$$

since $\sigma_H^2 > \sigma_L^2$. Intuitively, taking on high business risk makes the first-period outcome depend less on the associate's (a priori low) talent and more on external factors. For this reason, the only possible equilibrium is the one in which the associate takes on high business risk.[15]

Next, consider the opposite case: $m > \underline{m^p_{H^*}}$. Now, the status quo benefits the associate. Taking on high business risk is impossible in equilibrium. Indeed, for given use of the first-period output in the revision process, taking on low business risk makes it more likely that m^p stays above $\underline{m^p_{H^*}}$ since $Var\left(m^p(s^*, L)\right) < Var\left(m^p(s^*, H)\right)$. Intuitively, the associate is better off choosing the strategy whose outcome depends more on his (a priori high) talent and less on external factors. For this reason, the only possible equilibrium is the one in which the associate takes on low business risk.

Finally, let $\underline{m^p_{L^*}} \leq m \leq \underline{m^p_{H^*}}$. If the low business risk strategy is anticipated, the relevant threshold is $\underline{m^p_{L^*}}$, and the status quo is favorable to the associate. For the same reason as the one discussed just above, $(W_{L^*},\ L^*)$ is the only equilibrium candidate. If the high business risk strategy is anticipated, the relevant threshold is $\underline{m^p_{H^*}}$ and the status quo is detrimental to the associate. For the same reason as the one discussed when $m < \underline{m^p_{L^*}}$, $(W_{H^*},\ H^*)$ is the only equilibrium candidate. Competition in the labor market pushes firms to maximize the associate's intertemporal utility (computed at the beginning of the first period): $\left[W_{s^*} - \frac{k}{2}\left(e^*\right)^2\right] + \left[m + \Pr\left(m^p(s^*, s) \geq \underline{m^p_{s^*}}\right)(\Delta - I)\right]$. The low business risk equilibrium candidate is the one which maximizes the probability to make partner since $\Pr\left(m^p(L^*, L) \geq \underline{m^p_{L^*}}\right) \geq \frac{1}{2} \geq \Pr\left(m^p(H^*, H) \geq \underline{m^p_{H^*}}\right)$. It is also the one which raises the equilibrium effort to be exerted. However, this increases the associate's intertemporal utility only if the resulting effort does not exceed e^{FB}, which is not the case if making partner is very attractive. We show that under the condition that $\frac{\sigma_s^2}{\sigma_\theta^2}$ is high enough, the associate is better off under $(W_{L^*},\ L^*)$.

We use the discussion opening section 4.2 to reformulate these results for *any* associate.

[15] Since $m < \underline{m^p_{L^*}}$ implies $m < \underline{m^p_{H^*}}$, the status quo is also detrimental to the associate if H^* is anticipated.

Proposition 2 *Suppose partner positions are available, the business risk strategy is unobservable, and* $\frac{\sigma_s^2}{\sigma_\theta^2}$ *is high enough. There exists* $\underline{M_{L^*}^p}$ *such that any associate takes on low business risk in equilibrium if and only if* $m \geq \underline{M_{L^*}^p}$. *If otherwise, any associates takes on high business risk.*

Proposition 2 shows that opening partner positions makes low reputation associates switch from a low business risk strategy to a high business risk strategy.

In the next section, the choice of business risk strategy is observable.

4.2.2 Observable Business Risk Strategy

We build on the two previous subsections to note that (i) since partner positions are available, the associate takes into account the impact of the business risk strategy on the chances to reach the relevant reputation threshold and (ii) since strategies are observable, the associate takes into account cost-of-effort considerations. Thus, an equilibrium in which strategy s is pursued exists if and only if

$$\Pr\left(m^p(s) \geq \underline{m_{s^*}^p}\right)(\Delta - I) - \psi(e^*(s)) \geq \Pr\left(m^p(-s) \geq \underline{m_{s^*}^p}\right)(\Delta - I) - \psi(e^*(-s)), \qquad (12)$$

where (i) $m^p(s)$ is the posterior reputation when the actual strategy is s, (ii) $m^p(-s)$ is the posterior reputation when the associate deviates from equilibrium and (iii) $\psi(e^*(s))$ (respectively, $\psi(e^*(-s))$) is the cost of effort when the associates exerts the equilibrium effort corresponding to strategy s (respectively, $-s$).

Before discussing equilibrium business risk strategies as a function of initial reputation, two remarks are in order. First note that $\psi(e^*(L)) - \psi(e^*(H)) > 0$. Second, statistic rules for computing conditional expectations in the case of normal laws yield:

$$E(\theta \mid \pi, e^*, s) \sim N\left(m; \frac{\sigma_\theta^4}{\sigma_\theta^2 + \sigma_s^2}\right). \tag{13}$$

Thus, taking on low business risk rather that high business risk *overall* increases the variance of the posterior reputation distribution in equilibrium.

This result deserves some comments. Indeed, we know from the discussion in Section 4.2.1 that holding fixed the use of the first-period output in the revision process, taking on low business risk reduces the variance of the distribution of posterior reputation since the variance of the output distribution is smaller. However, markets use first-period output to a larger extent to revise reputation if the strategy is to take on low business risk. Indeed, output is then less a matter of luck, and thus a more precise measure of talent. This increases the variance of the distribution of posterior reputation. The latter effect dominates the former. This implies that taking on high business risk should not be confused with taking on high *reputation* risk, as originally noted by Hermalin (2003). When strategies are observable, taking on high business risk favors reputation status quo. With this result in mind, we can discuss strategy choices depending on initial reputation.

An equilibrium in which the associate takes on high business risk is a possible candidate in three cases. First, when $m > \underline{m}^p_{H^*}$, taking on high business risk is a dominant strategy since it allows the associate both to limit reputation revision and to reduce the cost of effort. Second, when m is below but close to $\underline{m}^p_{H^*}$, the same equilibrium is a candidate since the cost of effort reduction more than balances the lower probability to make partner—note that below $\underline{m}^p_{H^*}$, reputation status quo is detrimental to the associate. Third, taking on high business risk is an equilibrium candidate when initial reputation is low enough to have the reduction in the chances to become a partner sufficiently small to make it worth focusing on cost of effort reduction.

An equilibrium is which the associate takes on low business risk is a possible candidate in two cases. First, when m is below but not to far away from $\underline{m}^p_{L^*}$, it is worth taking on low business risk since this allows the associate to favor reputation revision—even if it increases the effort cost to be born. Next, this result extends above $\underline{m}^p_{L^*}$ by paying a wage $w_{L^*} < W_{L^*}$ so that m stays below $\underline{m}^p(w_{L^*})$.

Again, for some reputation levels (e.g., when $\underline{m}^p_{L^*} < m < \underline{m}^p_{H^*}$), there are two equilibrium candidates. Competition in the labor market pushes firms to maximize the associate's intertemporal utility. The resulting equilibrium is the one in which the associate takes on low business risk since it maximizes the chances to reach the preferred outcome, that is, make partner (even though in some occasions, effort can be excessive).

We use the discussion opening section 4.2 to reformulate these results for *any* associate.

Proposition 3 *Suppose that partner positions are available and the business risk strategy is observable. There exist* $\underline{M}^p_1$ *and* $\underline{M}^p_2$*, verifying* $\underline{M}^p_1 < \underline{M}^p_{L^*}$ *and* $\underline{M}^p_1 < \underline{M}^p_2 < \underline{M}^p_{H^*}$*, such that any associate takes on low business risk in equilibrium if and only if* $M^p_1 \leq m \leq \underline{M}^p_2$*. If otherwise, any associates takes on high business risk.*

Comparing Propositions (1) and (3) shows that the opportunity to make partner induces intermediate-reputation associates to switch from a high-risk business strategy to a low-risk business strategy.

The next section discusses implications of these results.

5 Discussion

According to the conventional wisdom in the sport fields, laggards take more risk than leaders at an interim period. This pattern is also observed in the mutual fund industry where competition between funds is analogous to a tournament in which the winner obtains a disproportionate prize (Brown et al., 1996; Chevalier and Ellison, 1997). It has been theoretically modeled in the context of an R&D race (Cabral, 2003; Anderson and Cabral, 2007).

In our framework, we obtain the opposite result for the associates willing to favor reputation status quo (i.e., $m \geq \underline{M_{H^*}^p}$) when the choice of business risk strategy is observable. Under some very specific conditions, notably related to patience, Cabral (2003), and Anderson and Cabral (2007) obtain that firms pursue the riskier of two strategies when they are ahead in the race. However, *both* leader and laggard then prefer the high-variance strategy. This contrasts with our result: Here, intermediate-reputation associates take on low business risk when high-reputation associates take on high business risk.

Next, and also contrary to immediate intuition, our results imply that the prospect of making partner can induce the associate to exert less effort. This is consistent with the casual observation that though associates all work long hours, real diligence varies from one associate to the next (Prendergast, 1999). It is best seen when considering an associate whose initial reputation is such that the associate is quite likely to make partner. Eq. (8) implies that

$$\lim_{F(\underline{\pi})\to 0,\ f\pi)\to 0} ke_s^* = \left[\frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_s^2}F(\underline{\pi}) - \underline{m_{s^*}^p}\ f(\underline{\pi})\right] + f(\underline{\pi})\left[m + \sigma_\theta^2 \frac{f(\underline{\pi})}{1-F(\underline{\pi})} + (\Delta - I)\right] = 0. \quad (14)$$

Thus, whether the business risk strategy is observable or not, the associate exerts no effort. By contrast, we know from Section 4.1 that when partner positions are not available, $e^*(L) = \frac{1}{k}\frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_L^2} > 0$ if the business strategy is observable and $e^*(H) = \frac{1}{k}\frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_H^2} > 0$ if otherwise.[16]

This result is driven by the difference in compensation structure between the associate level and the partner level. When the prospect of making partner is absent, the second-period wage

[16] Note that we do not mean to suggest that all associates exert more effort when the prospect of making partner is absent; naturally some of them are less diligent then.

is an increasing function of posterior reputation, which induces the associate to exert effort to make a good impression during the first period. By contrast, the second-period revenue of an associate who is almost sure to make partner does not depend on posterior reputation—but rather on actual talent.

Finally, one could reasonably expect that greater transparency in the labor market changes associate behavior. Proposition (1) confirms this intuition when partner positions are not available. Proposition (2) together with Proposition (3) also confirm that intuition if, for instance, $m \geq \underline{M_{H^*}^p}$. Then, a good-reputation associate switches from low business risk to high business risk when the business risk strategy becomes observable. And if $\underline{M_1^p} \leq m \leq \min(\underline{M_2^p}, \underline{M_{L^*}^p})$, an intermediate-reputation associate makes the opposite move.

However, it is interesting to observe that some associates keep the same behavior whether the business risk strategy is observable or not. Again, this concerns associates across the reputation spectrum. For instance, if $m < \underline{M_1^p}$ the associate always takes on high business risk, whereas if $\underline{M_L^p} < m < \underline{M_2^p}$ the associate always takes on low business risk.

6 Concluding Remarks

The perspective of becoming residual claimant of the cash flows one generates has received so far little attention in the theoretical career concerns literature. The main reason is the pervasive view that there are intrinsic differences between employees and entrepreneurs, that is, the dominant type of cash flows residual claimants. This view is occasionally grounded. For instance, Lazear (2004) shows that entrepreneurs may have a comparative disadvantage in a single skill, but more balanced talents that span a variety of different skills. However, this view has some limitations: Empirical evidence shows that 90% of entrepreneurs in the high-tech and professional service industries were previously employed by established firms (Burton et al., 2002; Gompers et al., 2005). Thus, talent can be transferred from an employee activity to an entrepreneurial activity.

Partners are another type of cash flows residual claimants. Within partnerships, associates enjoy mission autonomy before making partner. In a dynamic setting, we provide a theory for the business risk strategy associates opt for and the execution effort they exert during their employment period. Also, we examine how observability of the business risk strategy pursued affects associates' choices. Our results invalidate some intuitions. We show that preserving their reputation can lead good-reputation professionals to take on high business risk. Also, the prospect of making partner can decrease effort incentives. Finally, the fact that business risk strategies are observable does not necessarily change behavior.

Since mission autonomy and "hit the jackpot" compensation patterns also characterize the situation of scientists working in R&D who create a successful venture, top managers who become shareholders at a management buy-out or professionals who start a thriving fund or practice, we believe that our results are not restricted to the case of partnerships. This deserves further empirical investigation.

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7 Appendix

We define $\underline{\zeta}$ as $\max\{0, \zeta_1, \zeta_2, \zeta_3, \zeta_4\}$, where ζ_1 is characterized in the proof of Lemma 1, ζ_2 is characterized in the preliminary section to the proofs of Propositions 2 and 3, ζ_3 is characterized in the proof of Proposition 2, and ζ_4 is characterized in the proof of Proposition 3.

7.1 Proof of Lemma 1

First, we determine the associate's objective function. Note that given that (i) in equilibrium $m^p \overset{d}{=} m + \frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_s^2}(\pi - E(\pi))$ whether strategies are observable or not, (ii) $\pi \backsim N(m + e; \sigma_\theta^2 + \sigma_s^2)$, (iii) $\underline{m_{s^*}^p} = B + I - \Delta - W_{s^*}$, and (iv) $W_{s^*} = m + e^*$, we have $m^p \geq \underline{m_{s^*}^p} \Leftrightarrow \pi \geq \underline{\pi} \overset{d}{=} E(\pi) - \frac{\sigma_\theta^2+\sigma_s^2}{\sigma_\theta^2}\left(m - \underline{m_{s^*}^p}\right)$. Thus, an associate exerts an effort which maximizes

$$\Pr(\pi < \underline{\pi}) \times E_\pi[m^p \mid \pi < \underline{\pi}] + (1 - \Pr(\pi \leq \underline{\pi})) \times E_\pi[m^p + (\Delta - I) \mid \pi \geq \underline{\pi}] - \frac{k}{2}(e)^2. \quad (15)$$

Second, we determine the associate's equilibrium effort. It verifies

$$ke^* = \begin{pmatrix} \frac{\partial}{\partial e}\left[\Pr(\pi < \underline{\pi}) \times E_\pi[m^p \mid \pi < \underline{\pi}]\right]\Big|_{e=e^*} \\ + \frac{\partial}{\partial e}\left[(1 - \Pr(\pi \leq \underline{\pi})) \times E_\pi[m^p + (\Delta - I) \mid \pi \geq \underline{\pi}]\right]\Big|_{e=e^*} \end{pmatrix}. \quad (16)$$

The first term in the RHS of (16) writes

$$
\begin{aligned}
& \frac{\partial}{\partial e}\left[F\left(\underline{\pi}\right)\int_{-\infty}^{\underline{\pi}} E(\theta \mid \pi, e^*)\frac{f\left(\pi \mid e\right)}{F\left(\underline{\pi}\right)}d\pi\right]\Bigg|_{e=e^*} \\
&= \frac{\partial}{\partial e}\left[\int_{-\infty}^{\underline{\pi}} E(\theta \mid \pi, e^*) f\left(\pi \mid e\right) d\pi\right]\Bigg|_{e=e^*} \\
&= \frac{\partial}{\partial e}\left[\int_{-\infty}^{\underline{\pi}} \left(m + \frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_s^2}\left(\pi - E(\pi \mid e^*)\right)\right) f\left(\pi \mid e\right) d\pi\right]\Bigg|_{e=e^*} \\
&= \int_{-\infty}^{\underline{\pi}} m \times \frac{\partial f\left(\pi \mid e\right)}{\partial e} d\pi\Bigg|_{e=e^*} + \frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_s^2}\int_{-\infty}^{\underline{\pi}} \left(\pi - E(\pi \mid e^*)\right) \times \frac{\partial f\left(\pi \mid e\right)}{\partial e} d\pi\Bigg|_{e=e^*} \\
&= \int_{-\infty}^{\underline{\pi}} m \times \frac{\partial f\left(\pi \mid e\right)}{\partial e} d\pi\Bigg|_{e=e^*} + \frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_s^2}\int_{-\infty}^{\underline{\pi}} \frac{\left(\pi - E(\pi)\right)^2}{\sigma_\theta^2+\sigma_s^2} f\left(\pi \mid e^*\right) d\pi. \qquad (17)
\end{aligned}
$$

Note that $\int_{-\infty}^{\underline{\pi}} m \times \frac{\partial f(\pi|e)}{\partial e} d\pi\Big|_{e=e^*} = -m \times f\left(\underline{\pi}\right)$. Developing and integrating by part $\int_{-\infty}^{\underline{\pi}} \left(\pi - E(\pi)\right) \frac{(\pi - E(\pi))}{\sigma_\theta^2+\sigma_s^2} f\left(\pi \mid e^*\right) d\pi$ leads to $F\left(\underline{\pi}\right) + \frac{\sigma_\theta^2+\sigma_s^2}{\sigma_\theta^2}\left(m - \underline{m_{s^*}^p}\right) f\left(\underline{\pi}\right)$. Thus, the first term in the RHS of (16) can be rewritten as

$$
\frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_s^2} F\left(\underline{\pi}\right) - \underline{m_{s^*}^p} \times f\left(\underline{\pi}\right). \qquad (18)
$$

Since the associate knows the effort he exerts, $\frac{\partial}{\partial e}\left(E_\pi\left[m^p + (\Delta - I) \mid \pi \geq \underline{\pi}\right]\right) = 0$.[17] Thus, we can rewrite the second term in the RHS of (16) as

$$
\frac{\partial}{\partial e}\left(1 - \Pr\left(\pi < \underline{\pi}\right)\right)\Bigg|_{e=e^*} \times E_\pi\left[m^p + (\Delta - I) \mid \pi \geq \underline{\pi}\right]. \qquad (19)
$$

Besides,

$$
\frac{\partial}{\partial e}\left(1 - \Pr\left(\pi < \underline{\pi}\right)\right)\Bigg|_{e=e^*} = -\frac{\partial}{\partial e}\int_{-\infty}^{\underline{\pi}} f\left(\pi \mid e\right) d\pi\Bigg|_{e=e^*}, \qquad (20)
$$

[17] By contrast, $\frac{\partial}{\partial e}\left(1 - \Pr\left(\pi < \underline{\pi}\right)\right) \neq 0$ since markets do not observe e.

where $f(\pi \mid e)$ denotes the density of π conditional on e. Since $f(\pi \mid e) = \frac{1}{\sqrt{2\Pi}} \frac{1}{\sqrt{\sigma_\theta^2+\sigma_s^2}} \exp(-\frac{1}{2}\frac{(\pi-m-e)^2}{\sigma_\theta^2+\sigma_s^2})$, we obtain

$$\frac{\partial}{\partial e}\left(1-\Pr\left(\pi<\underline{\pi}\right)\right)\Big|_{e=e^*} = -\int_{-\infty}^{\underline{\pi}} \frac{\pi - E(\pi)}{\sigma_\theta^2+\sigma_s^2} f\left(\pi \mid e^*\right) d\pi = f\left(\underline{\pi}\right). \tag{21}$$

After computations, we have

$$E_\pi\left[m^p + (\Delta - I) \mid \pi \geq \underline{\pi}\right] = m + (\Delta - I) + \sigma_\theta^2 \frac{f\left(\underline{\pi}\right)}{1-F\left(\underline{\pi}\right)}. \tag{22}$$

Thus, the second term in the RHS of (16) can be rewritten as

$$f\left(\underline{\pi}\right)\left[m + (\Delta - I) + \sigma_\theta^2 \frac{f\left(\underline{\pi}\right)}{1-F\left(\underline{\pi}\right)}\right]. \tag{23}$$

Combining (18) and (23) implies that the associate exerts

$$ke^* = \frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_s^2} F\left(\underline{\pi}\right) + \left(m - \underline{m}_{s^*}^p\right) f\left(\underline{\pi}\right) + f\left(\underline{\pi}\right)\left[\Delta - I + \sigma_\theta^2 \frac{f\left(\underline{\pi}\right)}{1-F\left(\underline{\pi}\right)}\right]. \tag{24}$$

Third, we show that e^* decreases in σ_s^2. Using $\pi \backsim N\left(m+e; \sigma_\theta^2+\sigma_s^2\right)$ allows to rewrite (24) as

$$ke^* - \frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_s^2}\phi\left(\mathcal{C}_{s^*}\right) - \frac{m-\underline{m}_{s^*}^p}{\sqrt{\sigma_\theta^2+\sigma_s^2}}\varphi\left(\mathcal{C}_{s^*}\right) - \frac{\varphi\left(\mathcal{C}_{s^*}\right)}{\sqrt{\sigma_\theta^2+\sigma_s^2}}\left(\Delta - I + \frac{\sigma_\theta^2}{\sqrt{\sigma_\theta^2+\sigma_s^2}} \frac{\varphi\left(\mathcal{C}_{s^*}\right)}{1-\phi\left(\mathcal{C}_{s^*}\right)}\right) = 0, \tag{25}$$

where $\mathcal{C}_{s^*} \overset{d}{=} -\frac{\sqrt{\sigma_\theta^2+\sigma_s^2}}{\sigma_\theta^2}\left(m - \underline{m}_{s^*}^p\right)$ while φ and ϕ are respectively the density function and the cumulative distribution function of $N(0;1)$. Using $\underline{m}_{s^*}^p = B + I - \Delta - W_{s^*}^i$, we have $\frac{\partial \underline{m}_{s^*}^p}{\partial e^*} = -1$

and $\frac{\partial \underline{m}^p_{s*}}{\partial \sigma_s^2} = 0$. Differentiating the LHS of (25) in e^* and σ_s^2 gives

$$\frac{de^*}{d\sigma_s^2} = \frac{-\frac{\sigma_\theta^2}{\left(\sigma_\theta^2+\sigma_s^2\right)^2}\phi\left(\mathcal{C}_{s^*}\right) - \frac{1}{2}\frac{\varphi(\mathcal{C}_{s^*})}{\sqrt{\sigma_\theta^2+\sigma_s^2}}\left[\begin{array}{c}\left(\Delta - I + \frac{2\sigma_\theta^2}{\sqrt{\sigma_\theta^2+\sigma_s^2}}\frac{\varphi(\mathcal{C}_{s^*})}{1-\phi(\mathcal{C}_{s^*})}\right)\left[\frac{1}{\sigma_\theta^2+\sigma_s^2} + \frac{\left(m-\underline{m}^p_{s^*}\right)^2}{\sigma_\theta^4}\right] \\ +\frac{m-\underline{m}^p_{s^*}}{\sigma_\theta^2+\sigma_s^2}\left[\left(\frac{\varphi(\mathcal{C}_{s^*})}{1-\phi(\mathcal{C}_{s^*})}\right)^2 + \frac{\left(m-\underline{m}^p_{s^*}\right)^2}{\sigma_\theta^4}\right]\end{array}\right]}{k+\varphi\left(\mathcal{C}_{s^*}\right)\left[\begin{array}{c}\frac{\sqrt{\sigma_\theta^2+\sigma_s^2}}{\sigma_\theta^4}\left(m-\underline{m}^p_{s^*}\right)\left(\Delta - I + \frac{2\sigma_\theta^2}{\sqrt{\sigma_\theta^2+\sigma_s^2}}\frac{\varphi(\mathcal{C}_{s^*})}{1-\phi(\mathcal{C}_{s^*})}\right) \\ +\frac{1}{\sqrt{\sigma_\theta^2+\sigma_s^2}}\left(\frac{\varphi(\mathcal{C}_{s^*})}{1-\phi(\mathcal{C}_{s^*})}\right)^2 + \frac{\sqrt{\sigma_\theta^2+\sigma_s^2}}{\sigma_\theta^4}\left(m-\underline{m}^p_{s^*}\right)^2\end{array}\right]}. \tag{26}$$

Case 1: $m \geq \underline{m}^p_{s^*}$. The numerator in (26) is strictly negative, whereas the denominator is strictly positive. Thus, $\frac{de^*}{d\sigma_s^2} < 0$.

Case 2: $m < \underline{m}^p_{s^*}$. If m is sufficiently low compared to $\underline{m}^p_{s^*}$, (i) $\varphi\left(\mathcal{C}_{s^*}\right)$ tends to 0, which implies that the second term in the numerator goes to 0, and (ii) $-\frac{\sigma_\theta^2}{\left(\sigma_\theta^2+\sigma_s^2\right)^2}\phi\left(\mathcal{C}_{s^*}\right)$ tends to $-\frac{\sigma_\theta^2}{\left(\sigma_\theta^2+\sigma_s^2\right)^2} < 0$. If otherwise, there exists ζ_1 such that the numerator in (26) is strictly negative if $\Delta - I > \zeta_1$ since this condition ensures that the term in squared brackets is positive. As for the denominator in (26), the term in squared brackets is finite for any finite $\Delta - I$. Thus, there exists $\underline{k}$ such that if $k > \underline{k}$, the denominator is strictly positive.[18] Hence $\frac{de^*}{d\sigma_s^2} < 0$ if $\Delta - I > \zeta_1$ and $k > \underline{k}$.

This establishes Lemma 1.

7.2 Preliminary to the proofs of Propositions 2 and 3

7.2.1 Characterization of $\underline{M}^p_{L^*}$ and $\underline{M}^p_{H^*}$

First, combining $\underline{m}^p_{s^*} \overset{d}{=} B + I - \Delta - W_{s^*}$ and $W_{s^*} = m + e^*$ leads to

$$m = \underline{m}^p_{s^*} \Leftrightarrow B + I - \Delta = 2m + e^* \overset{d}{=} K(m, s^*). \tag{27}$$

[18] Note that the denominator in (26) is the opposite of the second derivative in effort of the associate's objective function defined in (15). Therefore, $k > \underline{k}$ implies that the associate's maximization program is concave in effort.

Thus, $\frac{dK(m,s^*)}{dm} = 2 + \frac{de^*}{dm}$. Using (24), we have

$$\frac{de^*}{dm} = -\frac{2\varphi\left(\mathcal{C}_{s^*}\right)\left[\begin{array}{c}\frac{\sqrt{\sigma_\theta^2+\sigma_s^2}}{\sigma_\theta^4}\left(m-\underline{m}_{s^*}^p\right)\left(\Delta - I + \frac{2\sigma_\theta^2}{\sqrt{\sigma_\theta^2+\sigma_s^2}}\frac{\varphi(\mathcal{C}_{s^*})}{1-\phi(\mathcal{C}_{s^*})}\right)\\ +\frac{1}{\sqrt{\sigma_\theta^2+\sigma_s^2}}\left(\frac{\varphi(\mathcal{C}_{s^*})}{1-\phi(\mathcal{C}_{s^*})}\right)^2+\frac{\sqrt{\sigma_\theta^2+\sigma_s^2}}{\sigma_\theta^2}\left(m-\underline{m}_{s^*}^p\right)^2\end{array}\right]}{k+\varphi\left(\mathcal{C}_{s^*}\right)\left[\begin{array}{c}\frac{\sqrt{\sigma_\theta^2+\sigma_s^2}}{\sigma_\theta^4}\left(m-\underline{m}_{s^*}^p\right)\left(\Delta - I + \frac{2\sigma_\theta^2}{\sqrt{\sigma_\theta^2+\sigma_s^2}}\frac{\varphi(\mathcal{C}_{s^*})}{1-\phi(\mathcal{C}_{s^*})}\right)\\ +\frac{1}{\sqrt{\sigma_\theta^2+\sigma_s^2}}\left(\frac{\varphi(\mathcal{C}_{s^*})}{1-\phi(\mathcal{C}_{s^*})}\right)^2+\frac{\sqrt{\sigma_\theta^2+\sigma_s^2}}{\sigma_\theta^4}\left(m-\underline{m}_{s^*}^p\right)^2\end{array}\right]},$$

and

$$\frac{dK(m,s^*)}{dm} = \frac{2k}{k+\varphi\left(\mathcal{C}_{s^*}\right)\left[\begin{array}{c}\frac{\sqrt{\sigma_\theta^2+\sigma_s^2}}{\sigma_\theta^4}\left(m-\underline{m}_{s^*}^p\right)\left(\Delta - I + \frac{2\sigma_\theta^2}{\sqrt{\sigma_\theta^2+\sigma_s^2}}\frac{\varphi(\mathcal{C}_{s^*})}{1-\phi\left(\mathcal{C}_{s^*}^i\right)}\right)\\ +\frac{1}{\sqrt{\sigma_\theta^2+\sigma_s^2}}\left(\frac{\varphi(\mathcal{C}_{s^*})}{1-\phi(\mathcal{C}_{s^*})}\right)^2+\frac{\sqrt{\sigma_\theta^2+\sigma_s^2}}{\sigma_\theta^4}\left(m-\underline{m}_{s^*}^p\right)^2\end{array}\right]}. \tag{28}$$

Since the denominator in (28) corresponds to the denominator in (26), $\frac{dK(m,s^*)}{dm} > 0$ if $k > \underline{k}$.

Second, $\lim_{m\to-\infty} K(m,s^*) = -\infty$ since $\lim_{m\to-\infty} e^* = \frac{1}{k}\frac{\sigma_\theta^2}{\sigma_\theta^2+\sigma_s^2}$ for any finite value of $\Delta - I$. Besides, $\lim_{m\to+\infty} K(m,s^*) = +\infty$ since $e^* \geq 0$. Thus, $K(m,s^*)$ is strictly increasing in m from $-\infty$ to $+\infty$. Hence, there exists a unique associate, i, characterized by $K(m_i,s^*) = B + I - \Delta$, which is equivalent to $m_i = \underline{m}_{i,s^*}^p \stackrel{d}{=} \underline{M}_{s^*}^p$. Besides, $m_j > m_i \Leftrightarrow m_j > \underline{m}_{j,s^*}^p$ while $m_j < m_i \Rightarrow m_j < \underline{m}_{i,s^*}^p$.

Third, $K(m,L^*) > K(m,H^*)$ implies that $\underline{M}_{L^*}^p < \underline{M}_{H^*}^p$.

Fourth, consider an associate characterized by $m < \underline{m}_{L^*}^p$. Since $K(m,L^*) > K(m,H^*)$ the associate's reputation also verifies $m < \underline{m}_{H^*}^p$. Thus, the associate will not make partner if the status quo in terms of reputation prevails, whatever his choice of strategy. Also $m < \underline{m}_{L^*}^p < \underline{M}_{L^*}^p$ since K is a strictly increasing function of m. Thus, *any* associate characterized by $m < \underline{M}_{L^*}^p$ will not make partner if the status quo prevails.

Consider now an associate characterized by $m \geq \underline{m}_{H^*}^p$. Since $K(m,L^*) > K(m,H^*)$ the associate's reputation verifies $m > \underline{m}_{L^*}^p$. Thus, the associate will make partner if the status quo prevails, whatever his choice of strategy. Also, $m \geq \underline{m}^p_{H^*} > \underline{M}^p_{H^*}$ since K is a strictly increasing function of m. Thus, *any* associate characterized by $m \geq \underline{M}^p_{H^*}$ will make partner if the status quo prevails.

Finally, we derive from the two previous cases that *any* associate characterized by $\underline{M}^p_{L^*} \leq m < \underline{M}^p_{H^*}$ will (respectively, will not) make partner if he takes on low (respectively, high) business risk during the first period and reputation status quo prevails.

7.2.2 Maximization of the associate's intertemporal utility

Denote the associate's intertemporal utility by $U \overset{d}{=} \left[W_{s^*} - \frac{k}{2}\left(e^*\right)^2\right] + \left[m + \Pr\left(m^p(s^*, s^*) \geq \underline{m}^p_{s^*}\right)(\Delta - I)\right]$, with $W_{s^*} = m + e^*$.

We have

$$\frac{dU}{d\sigma_s^2} = \left(1 - e^* + \frac{\sqrt{\sigma_\theta^2 + \sigma_s^2}}{\sigma_\theta^2}\varphi\left(\mathcal{C}_{s^*}\right)(\Delta - I)\right)\frac{de^*}{d\sigma_s^2} - \frac{1}{2}\frac{\mathcal{C}_{s^*}}{\sigma_\theta^2 + \sigma_s^2}\varphi\left(\mathcal{C}_{s^*}\right)(\Delta - I). \qquad (29)$$

Using (8) we obtain that

$$\lim_{\Delta - I \to +\infty}\left(1 - e^* + \frac{\sqrt{\sigma_\theta^2+\sigma_s^2}}{\sigma_\theta^2}\varphi\left(\mathcal{C}_{s^*}\right)(\Delta - I)\right) = \left(-\frac{1}{k\sqrt{\sigma_\theta^2+\sigma_s^2}} + \frac{\sqrt{\sigma_\theta^2+\sigma_s^2}}{\sigma_\theta^2}\right)\varphi\left(\mathcal{C}_{s^*}\right)(\Delta - I) > 0.$$

Thus, there exists ζ_2 such that if $\Delta - I > \zeta_2$ we have $\left(1 - e^* + \frac{\sqrt{\sigma_\theta^2+\sigma_s^2}}{\sigma_\theta^2}\varphi\left(\mathcal{C}_{s^*}\right)(\Delta - I)\right) > 0$. Moreover, (i) $\frac{de^*}{d\sigma_s^2} < 0$ and (ii) $\mathcal{C}_{s^*} \geq 0$ if $m \leq \underline{m}^p_{s^*}$. This implies that $\frac{dU}{d\sigma_s^2} < 0$ if $m \leq \underline{m}^p_{s^*}$.

7.3 Proof of Proposition 2

The proof proceeds in two steps.

1- Characterization of the equilibrium candidates

Observe that

$$\Pr\left(m^p(s^*,H) \geq \underline{m^p_{s^*}}\right) = 1-\phi\left(-\frac{1}{\sqrt{\sigma_\theta^2+\sigma_H^2}}\frac{\sigma_\theta^2+\sigma_{s^*}^2}{\sigma_\theta^2}\left(m-\underline{m^p_{s^*}}\right)\right) \text{ and}$$
$$\Pr\left(m^p(s^*,L) \geq \underline{m^p_{s^*}}\right) = 1-\phi\left(-\frac{1}{\sqrt{\sigma_\theta^2+\sigma_L^2}}\frac{\sigma_\theta^2+\sigma_{s^*}^2}{\sigma_\theta^2}\left(m-\underline{m^p_{s^*}}\right)\right).$$

Thus, (i) if $m > \underline{m^p_{H^*}}$, $\Pr\left(m^p(s^*,L) \geq \underline{m^p_{s^*}}\right) > \Pr\left(m^p(s^*,L) \geq \underline{m^p_{s^*}}\right)$ so that taking on low risk is a strictly dominant strategy; (ii) if $m < \underline{m^p_{L^*}}$, $\Pr\left(m^p(s^*,H) \geq \underline{m^p_{s^*}}\right) > \Pr\left(m^p(s^*,L) \geq \underline{m^p_{s^*}}\right)$ so that taking on high risk is a strictly dominant strategy; and (iii) if $\underline{m^p_{L^*}} \leq m \leq \underline{m^p_{H^*}}$, (W_{H^*}, H^*) and (W_{L^*}, L^*) are two equilibrium candidates.

2- Selection of the equilibrium which maximizes the associate's intertemporal utility

It follows from (29) that $\frac{dU}{d\sigma_s^2} < 0$ when $m > \underline{m^p_{s^*}}$ if either $|\mathcal{C}_{s^*}|$ is small (i.e., m is sufficiently close to $\underline{m^p_{s^*}}$) or $|\mathcal{C}_{s^*}|$ is large (i.e., m is sufficiently above $\underline{m^p_{s^*}}$). If otherwise, $\varphi\left(\mathcal{C}_{s^*}\right) \neq 0$. Using (26) we obtain that

$$\lim_{\Delta-I\to+\infty}\left|\frac{de^*}{d\sigma_s^2}\right| = \frac{1}{2}\frac{\sigma_\theta^2}{\left(\sigma_\theta^2+\sigma_s^2\right)^{3/2}}\left|\frac{1}{\mathcal{C}_{s^*}}+\mathcal{C}_{s^*}\right|. \tag{30}$$

This implies that

$$\lim_{\Delta-I\to+\infty}\frac{dU}{d\sigma_s^2} = \frac{1}{2}\frac{\varphi\left(\mathcal{C}_{s^*}\right)(\Delta-I)}{\sigma_\theta^2+\sigma_s^2}\left[-\frac{\sigma_\theta^2}{k\left(\sigma_\theta^2+\sigma_s^2\right)}\left(\frac{1}{\mathcal{C}_{s^*}}+\mathcal{C}_{s^*}\right)+\frac{1}{\mathcal{C}_{s^*}}\right] < 0$$

if $\frac{\sigma_s^2}{\sigma_\theta^2}$ is high enough. Thus, there exists ζ_3 such that if $\Delta - I > \zeta_3$, maximizing the associate's intertemporal utility leads to (W_{L^*}, L^*).

This establishes Proposition 2.

7.4 Proof of Proposition 3

The proof proceeds in three steps.

1- Characterization of the equilibrium candidates

Using statistic rules for computing conditional expectations in the case of normal laws leads to $E(\theta \mid \pi, e^*, s) \sim N\left(m; \dfrac{\sigma_\theta^4}{\sigma_\theta^2 + \sigma_s^2}\right)$. Thus, opting for L (respectively, H) increases (respectively, decreases) the variance of $E(\theta \mid \pi, e^*, s)$.

Let us now identify the equilibria. First, (W_{H^*}, H^*) is an equilibrium if and only if

$$\begin{array}{c} \left[\Pr\left(m^p(H) \geq \underline{m}^p_{H^*}\right) - \Pr\left(m^p(L) \geq \underline{m}^p_{H^*}\right)\right](\Delta - I) \\ -\left[\psi(e^*(H, \underline{m}^p_{H^*})) - \psi(e^*(L, \underline{m}^p_{H^*}))\right] \end{array} \geq 0, \tag{31}$$

where $m^p(H)$ (respectively, $m^p(L)$) denotes the associate's updated reputation when he takes on high (respectively, low) business risk and $e^*(H, \underline{m}^p_{H^*})$ (respectively, $e^*(L, \underline{m}^p_{H^*})$) denotes the associate's equilibrium effort when he takes on high (respectively, low) business risk, while the threshold above which becoming partner is possible is $\underline{m}^p_{H^*}$.

If $m > \underline{m}^p_{H^*}$, (31) is always satisfied since (i) $\psi(e^*(H, \underline{m}^p_{H^*})) - \psi(e^*(L, \underline{m}^p_{H^*})) < 0$ and (ii) $\Pr\left(m^p(H) \geq \underline{m}^p_{H^*}\right) > \Pr\left(m^p(L) \geq \underline{m}^p_{H^*}\right)$—taking high business risk decreases the variance of $E(\theta \mid \pi, e^*, s)$ while $E\left[E(\theta \mid \pi, e^*, s)\right] = m$ in equilibrium.

Suppose now that $m \leq \underline{m}^p_{H^*}$. There exists $\underline{m}^p_\beta$ such that if $m < \underline{m}^p_\beta$ (i.e., $\left|m - \underline{m}^p_{H^*}\right|$ is sufficiently large), $\left[\Pr\left(m^p(H) \geq \underline{m}^p_{H^*}\right) - \Pr\left(m^p(L) \geq \underline{m}^p_{H^*}\right)\right](\Delta - I)$ is negative but very small for any $\Delta - I$ which takes a finite value. Also, there exists $\underline{m}^p_2$ such that if $\underline{m}^p_2 < m$ (i.e., $\left|m - \underline{m}^p_{H^*}\right|$ is sufficiently small) the same result holds. Besides, $\psi(e^*(H, \underline{m}^p_{H^*})) - \psi(e^*(L, \underline{m}^p_{H^*})) < 0$. Then (31) is satisfied and (W_{H^*}, H) is an equilibrium. Note that $\underline{m}^p_\beta < \underline{m}^p_2 < \underline{m}^p_{H^*} \leq \underline{M}^p_{H^*}$.

Second, (W_{L^*}, L^*) is an equilibrium if and only if

$$\begin{array}{c}\left[\Pr\left(m^p(L) \geq \underline{m}^p_{L^*}\right) - \Pr\left(m^p(H) \geq \underline{m}^p_{L^*}\right)\right](\Delta - I) \\ - \left[\psi(e^*(L, \underline{m}^p_{L^*})) - \psi(e^*(H, \underline{m}^p_{L^*}))\right]\end{array} \geq 0. \tag{32}$$

Taking on low business risk implies a higher cost of effort: $\psi(e^*(L, \underline{m}^p_{L^*})) - \psi(e^*(H, \underline{m}^p_{L^*})) > 0$. Thus, for (32) to be satisfied, $\Pr\left(m^p(L) \geq \underline{m}^p_{L^*}\right) - \Pr\left(m^p(H) \geq \underline{m}^p_{L^*}\right)$ must be strictly positive. This requires $m < \underline{m}^p_{L^*}$ since (i) both $m^p(L)$ and $m^p(H)$ are normally distributed with mean m but (ii) $Variance(m^p(L)) = \dfrac{\sigma_\theta^4}{\sigma_\theta^2 + \sigma_L^2} > \dfrac{\sigma_\theta^4}{\sigma_\theta^2 + \sigma_H^2} = Variance(m^p(H))$. Rewrite (32) as

$$\Delta - I \geq \frac{\psi(e^*(L, \underline{m}^p_{L^*})) - \psi(e^*(H, \underline{m}^p_{L^*}))}{\Pr\left(m^p(L) \geq \underline{m}^p_{L^*}\right) - \Pr\left(m^p(H) \geq \underline{m}^p_{L^*}\right)} \overset{d}{=} \zeta\,(m)\,. \tag{33}$$

We have $\zeta\,(m)\,(\geq 0)$ that takes a finite value if the denominator is strictly positive (i.e., if $\left|m - \underline{m}^p_{L^*}\right|$ takes intermediate values) for any $\Delta - I > 0$.[19] This implies that for any high enough $\Delta - I$ (i.e., $\Delta - I \geq \zeta_4$), there exists an interval in terms of initial reputation values—with $\left|m - \underline{m}^p_{L^*}\right|$ taking intermediate values—for which (33) is satisfied. Define $\underline{m}^p_1$ as the lower bound of such an interval and $\underline{m}^p_\alpha$ as the upper bound, that is, $\Delta - I \geq \zeta\,(m)$ if $\underline{m}^p_1 \leq m \leq \underline{m}^p_\alpha$ (with $\underline{m}^p_\alpha < \underline{m}^p_{L^*} \leq \underline{M}^p_{L^*}$).[20] Note that $\underline{M}^p_{L^*} < \underline{M}^p_{H^*}$ both implies that $\underline{m}^p_1 < \underline{m}^p_\beta$ and $\underline{m}^p_\alpha < \underline{m}^p_2$.

Third, there exists an equilibrium (w_{L^*}, L^*) when $\underline{m}^p_\alpha \leq m \leq \underline{m}^p_2$, with $W_{H^*} \leq w_{L^*} < W_{L^*}$. It requires to set w_{L^*} such that $|m - \underline{m}(w_{L^*})|$ takes intermediate values, which allows to verify $[\Pr(m^p(L) \geq \underline{m^p}(w_{L^*})) - \Pr(m^p(H) \geq \underline{m^p}(w_{L^*}))] > 0$. Since the labor market is competitive, w_{L^*} is the highest possible wage such that $w_{L^*} \geq W_{H^*}$ and

[19] The rigorous proof is available upon request from the authors.

[20] Note that the numerator in the RHS of (33) takes a finite value since $e^* = +\infty$ is never a solution to the associate's maximization program.

$$\begin{array}{r} \left[\Pr\left(m^p(L) \geq \underline{m^p}(w_{L^*})\right) - \Pr\left(m^p(H) \geq \underline{m^p}(w_{L^*})\right)\right](\Delta - I) \\ -\left[\psi(e^*(L, \underline{m^p}(w_{L^*}))) - \psi(e^*(H, \underline{m^p}(w_{L^*})))\right] \end{array} \geq 0. \tag{34}$$

Note that when $m = \underline{m_2}$, $w_{L^*} = W_{H^*}$.

2- Selection of the equilibrium which maximizes the associate's intertemporal utility

If $\underline{m_1^p} \leq m \leq \underline{m_\beta^p}$, equilibrium candidates are (W_{H^*}, H^*) and either (W_{L^*}, L^*) or (w_{L^*}, L^*).

Consider first the case in which (W_{H^*}, H^*) and (W_{L^*}, L^*) are candidates. We know—from (29)—that $\frac{dU}{d\sigma_s^2} < 0$ if $m \leq \underline{m_{s^*}^p}$. Moreover, $m < \underline{m_{L^*}^P} < \underline{m_{H^*}^p}$ implies that $m < \underline{m^p}(\sigma_s^2)$, $\forall$ $\sigma_s^2 \in [\sigma_L^2; \sigma_H^2]$. Thus $\frac{dU}{d\sigma_s^2} < 0$, $\forall$ $\sigma_s^2 \in [\sigma_L^2; \sigma_H^2]$, so that maximizing the associate's intertemporal utility leads to (W_{L^*}, L^*).

Consider now the case in which (W_{H^*}, H^*) and (w_{L^*}, L^*) coexist. We have $m < \underline{m_{L^*}^p} < \underline{m^p}(w_{L^*})$ which implies that $m < \underline{m^p}(\sigma_s^2)$, $\forall$ $\sigma_s^2 \in [\sigma_L^2; \sigma_H^2]$. Thus, $\frac{dU}{d\sigma_s^2} < 0$, $\forall$ $\sigma_s^2 \in [\sigma_L^2; \sigma_H^2]$, so that maximizing the associate's intertemporal utility leads to (w_{L^*}, L^*).

3- Characterization of the thresholds $\underline{M_1^p}$, $\underline{M_\alpha^p}$, $\underline{M_\beta^p}$, and $\underline{M_2^p}$

Combining $\underline{m_{H^*}^p} \stackrel{d}{=} B + I - \Delta - W_{H^*}$ and $W_{H^*} = m + e^*$ leads to $\left|m - \underline{m_{H^*}^p}\right| = A$ (with $A \in \mathbb{R}^+$) $\Leftrightarrow A + B + I - \Delta = 2m + e^* \stackrel{d}{=} K(m, H^*)$ if $m < \underline{m_{H^*}^p}$.

Since (i) $\frac{dK(m,H^*)}{dm} = 2 + \frac{de^*}{dm} > 0$ if $k > \underline{k}$ (cf. Characterization of $\underline{M_{L^*}^p}$ and $\underline{M_{H^*}^p}$), (ii) $\lim\limits_{m \to -\infty} K(m, H^*) = -\infty$ since $\lim\limits_{m \to -\infty} e^* = \frac{1}{k}\frac{\sigma_\theta^2}{\sigma_\theta^2 + \sigma_H^2}$ for any finite value of $\Delta - I$, and (iii) $\lim\limits_{m \to +\infty} K(m, H^*) = +\infty$ since $e^* \geq 0$, $K(m, H^*)$ is strictly increasing in m from $-\infty$ to $+\infty$.

Hence, there exists a unique associate, i, characterized by $K(m_i, H^*) = A + B + I - \Delta$.

Let $A = \left|\underline{m_2} - \underline{m_{H^*}^p}\right|$. This implies that there is a unique associate i, such that $\left|m_i - \underline{m_{H^*}^p}\right| = \left|\underline{m_2} - \underline{m_{H^*}^p}\right|$. Let us denote by $\underline{M_2^p}$ this associate's reputation. For any $m < \underline{M_{H^*}^p}$, $\left|m - \underline{m_{H^*}^p}\right| < \left|\underline{m_2} - \underline{m_{H^*}^p}\right|$ if and only if $\underline{M_2^p} < m < \underline{M_{H^*}^p}$ and $\left|m - \underline{m_{H^*}^p}\right| > \left|\underline{m_2} - \underline{m_{H^*}^p}\right|$ if and only if $m < \underline{M_2^p}$.

Finally, applying the same line of reasoning to $\left|m_i - \underline{m_{H^*}^p}\right| = \left|\underline{m_\alpha} - \underline{m_{H^*}^p}\right|$, $\left|m_i - \underline{m_{H^*}^p}\right| = \left|\underline{m_\beta} - \underline{m_{H^*}^p}\right|$, and $\left|m_i - \underline{m_{H^*}^p}\right| = \left|\underline{m_2} - \underline{m_{H^*}^p}\right|$ allows to define the unique associate characterized respectively by $m_i = \underline{M_\alpha^p}$, $m_i = \underline{M_\beta^p}$, and $m_i = \underline{M_2^p}$.

This establishes Proposition 3.