Seeking Alpha: Excess Risk Taking and Competition for Managerial Talent

Viral Acharya       Marco Pagano       Paolo Volpin

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Abstract

We present a model where managers are risk-averse, and firms compete for scarce managerial talent (“alpha”). When managers are not mobile across firms, firms provide efficient compensation, which allows for learning about managerial talent and insures low-quality managers. When instead managers can move across firms, firms cannot provide co-insurance among their employees. In anticipation, risk-averse managers may churn across firms or undertake aggregate risks in order to delay the revelation of their true quality. The result is excessive risk-taking with pay for short-term performance and build up of long-term risks. We conclude with a discussion of policies to address the inefficiency in firms’ compensation.

JEL classification: D62, G32, G38, J33.

Keywords: short-termism, executive compensation, tail risk, managerial turnover.

Authors’ addresses: Viral Acharya, New York University; e-mail: vacharya@stern.nyu.edu. Marco Pagano, Università di Napoli Federico II; e-mail: mrpagano@tin.it. Paolo Volpin, London Business School; e-mail: pvolpin@london.edu.

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“The dirty secret of bank bonuses is that these practices have arisen not merely due to a culture of arrogance; the more pernicious problem is a sense of insecurity. Banks operate in a world where their star talent is apt to jump between different groups, whenever a bigger pay-packet appears, with scant regard for corporate loyalty or employment contracts. The result is that the compensation committees of many banks feel utterly trapped. ... Against that background, what the members of some compensation committees are quietly starting to conclude is that the only real solution is to start clamping down on the whole “transfer” game. “If Fifa can stop clubs poaching other players and ripping up contracts, then why can’t the banks do the same?” asks one... It is time, in other words, for bankers and regulators to take a leaf out of football’s book and start debating not just the issue of pay, but also the poaching culture that is at the root of those huge bonus figures.” – Tett (2009)

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“Should any investor be prepared to bet on [Mexico’s] next 100 years - or that of any country?... Cynics suggest no one buys a century bond thinking further away than their next job move since it won’t be their problem when it does come due.” – Hughes (2010)

1 Introduction

Excess risk-taking by financial institutions and overly generous managerial pay are regarded by many as key factors contributing to the 2007-09 crisis.¹ In particular, it has become commonplace to blame banks and securities companies for offering compensation packages that reward managers (and more generally, other risk-takers such as traders and salesmen) generously for undertaking investments with high returns in the short run but with large “tail risks” that emerge only in the long run. As governments have been forced to rescue failing financial institutions, politicians and the media have stressed the need that managerial pay packages be cut and incentive systems based on options and bonuses be reined in, made more sensitive to long-term performance, and in some extreme cases be outright eliminated.² It is natural to ask whether these limitations to managerial pay are the right

¹See, for example, Rajan (2005, 2008), Richardson and Walter (2009), although there is less than perfect agreement on the effect of managerial compensation on risk-taking (see Section 2).

²For instance, the 2008 German bailout plan required banks accepting state aid to cap annual salaries of their executives at €500,000, and to forgo bonuses and dividend payments. Similarly, in early 2009 the U.S. government capped at $500,000 the pay of top executives at companies that received significant federal assistance. Also in the U.K., Sweden and Switzerland, governments set limits on financiers’ compensation in their efforts to rescue their banking systems.
policy response to the problem. Indeed, it is crucial to ask what is the root of the problem, that is, which market failure in compensation practices has led to rewards for short-term performance at the expense of a build-up of tail risks.

The argument that we explore in this paper is that the root of the problem is the difficulty of rewarding managerial talent when managers can carry out projects with long-term or tail risk and the market allows them to move across firms before that risk materializes. For instance, a trader in a financial firm can set up a “carry trade” and leave the firm before it is known whether the carry represented an arbitrage opportunity or simply reward for risk (so that the trade eventually “blows up”). In this situation managers who take tail risks while moving rapidly across firms raise their short-term performance and pay, while reducing the extent to which they can be held responsible for project failures. When such job churning is possible, competition for managerial talent induces a negative externality, as each firm provides an “escape route” to the employees of others. In contrast, if the market for managerial talent is not very competitive, managers are more likely to be stuck with their initial employer and held responsible for project failures. The contrast between these two labor market regimes is reminiscent of that between the current high-mobility one and that prevailing around the middle of last century: as documented by Frydman (2007) for a balanced panel of U.S. firms spanning 1936 to 2003, the top executives working for a single company for all their life were about 30 percent between 1990 and 2003, down from a 70 percent average from 1940 to 1967.

More specifically, we consider a setting in which managers are risk-averse and risk-neutral firms compete for scarce managerial talent. We model managerial talent as “alpha”, that is, the ability to generate high returns without incurring high risks: lacking such talent, managers can generate high returns only by taking correspondingly high risks.
However, risk materializes only in the long run. So managerial talent can be identified only if managers who have chosen potentially risky projects remain for a sufficiently long period of time with their initial employers: if they leave earlier, the long-term performance of the projects that they have initiated is never learnt, because it is more efficient for the firm to liquidate them.

In this setting, if managers were tied to their initial employer, then over time firms could tell apart the talented from those who are not, and could also insure managers against the risk of finding out that they are not talented. So there would be two efficiency gains. First, a better choice of investment projects: once managers’ skills are known, they can be assigned to the project they are best suited to manage. Second, there is a risk-sharing gain: managers who are revealed to be low-skill can be cross-subsidized at the expense of the talented ones.

However, competition for managers can prevent both of these welfare gains from being fully realized. If firms compete aggressively in the labor market (“seeking alpha”), then managers can leave before the long-term risks that they have incurred materialize. In particular, the managers who are discovered to be high-alpha types will extract all rents from their firms, by generating competitive offers that reward their talent. This prevents firms from subsidizing low-alpha managers. Therefore, if the labor market is competitive, managers face skewed performance rewards before their types are revealed: high-alpha types extract all rents, and low-alpha types get no subsidy. Now, if firms assign managers of unknown quality to risky projects (which they will do if risky projects sufficiently outperform safe ones), then managers have the incentive to move to another firm before the risk of their project has materialized. They are then going to replicate the same behavior in other firms. In the aggregate, many managers will churn from one firm to the next, choosing risky
projects irrespective of their ability to avoid the implied risks. Talented employees will be identified only in the long run: as managers approach the end of their careers, residual risk from being revealed as the low-alpha type declines, so that the demand for insurance through churning wanes.

The benefit of churning to young managers is to delay the revelation of their true quality. We show that if projects carry aggregate risk which delays learning individual manager quality from realized outcomes, then undertaking such projects becomes an alternative way for managers to synthesize insurance. Regardless of the way in which managers synthesize insurance – churning or undertaking aggregate risky projects – the net outcome is that there is inefficiency relative to the case of no competition for managers: since manager types are not revealed sufficiently quickly, efficient allocation of managers to projects does not take place in time and too many projects fail; along the way, managers’ pay is not commensurate to their actual performance.

The model generates several additional results. First, we show that if managers are sufficiently risk-averse, then an increase in the tail risk of projects can lead to greater churning, and thus to greater risk-taking for society. Second, frictions in the labor market for managers (e.g., search costs) can reduce the inefficiency by lowering managerial churning. Conversely, ease in interim liquidation of assets (e.g., opening of securitization markets for loans) can exacerbate the inefficiency by inducing greater churning. Third, limits to deferring managerial compensation only renders it harder for firms to keep employees, exacerbating the inefficiency arising from competition for managers.

To summarize, competition in the market for managers generates an inefficiency due to the contractual externality among firms. The financial sector appears to fit our model particularly well since trading and sales skills are highly fungible across firms, inducing
them to compete keenly for “alpha”. Further, much risk-taking in the financial sector, ranging from holding AAA-rated mortgage-backed securities to selling credit default swaps or longevity insurance, contains aggregate risks and has the flavor of earning a carry (interest or insurance premium) in the short run but with potential long-run risks (default risk or longevity risk). While there are other explanations for incentives to engage in such risk-taking, e.g., government guarantees of the financial sector without adequate risk controls, our model potentially explains why such risk-taking featured even in parts of the financial sector such as investment banks and the insurance sector, which a priori had no access explicit or implicit government guarantees.

The paper is organized as follows. Section 2 discusses the related literature. Section 3 lays out the structure of the model. In Section 4 we solve for the equilibrium and present its novel and testable empirical implications. In Section 5 we relax several of assumptions to explore the robustness of our results. Section 6 concludes with a brief description of the model’s policy implications. Proofs are in the Appendix.

2 Related literature

The paper studies a model of the labor market in the spirit of Harris and Holmstrom (1982). Workers are long-lived, and there is uncertainty about their productivity. Because workers are risk-averse and firms are risk-neutral, the first-best is for firms to fully insure workers, and pay them a constant wage. As Harris and Holmstrom observe, however, full-insurance is not feasible if there is labor market competition and worker mobility. The reason is that, under full-insurance, workers who turn out to be very productive (the good types) will be paid less than their marginal product. So competing firms will want to hire them, leaving the original firm only with low-productivity workers (the bad types).
The innovation in this paper is to introduce a project choice that allows the firm to control whether types become observable or not. If workers are assigned to the safe project, their types stay hidden; while if they are assigned repeatedly the same risky project, their type becomes known. The safe-project option eliminates the Harris-Holmstrom problem, since if productivity shocks are hidden, full insurance is possible. However, this insurance comes at a cost, since knowing a worker’s productivity is useful in selecting the best project for a worker. Hence, our model features a trade-off involving the two information effects discussed in Hirshleifer (1971): information revelation has a cost, because it destroys insurance possibilities, but also a benefit, because it enhances production efficiency. However, in our model the firm only takes into account production efficiency when it assigns workers to projects: insofar as a worker remains with the same employer for more than one period, the employer has the incentive to assign him to the same project and learn his type. Hence, if a worker wants to delay the revelation of his type, he will want to churn across firms: while such mobility will provide insurance, it will lead to persistent inefficiency in worker-project matching. As an alternative to seeing its employees leave, a firm can assign them to projects whose outcome has low sensitivity to the worker’s managerial talent, being dominated by aggregate risk. But also in this case insurance involves sacrificing productive efficiency, which would require early learning of the workers’ quality.

Our results present a countervailing force to the benefits arising from competitive labor markets through efficient matching. Gabaix and Landier (2008) present matching models à la Rosen (1981) in which the rise in CEO pay is attributed to their scarce talent and its efficient matching to larger firms. In contrast, in our setting competition for talent among firms results in less efficient matching of managers to projects within each firm.

The fact that competition for scarce managerial talent introduces in our model an
externality in firms’ wage setting is reminiscent of the corporate governance externalities formalized by Acharya and Volpin (2009) and Dicks (2009): in their models competition pushes firms to incentivize managers via higher wages rather than better governance, a result supported empirically by Acharya, Gabarro and Volpin (2009). In the same spirit, Thanassoulis (2012) shows that competition for bankers generates a negative externality, driving up market levels of banker remuneration and hence rival banks’ default risk: optimal financial regulation involves limiting the proportion of the balance sheet used for bonuses.

In contrast to these papers on governance externalities, our focus is on a dynamic setting in which firms need time to learn about their employees and allocate them to proper tasks, but this is hindered by managers’ ability to generate offers from other firms before their type is learnt.

Labor market competition may also lead companies to rely too much on high-powered incentives, thereby shifting effort away from less easily contractible tasks, such as risk management, towards contractible ones. This point is captured by Bénabou and Tirole (2012), in a multitasking model where workers differ in their productivity in the rewardable task and in their willingness to provide the unrewarded one, i.e. in their work ethic. When these differences are not observable, labor contracts are designed to screen different types of workers. When firms compete for workers, however, they will use incentive pay also to compete for workers: being more attractive to more productive workers, incentive pay also helps firms use to attract or retain them. Under perfect competition, firms end up relying too much on incentive pay and destroying work ethics, compared with the social optimum.

Finally, competition for managerial talent may hinder firms’ ability to discipline managers, generating inefficient managerial compensation in settings with moral hazard. Axelsson and Bond (2009) show that smart workers may be “too hard to manage”, because
their high outside options make them insensitive to firing incentives. De Marzo, Livdan and Tchistyi (2011) show that in a dynamic moral hazard model limited liability may make it too costly for the firm to restrain managers from taking tail risks. Relatedly, Makarov and Plantin (2010) develop a model of active portfolio management in which fund managers may secretly gamble in order to manipulate their reputation and attract more funds, resulting in trading strategies that expose investors to severe losses. Our analysis differs from these models because in our context excess risk-taking does not arise from moral hazard, but from inefficiently slow learning of employees’ skills.

Our paper is motivated by the anecdotal evidence of trader churning in the financial sector (see Tett, 2009, cited in the introductory quote) and the competitive “search for yield” (which we interpret as “seeking alpha”) by financial firms. Rajan (2005) was one of the first to warn about excessive risk taking in financial institutions driven by short-termist pay packages, labeled as compensation for “fake alpha” in Rajan (2008). In another thought-provoking piece, Smith (2009) refers to the role of managerial mobility in entrenching the culture of bonus without performance on Wall Street. Indeed the argument could apply beyond the boundaries of the financial sector, considering that the mobility of U.S. top managers has increased in all sectors since the 1970s (Frydman, 2007), while the idiosyncratic volatility of listed U.S. firms has risen considerably, be it computed from real or financial variables (Campbell, Lettau, Malkiel and Xu, 2001, Comin and Mulani, 2006, Comin and Philippon, 2006, among others).

3An extended quote borrowed from Smith (2009) runs as follows: “In time there was significant erosion of the simple principles of the partnership days. [...] Competition for talent made recruitment and retention more difficult and thus tilted negotiating power further in favor of stars. Henry Paulson, when he was CEO of Goldman Sachs, once remarked that Wall Street was like other businesses, where 80% of the profits were provided by 20% of the people, but the 20% changed a lot from year to year and market to market. You had to pay everyone well because you never knew what next year would bring, and because there was always someone trying to poach your best trained people, whom you didn’t want to lose even if they were not superstars. Consequently, bonuses in general became more automatic and less tied to superior performance.”
Admittedly, there is still no full agreement on the role of pay packages in firms’ risk taking. Fahlenbrach and Stulz (2009) present evidence that bank CEOs lost a significant portion of their stock-based pay and conclude that pay excesses were not the likely cause of risk-taking at financial firms. Bebchuk, Cohen and Spamann (2010) contend this view, by documenting that bank CEOs, including those of Bear Stearns and Lehman Brothers, had paid out to themselves huge payoffs prior to the crisis, greatly in excess of the amounts they lost eventually. So they argue that bank management did benefit from short-term compensation that was not tied to long-run performance, as is the case in our model with managerial churning and the undertaking of aggregate risks. Chen, Hong and Scheinkman (2009) also present evidence linking compensation and risk-taking at financial firms in 1992-2008 that is consistent with payouts to top management being tied to short-term risk-taking incentives. None of these papers, however, examines explicitly the role of employee turnover in generating risk-taking incentives, as we do.

3 Model

There are $K$ profit-maximizing firms (indexed by $k = 1, \ldots, K$), which live forever and are owned by risk-neutral shareholders, and $I$ risk-averse managers (indexed by $i = 1, \ldots, I$), each living for $T$ discrete periods. The analysis will focus on a generation of managers who start their career in period $t = 1$ and retire in period $t = T$.

Firms are competitive and maximize their expected profits. Managers maximize their expected utility $U = E \left[ u(W) \right]$, where $u(\cdot)$ is an increasing and concave function of final (period-$T$) wealth $W$: managers are risk-averse regarding their lifetime compensation, and therefore are concerned about the release of public information about their managerial quality. The assumption that managers only care about final wealth not only avoids dealing
with intertemporal optimization problems (which are not central to the analysis), but more importantly puts no limits on deferring compensation: payments can be deferred to the end of the employment period, at no cost for the employer. The case with partial deferral or intermediate consumption is discussed as an extension.

Each firm can condition its own compensation package on the projects assigned to the manager and on the timing of his possible resignation. The firm does not have recourse to manager’s wealth outside the employment contract. In particular, it cannot encroach on the compensation that the manager has received or will receive from other employers—a realistic assumption about the legal reach of each employment contract. Managers start their career with no initial wealth and have limited liability. This implies that their total payoff from each employment contract cannot be negative. For simplicity, there is no discounting: the interest rate is normalized to zero.

3.1 Projects and managers

Managers can run one new project per period, and each project lasts for two periods. Hence, a manager working with the same firm for his entire career runs two projects in each period, except in the first and the last period of employment. Not all managers are equally talented: a fraction \( p \in (0, 1) \) of them are good at managing risk, and a fraction \( 1 - p \) are bad. Each manager \( i \) initially does not know his own quality \( q_i = \{G, B\} \).

Projects are of two types: safe projects, which only generate an immediate and certain payoff, and risky projects, which produce a large immediate payoff but, in the hands of low-quality managers, eventually entail a loss. Specifically:

(i) safe projects \( S \) yield \( y \) in the first period and 0 in the second period, irrespective of the ability of the manager in charge of it;
(ii) risky projects $R$ yield $x$ in the first period and either 0 or $-c$ in the second period, depending on whether they are matched with a good ($G$) or bad ($B$) manager.

The dependence of the risky project’s revenue on the manager’s type can be interpreted as a reflection of his ability in managing the risky project. Good managers add value to a risky project by reducing its risk (for simplicity, to zero, which is the same level of risk as the safe project), without reducing its expected revenue. In this sense, good managers generate “alpha”, namely they improve the risk-return tradeoff of the firm that employs them. Conversely, bad managers can generate the same short-run return $x$ but only at the future cost $c$.4

A key assumption is that if a manager initiates a project of type $R$, his ability becomes known only if he remains in charge of it for both periods. The assumption that the project’s first-period performance is uninformative captures the idea that failure is an infrequent event (“tail risk”), so that it takes time to screen a person’s ability to manage a risky project. Indeed, to capture the fact that the wait to ascertain the quality of a match can be considerable, in an extension we generalize the model to the case in which the project may have uninformative outcomes even after two periods, so that learning typically requires more than two periods.

By the same token, if a manager leaves after one period, the quality of the project can no longer be gauged. We assume that in this case the project is liquidated, and that in the process the information about the identity of the project’s initiator is lost.5 The reason why

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4 Project $R$ can be interpreted as a carry trade. To generate a profit $x$ the trade needs to be closed in time. So the skilled trader chooses the right time to close the trade and incurs no cost in the second period; while the unskilled trader (who has no clue when to close out the trade) incurs a cost $c$ in the second period.

5 Avoiding such information loss would require an institution that is capable both of (i) pooling information about the identity of the departing manager (obtained from his initial employer) and the eventual performance of the project (from the project’s buyer), and (ii) reselling such information to the new employer of the manager. Establishing such an “information broker” would require an unrealistic level of
incomplete projects are sold is that their in-house completion is inefficient: using another
manager from the firm to complete an unfinished project would prevent him from starting a
new project of his own. In contrast, outside the firm there are managers who can complete
the project at zero cost. In other words, within the firm there is a scarce supply of “creative
managers” who can initiate new projects, while outside the firm there is abundant supply
of “non-creative managers” who can complete them.

If the project is liquidated, it is sold for its expected value \( x - (1 - \lambda)c \), where \( \lambda \)
denotes the probability that the risky project was initiated by a good manager. We assume
that each firm has a large number of managers, so that one can apply the law of large
numbers to compute \( \lambda \): for instance, if the pool of departing managers is representative
of the population, then \( \lambda = p \), so that the price at which unfinished risky projects can be
liquidated is \( x - (1 - p)c \). We assume that

\[
x - (1 - p)c > y > x - c. \tag{1}
\]

The left-hand side inequality indicates that the expected revenue of project \( R \) exceeds that
of project \( S \) if the manager is of unknown quality: this captures the idea that accepting
greater risk entails higher expected return. The right-hand side inequality indicates that
the expected revenue of a safe project exceeds that of a risky one if the manager is known
to be bad. The implication of assumption (1) is that it is optimal to assign bad managers
only to safe projects, and good ones only to risky projects. Assigning bad managers to
risky projects would imply excessive risk-taking.
3.2 Market for managerial talent

We assume that in each period, the pool of projects available to a firm includes at least one safe and one risky project per manager. Therefore, managers – not projects – are the scarce factor of production, since only they can start a new project.\(^6\)

Let \(i\) denote a generic manager, \(k\) a generic firm and \(t\) a generic period. At the beginning of period \(t\), the firm decides whether to make an offer to the manager. The offer consists of a compensation \(W_{ikt}\) contingent on the projects \(\{P_{ikt}\}_{\tau=t}^{\tau=T-1}\) to which manager \(i\) is assigned over his future employment life:

\[
W_{ikt} = W\left(\{P_{ikt}\}_{\tau=t}^{\tau=T-1}\right),
\]

where \(P_{ikt} \in \{R, S\}\) if in period \(\tau\) manager \(i\) is assigned to a risky (safe) project at firm \(k\), \(P_{ikt} = 0\) if manager \(i\) does not work at firm \(k\), and \(W(\cdot)\) is a mapping \((0, R, S)^{T-t} \mapsto \mathbb{R}^+\).

The only constraints on the firm’s choice of compensation are that it must be non-negative \((W(\cdot) \geq 0)\) because of managers’ limited liability, and feasible, namely it cannot exceed the expected revenues generated by manager \(i\) in his employment relationship with firm \(k\). To save on notation, we set \(W_{ikt} = 0\) when firm \(k\) chooses not to make an offer to manager \(i\) in period \(t\).

The manager can accept or reject the offer \(W_{ikt}\): let \(F_{it} \in \{1, 2, \ldots, K\}\) denote the employer he works for in period \(t\). Hence, \(F_{it} = k\) means that manager \(i\) works for firm \(k\) in period \(t\).

It is important to notice that firms can precommit to the wage contracts \(W_{ikt}\). As we will see, this precommitment prevents firms from exploiting any informational advantage

\(^6\)Note that the managers hired by firms have enough experience to be able to initiate a project, even though their quality is unknown. They are not to be confused with inexperienced managers, who are indeed abundant, but are only able to complete projects started by someone else.
that they may gain by gauging their own employees’ ability. We also assume that, in offering such long-term wage contracts, firms bid competitively for managers, anticipating their future performance: hence, managers extract all the expected profits that they will generate in their tenure with any employer. Moreover, while firms precommit to a wage contract, they do not precommit to any specific project assignment: once the wage contract is agreed upon at time $t$, the firm assigns the manager to the projects $\{P_{kt}\}_{t=t}^{T-1}$ that maximize its expected profits.

While *ex ante* there is perfect competition for managerial talent, *ex post* switching costs may prevent it: over time, managers may make location- or firm-specific investments or develop location- or firm-specific tastes, so that other firms cannot poach them. To bring out the implications of *ex-post* competition for managerial talent, we will focus initially on the two polar cases where switching costs are either totally absent – the “competitive regime” – or prohibitively high – the “non-competitive regime”. In both regimes, managerial performance is assumed to be publicly observable: if a manager’s ability becomes known to the current employer, it becomes equally known to outside employers.\(^7\) In an extension, we shall consider an intermediate case where the managerial labor market features some frictions in the form of switching costs.

In the competitive regime, at the beginning of each period a manager can choose whether to leave his current employer or not. In the non-competitive regime, instead, he cannot leave the initial employer once he has accepted the initial offer. Formally, $F_{it} = F_{it+1} = k$ if

\(^7\)However, note that this assumption is inessential in our context, due to the multiperiod nature of the employment relationship. To see why, suppose that a manager’s performance were visible only to his current employer. Then, in the competitive regime a manager who turned out to be good could be hired by an outside employer, who could condition his pay on his subsequent performance. The manager would have the incentive to choose a risky project and remain with the same employer for at least two periods, to allow him to verify that he is good. So even if the manager’s performance were not publicly observed, outside offers would be effectively conditioned on his true type, if this has become known to the manager (and current employer).
manager $i$ employed by firm $k$ in period $t$ chooses to remain there also in period $t+1$, while $F_{it} \neq F_{i(t+1)}$ if the manager leaves firm $k$ at the beginning of period $t+1$. When indifferent between staying with the current firm and leaving, a manager is assumed to stay with his current employer. This tie-breaking assumption can be motivated with the presence of an arbitrarily small switching cost even in the competitive regime.

The difference between the two regimes may capture, for instance, the changing relationship between managers and their employers documented by Frydman (2007), their mobility across companies sharply rising over the last half-century, as their skills became less and less firm-specific. This has certainly been the case in banking, which in past used to entail much local knowledge, so that over their careers bank managers developed employer- and location-specific skills; currently, banking is less local, due to technological change and new financial products. Moreover, corporate loyalty has lost appeal in the world of finance, as noticed by Tett (2009) in the introductory quote of this paper.

### 3.3 Time line

A representative manager lives for $T \geq 2$ periods. Because managers are scarce, in what follows we assume without loss of generality that manager $i$ is employed in all periods. The sequence of actions is as follows:

(i) In period 1, manager $i$ is hired by firm $k$ ($F_{i1} = k$) that pledges to pay him a final compensation $W_{ik1}$. The firm then assigns the manager to a project: $P_{ik1} \in \{R, S\}$.

(ii) In period 2, the manager chooses whether to stay with employer $k$ ($F_{i2} = k$) or to leave ($F_{i2} \neq k$). If the manager stays ($F_{i2} = k$), he completes the project $P_{ik1}$ started in period 1 and employer $k$ assign him to a new project $P_{ik2} \in \{R, S\}$.\footnote{Notice that profit maximization requires the firm to assign the completion of the initial project $P_{ik1}$ to

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leaves ($F_{i2} \neq k$), the project started in period 1 is sold for a price equal to its expected revenues (including any first-period revenue), while the manager is hired by a new firm $j$ ($F_{i2} = j$) that pledges to pay him a final compensation $W_{ij2}$ and assigns him to a new project $P_{ij2} \in \{R, S\}$.

(iii) In any subsequent period from $t = 3$ to $t = T - 2$, the sequence of moves is the same as under (ii) with appropriate change of firm and time indices.

(iv) In period $T$, the manager cannot leave (as he will not be starting a new project), will complete the project started in period $T - 1$ and will consume his final wealth, which is the sum of the compensations awarded by the various employers that have hired him, given by $\mathbf{W}_i = \sum_{k=1}^{K} \sum_{t=1}^{T-1} W_{ikt}$, where $k$ is a generic firm and the terms inside the sum are zero for any firm $k$ and period $t$ in which either no offer is made or the manager rejects the offer.

3.4 Learning about managers’ types

In any period $t$ the employment history of manager $i$ can be summarized by the belief $\theta_{it}$ that his type is good ($q_i = G$). Since in our setting information about the manager’s quality is symmetric, the belief $\theta_{it}$ is shared by all players. At the beginning of his career, the manager’s quality is unknown: he is good with probability $p$ or bad with probability $1 - p$. Hence, $\theta_{i0} = p$. In each period $t$, the belief $\theta_{it}$ is updated on the basis of manager $i$’s performance in period $t$.

As the first-period payoff of a project is uninformative, there is no updating of beliefs in period 1: $\theta_{i1} = p$. In period 2, there is no change in belief if manager $i$ left his initial employer $k$ ($F_{i2} \neq F_{i1}$) or if he managed the safe project in period 1 ($P_{ik1} = S$), that manager $i$, since this allows it to learn his type in period 2 and improve its future project-manager matching.
is, \( \theta_{i2} = p \). If instead the manager did not leave his past employer (\( F_{i2} = F_{i1} \)) and he managed the risky project in period 1 (\( P_{ik1} = R \)), then the second-period revenue of the initial project reveals his quality: if the project’s total revenue \( \pi_{ik1} \) is \( x \), manager \( i \) is revealed to be good and therefore \( \theta_{i2} = 1 \); if instead \( \pi_{ik1} = x - c \), manager \( i \) is revealed to be bad, so that \( \theta_{i2} = 0 \).

Following the same logic, information about the manager’s type is updated in all periods \( t \geq 3 \) as follows:

(i) \( \theta_{it} = 0 \) if either the manager is already known to be bad (\( \theta_{it-1} = 0 \)) or if his quality was unknown in period \( t - 1 \) (\( \theta_{it-1} = p \)) but is revealed to be bad in period \( t \), which happens if he remains with his previous employer (\( F_{it} = F_{it-1} \)) and at \( t - 1 \) had managed a risky project (\( P_{ikt-1} = R \)) that produces a low revenue over its lifetime (\( \pi_{ikt-1} = x - c \)).

(ii) \( \theta_{it} = p \) if previously the manager’s type was uncertain (\( \theta_{it-1} = p \)) and in period \( t - 1 \) he chose the safe project (\( P_{ikt-1} = S \)), or managed the risky one (\( P_{ikt-1} = R \)) and left his previous employer (\( F_{it} \neq F_{it-1} \)).

(iii) \( \theta_{it} = 1 \) if either the manager is already known to be good (\( \theta_{it-1} = 1 \)) or if his quality was unknown in period \( t - 1 \) (\( \theta_{it-1} = p \)) but is revealed to be good in period \( t \), which happens if he remains with his previous employer (\( F_{it} = F_{it-1} \)) and at \( t - 1 \) was assigned to a risky project (\( P_{ikt-1} = R \)) that produces a high revenue over its lifetime (\( \pi_{ikt-1} = x \)).

### 3.5 Strategies and payoffs

At the start of each period \( t \), firm \( k \) offers to any manager \( i \) not currently employed in the firm a compensation based on its belief about the manager’s quality. This belief is conditional only on information available as of period \( t - 1 \), since the offer is made before
period-t revenues are realized. Formally, the firm’s strategy is an offer of the compensation schedule \( W(\cdot \mid \theta_{t-1}) \) to manager \( i \).

If firm \( k \) employs manager \( i \), in each period \( t \) it will assign him to a project, that is, choose \( P_{ikt} \in \{R, S\} \) as a function of the belief \( \theta_{t-1} \) about the manager’s quality, so as to maximize the expected expected revenue:

\[
\pi(P_{ikt} \mid \theta_{t-1}) = \begin{cases} 
  x - (1 - \theta_{t-1})c & \text{if } P_{ikt} = R, \\
  y & \text{if } P_{ikt} = S.
\end{cases}
\]  

The strategy of a manager consists of his period-by-period choice of employer. Formally, manager \( i \) employed by firm \( k \) in period \( t - 1 \) will choose which firm to work for in period \( t \) \( (F_{it}) \) as a function of the belief \( \theta_{t-1} \) about his quality, so as to maximize the expected utility from his compensation \( U(W_i \mid \theta_{t-1}) \).

### 4 Equilibrium

In this section we solve for the equilibrium in each of the two alternative labor market regimes described in Section 3.2, the competitive and non-competitive regime, respectively. If there is \emph{ex-post} competition, a manager can choose to work in a different firm \( F_{it} \) in each period, if he wishes to do so; in contrast, in the non-competitive regime a manager is constrained to remain with his initial employer \( F_{i1} \), so that good managers cannot be poached by outside employers even if their talent has been revealed by their performance with the current employer.

Recall that in both regimes firms are assumed to compete for managers \emph{ex ante}: they all bid for managers, and managers choose the highest bid. Even though in equilibrium this drives their expected profits to zero, we make the usual tie-breaking assumption that they prefer to attract as many managers as possible.
Formally, we solve for the perfect Bayesian equilibrium of the following game:

(i) in any period $t$, firm $k$ chooses to assign manager $i$ to project $P_{ikt}$ so as to maximize its expected profits conditional on the belief $\theta_{it-1}$ about manager $i$’s quality for all periods in which manager $i$ works for firm $k$:

$$\max_{P_{ikt} \in \{S,R\}} \pi(P_{ikt} | \theta_{it-1}) \cdot I_{F_{it}=k} = \pi_{ikt}^*,$$  \hspace{1cm} (3)

where $\pi_{ikt}(P_{ikt} | \theta_{it-1})$ is defined in equation (2), and the matching indicator $I_{F_{it}=k} = 1$ if $F_{it} = k$ and $I_{F_{it}=k} = 0$ otherwise;

(ii) in any period $t$, firm $k$ chooses $W_{ikt}$ so as to maximize its expected profits from hiring manager $i$, conditional on the belief $\theta_{it-1}$ about manager $i$’s quality:

$$\max_{W_{ikt}} \left[ E \left( \sum_{\tau=t}^{T-1} \pi_{ikt}^\tau \mid \theta_{it-1} \right) - W_{ikt} \right] \cdot I_{F_{it}=k}, \hspace{1cm} (4)$$

taking as given the strategy of the manager and those of other firms;

(iii) in any given period $t$, manager $i$ chooses his employer $F_{it}$ so as to maximize his expected utility conditional on the belief $\theta_{it-1}$:

$$\max_{F_{it}} U \left( W_i \mid \theta_{it-1} \right) = E \left[ u \left( \sum_{k=1}^{K} \sum_{s=1}^{T} W_{iks} \mid \theta_{it-1} \right) \right], \hspace{1cm} (5)$$

taking as given the firm’s strategy;

(iv) beliefs are updated as described in Section 3.4.

This defines the equilibrium for the competitive regime. The equilibrium for the non-competitive regime differs from this only because the firm’s problem (4) and the manager’s problem (5) are solved under the additional constraint $F_{it} = F_{i1}$ for all $t$. In other words, either the firm succeeds in hiring manager $i$ in period 1 ($I_{F_{i1}=k} = 1$) or it never does. Hence, the equilibrium allocation of managers across firms is irrevocably set in period 1, and only
the choice of projects can change over time. Since solving for the equilibrium in this case
is simpler, in the next section we start from the analysis of the non-competitive regime.

Before doing so, note that the solution to the optimal assignment problem in part (i) of
the equilibrium as defined above depends only on the belief about the manager’s quality,
once manager $i$ has chosen to work for firm $k$ in period $t$. Since $\theta_{it-1}$ can only take three
values, namely $0$, $1$ and $p$, assumption (1) implies that:

$$(P_{ikt}, \pi^*_{ikt}) = \begin{cases} (R, x) & \text{if } \theta_{it-1} = 1, \\ (R, x - (1 - p)c) & \text{if } \theta_{it-1} = p, \\ (S, y) & \text{if } \theta_{it-1} = 0, \end{cases} \quad (6)$$

that is, managers who are known to be good or of unknown quality are assigned to risky
projects, and managers known to be bad are assigned to safe projects.

### 4.1 Non-competitive regime

When there is no ex-post mobility of managers, firm $k$’s problem (4) simplifies to:

$$\max_{W_{ik1}} \left[ E \left( \sum_{t=1}^{T-1} \pi^*_{ikt} \mid p \right) - W_{ikt} \right] \cdot I_{F_{i1}=k}, \quad (7)$$

because the hiring decision is done only in period 1, where the belief $\theta_{i0} = p$ is based on the
unconditional distribution of managers’ quality. Due to \textit{ex-ante} competition, the solution
to this problem is simply

$$W_{ik1} = E \left( \sum_{t=1}^{T-1} \pi^*_{ikt} \mid p \right). \quad (8)$$

Hence, the equilibrium lifetime wage of manager $i$ is the revenue that he is expected to
generate over his entire career at firm $k$. By their symmetry, all firms pay an identical
lifetime wage, implying that managers are indifferent between them. Moreover, managers
are perfectly insured against the risk arising from their unknown quality: equation (8)
implies that good managers subsidize bad ones.
The firm optimally chooses to assign the risky project to a manager of unknown quality in periods 1 and 2. From period 3 onwards, the firm can condition the project assignment on the manager’s true quality: the firm will assign only risky projects if the manager is discovered to be good, and only safe projects otherwise. Under this policy, over his career the manager will generate revenues

$$\Pi^* = 2[x - (1 - p)c] + (T - 3)[px + (1 - p)y]. \quad (9)$$

The first term in (9) is the expected period-1 and period-2 profits from the risky project undertaken at $t = 1$ and $t = 2$ by a manager of unknown quality (because it takes two periods to learn his type, the manager’s quality is still unknown at $t = 1$, so that assigning him to the risky project yields the highest profit by assumption 1); while the second term is the sum of the expected continuation revenues of the two types of managers in periods 3 through $T$, weighted by their respective frequencies.

This equilibrium outcome coincides with the first best: it features both (i) optimal risk-sharing, that is, complete insurance of managers by firms (as the latter are risk neutral) and (ii) productive efficiency, that is, optimal choice of projects conditional on managers’ quality. So in the non-competitive regime, the managers’ equilibrium final wealth is $\bar{W} = \Pi^*$ and their utility is

$$U^* = u(\Pi^*), \quad (10)$$

while firms earn zero expected profits.

This argument establishes the following result:

**Proposition 1 (Equilibrium under no competition)** *Without ex-post competition for managers, the first-best outcome is attained in equilibrium.*
Note that optimal risk-sharing requires the firm not to condition the salary on the quality of the employees, even though this information is used in the matching of managerial talent to projects. In other words, good managers subsidize bad ones: this cross-subsidy is feasible only because in the non-competitive regime good managers cannot leave the company to get higher pay at other firms. Indeed this cross-subsidization may break down in the competitive regime, to which we turn next.

4.2 Competitive market for managers

When there is \textit{ex-post} competition for managerial talent, the first-best allocation characterized above may no longer be an equilibrium. The key observation is that competition changes the outside options for managers who choose the risky project and remain at least two periods with an employer: since in this case outside employers can infer the manager’s ability, they will bid up to $x$ the per-period compensation of good managers, and offer $y$ to bad ones. From expression (9), it is immediate that the first-best compensation per period, $\Pi^*/(T-1)$, is smaller than $x$ and greater than $y$: hence, if a firm were to offer this compensation, its good managers would leave, while the bad ones would stay. Hence, paying $\Pi^*$ would entail losses, and the cross-subsidization required to provide optimal risk-sharing would become infeasible.

However, the initial employer may offer a contract that still provides optimal risk sharing and deters managerial mobility by imposing a penalty on good managers if they leave the firm. The most effective such contract is one that makes the entire date-$T$ compensation $\Pi^*$ contingent on the manager never leaving the firm: the firm will pay nothing if the manager leaves at any time in his career.\footnote{Recall that, having zero initial wealth and limited liability, the manager cannot be penalized more than this.} Formally, at time 1 firm $k$ offers the following contract
to manager $i$:

$$W_{ik} = \begin{cases} 
\sum_{t=1}^{T-1} E(\pi^*_t \mid p) = \Pi^* & \text{if } F_{it} = k \forall t, \\
0 & \text{otherwise},
\end{cases} \quad (11)$$

where $\pi^*_t$ is the profit generated by the optimal project assignment at time $t$ in firm $k$, from expression (6). The firm that offers this contract earns zero expected profits only if the manager does not leave the company: if he does, it makes positive profits because it earns the revenues produced by the manager but does not pay him anything. But we must check if the manager who accepts this contract has no incentive to leave.

First of all, notice that if a manager plans to eventually leave the firm, under contract (11) he will want to leave no later than the start of period 3, since staying longer would only increase the penalty for resigning. Second, leaving at the start of period 2 is inefficient, because it entails no learning about the manager’s quality, yet it implies a penalty equal to the first period’s revenue. Third, a manager who was revealed to be bad in period 2 has no incentive to leave the firm. Hence, we need only to consider a manager revealed to be good in period 2. If he were to stay with the initial firm, his final wealth would be $\Pi^*$. If instead he were to leave at the start of period 3, he would earn a final wealth $(T-3)x$ from the new employer, as shown above.

The comparison between $(T-3)x$ and $\Pi^*$ yields a cutoff value $\hat{T}$, which defines the maximum career duration that allows the firm to retain its managers through the contract just described:

$$\hat{T} = 3 + 2 \frac{x - (1-p)c}{(1-p)(x-y)} \quad (12)$$

If $T \leq \hat{T}$ the first-best allocation can be sustained even in the competitive regime, while if $T > \hat{T}$ it cannot. Intuitively, if the manager’s career duration $T$ is very short, then he must spend a large fraction of his career with an employer just to be recognized as being of good quality and therefore loses a large fraction of his wealth if he chooses to leave. For instance,
if his career were to span three periods ($T = 3$), he would lose $2/3$ of his lifetime stream of revenue to the initial employer, and only earn $1/3$ with the new one. So leaving would not be optimal, as witnessed by the fact that $\hat{T} > 3$. In this case, the first-best would be feasible. If instead the manager’s career duration is longer, i.e., $T > \hat{T}$, then contract (11) would not deter the manager from leaving. Intuitively, the penalty for leaving (which is the loss of the revenue produced in periods 1 and 2) is small compared to the gain in later periods. In such case, the first-best would not be feasible.

It is instructive to see how the cutoff value $\hat{T}$ responds to changes in the other two main parameters of the problem. In Figure 1, we show that an increase in the fraction of good managers, $p$, expands the range of values of $T$ for which the first-best allocation can be achieved (for instance, for $p$ very close to 1 it can be achieved even for very large $T$): intuitively, the cost of subsidizing bad managers is quite low because there are few of them. In Figure 2, instead, we see that an increase in the excess profitability of a well-managed risky project over that of a safe one, $x - y$, reduces the range of values of $T$ for which the first-best allocation can be achieved: when these excess profits are large, outside employers can lure away a good manager even if his remaining job tenure is relatively short.

The following proposition summarizes the discussion up to this point:

**Proposition 2 (First-best region under competition)**  In a competitive managerial market, the first-best outcome can be attained in equilibrium if and only if the manager’s career duration is sufficiently short, i.e. $T \leq \hat{T}$, where $\hat{T}$ is defined by (12).

What happens when the first best cannot be attained, that is, when $T > \hat{T}$? In this case, contract (11) cannot be offered in equilibrium because managers would leave and firms would make profits. This is inconsistent with equilibrium, because it would lead firms to
deviate from contract (11) by offering a higher compensation.

To find the equilibrium, we start by noticing that, due to competition for managers, equilibrium contracts must lead to zero expected profits, conditional on the current belief about the manager's quality $\theta_{it-1}$. Formally, at any time $t \in (1, ..., T - 1)$ firm $k$ offers the following contract to manager $i$:

$$W_{ikt} = E\left(\sum_{t=1}^{T-1} \pi_{ikt}^* | \theta_{it-1}\right).$$

(13)

What remains to be pinned down to characterize the equilibrium is the managers' choice whether to stay with their initial employer or to leave. We focus on the following candidate equilibrium: the manager changes employer in each of the first $K$ periods, earning the expected revenue $x - (1 - p)c$ per period, with $K \in [0, T - 3]$. From period $K + 1$ onwards, he remains with the same employer. Since the employer will optimally choose project $R$ in periods $K + 1$ and $K + 2$, by period $K + 3$ the manager's quality will be known, so that subsequently he will be assigned project $R$ if good, and project $S$ otherwise. Hence, the manager's problem in (5), upon substituting for the compensation (13) and for the optimal choice of project described above, can be rewritten simply as:

$$\max_K pu (W_G) + (1 - p) u (W_B),$$

(14)

where

$$W_G \equiv (K + 2) [x - (1 - p)c] + (T - 3 - K)x$$

(15)

is the final wealth of a good manager, and

$$W_B \equiv (K + 2) [x - (1 - p)c] + (T - 3 - K)y$$

(16)

is the final wealth of a bad manager. Hence, the manager’s problem reduces to the choice of $K$, namely, the number of periods in which he “churns” jobs: churning is a way for
the manager to delay the revelation of his type and thus obtain insurance, but this comes at the cost of greater inefficiency, as bad managers should be assigned to the safe project rather than the risky one. Therefore, the trade-off is between insurance, which is obtained by delaying the revelation of the manager’s quality (a larger $K$) and productive efficiency, which comes with earlier revelation (a smaller $K$). The two polar cases are $K = 0$ and $K = T - 3$: in the first case, the manager never leaves his initial employer, and thus obtains no insurance (except in periods 1 and 2), but achieves productive efficiency; in the second case, the manager achieves perfect insurance by churning jobs all the time, at the cost of low productive efficiency. The optimal $K$ maximizes expression (14), and is defined implicitly by the first order condition:

$$\frac{u'(W_B)}{u'(W_G)} = \frac{pc}{x - y - (1 - p)c},$$

where $W_G$ and $W_B$ are given by (15) and (16) and the fraction is positive by assumption (1).

Intuitively, increasing $K$ transfers wealth from the state in which the manager is revealed to be good ($W_G$ being decreasing in $K$) to that in which he is revealed to be bad ($W_B$ being increasing in $K$). Hence:

**Proposition 3 (Churning equilibrium)** In a competitive managerial market, if $T > \hat{T}$ in equilibrium the manager switches firm in every period for the first $K^*$ periods, and subsequently remains with the same firm, where $K^*$ satisfies condition (17).

Figure 3 describes the equilibrium in the space $(W_G, W_B)$. Point A on the 45° line represents the final wealth obtained by churning for $T - 3$ periods: in this case the manager obtains the same wealth independently of its type. Point B in the figure represents instead the case in which the manager chooses not to churn. In this case, if his type is good his final wealth ($W_G$) is much larger than his wealth if his type is bad ($W_B$). By setting the
number of churning periods $K$ between 0 and $T - 3$, the manager can choose any point on the segment $\overline{AB}$: this line, whose slope is $-p/(1 - p)$, illustrates the extent to which the manager can self-insure by churning. The optimal choice on that line depends on the probability $p$ of being a good type and on the utility function $u(\cdot)$: in particular, it depends on the marginal rate of substitution between the two states of the world (the state in which the type is good and the state in which the type is bad) and thus on the degree of risk aversion of manager. Intuitively, a more risk-averse manager will choose a higher $K$ to smooth consumption more between the two states. As shown in the graph, the solution is the tangency point between the manager’s indifference curve and the segment $\overline{AB}$.

It is worth noticing that churning for $T - \hat{T}$ periods, where $\hat{T}$ is given in equation (12), and then staying in a firm for the remaining $\hat{T}$ periods cannot be an equilibrium if there is competition for managers. Intuitively, with competition, a firm can only punish departing managers by appropriating the revenue that they have produced within the firm; it cannot claim back what managers have received from previous employers while churning across them. This destroys the bonding mechanism at the basis of the derivation of $\hat{T}$. With competition, insurance can only be achieved by churning every period for up to $K^*$ periods, and this is a dominant strategy when $T > \hat{T}$.

Finally, it is natural to ask whether firms could offer managers to delay the revelation of their type by churning “internally” across projects, without having to switch to other employers: this would be achieved if managers of unknown quality were assigned to a new risky project in every period, liquidating all the resulting incomplete projects. But under our assumptions the firm cannot commit to this project assignment rule: once the wage contract is signed, the firm assigns managers to projects so as to maximize its expected profits, which calls for learning its managers’ quality as fast as possible. Hence, a manager
of unknown quality who were to spend more than a single period with the same employer would see himself assigned to the same risky project twice, and his type revealed.

4.3 Comparative statics

The time that the typical manager spends churning, $K^*$, can be taken as a measure of the inefficiency arising from *ex-post* competition in the managerial labor market. Hence, it is interesting to investigate how $K^*$ responds to changes in the parameters of the problem. To illustrate comparative statics in a simple example where predictions are unambiguous, it is worth focusing on the case where managers have negative exponential (CARA) utility:

Example (Comparative statics in the churning equilibrium: CARA utility) If managers have CARA utility $u(w) = -e^{-\gamma w}$ (with $\gamma \geq 0$), then the optimal number of churning periods is

$$ K^* = \max \left\{ T - 3 - \frac{\log(g)}{x - y}, 0 \right\}, $$

where $g \equiv \{pc/[x - y - (1 - p)e]\}^{1/\gamma} > 1$. $K^*$ is increasing in the managers’ employment horizon $T$, in the degree of risk-aversion $\gamma$, the probability of being a good manager $p$, and is decreasing in the magnitude of tail risk $c$.\(^{10}\)

These results are intuitive. A longer employment horizon $T$ makes the manager more averse to revealing his type, because the implied risk refers to a larger future cash flow, and therefore induces him to churn across firms for a longer interval. By the same token, a more risk-averse manager will seek more insurance, and therefore churn longer: ironically, greater risk aversion by managers imply more risk taking by society! Finally, the demand

\(^{10}\)Expression (18) follows from replacing $u(w) = -e^{-\gamma w}$ in the first-order condition (17) and solving for $K^*$. The expression immediately implies that $K^*$ is increasing in $T$. To establish the other comparative statics results, notice that $K^*$ is decreasing in $g$, and that in turn $g$ is decreasing in $\gamma$ and $p$, and is increasing in $c$. 

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for insurance decreases in its cost, which is increasing in the tail risk $c$ and in the probability of being a bad manager $1 - p$.

The result that a longer employment horizon $T$ implies a longer churning interval $K^*$ extends beyond the CARA case: any risk averse manager will churn longer if his career lengthens. Instead, other comparative statics depend on how risk aversion behaves as a function of wealth. In particular, the response of job churning to a change in tail risk $c$ can be characterized as follows:

**Proposition 4 (Effect of tail risk on job churning)** The length of equilibrium churning period $K^*$ is decreasing in the tail risk parameter $c$ if the manager’s utility function features constant or increasing absolute risk aversion, or constant relative risk aversion exceeding 1.

Intuitively, an increase in $c$ raises the cost of obtaining insurance by churning, and this greater cost has both a substitution effect and a wealth effect on the manager’s desired level of self-insurance via churning. The substitution effect will lead to a reduction in the demand for insurance (and thus induce a reduction in $K^*$), but the wealth effect (due to the fact that a larger value of $c$ implies a lower average payoff for the manager) may increase the demand for insurance if risk aversion is decreasing in wealth (lower wealth being associated with greater risk aversion). The proposition identifies cases in which the substitution effect dominates.

However, there are circumstances in which the effect of tail risk on the churning period $K^*$ goes in the opposite direction relative to what is predicted by Proposition 4. This occurs if managers are very risk-averse and if the parameter $c$ is large, so that the associated wealth effect is sizeable. Indeed in Figure 4, where $\gamma$ is assumed to be equal to 7.5, an increase
in tail risk $c$ is initially associated with a shorter churning period $K^*$, but for sufficiently large $c$ it leads to a longer churning period $K^*$. (More precisely, on the horizontal axis of Figure 4 the tail risk parameter $c$ is standardized by $(x - y)/(1 - p)$, which is the maximum value of $c$ consistent with assumption (1)). In the left-side portion of Figure 4, the substitution effect dominates, so that managers churn less as tail risk increases, while in its right-side portion the wealth effect dominates, so that managers actually churn more if tail risk increases.

Hence, if managers are highly risk-averse and projects feature large tail risk, as in the right portion of Figure 4, they may respond to an increase in tail risk by taking more insurance in the form of churning, rather than less. This would exacerbate the inefficiency arising from delayed allocation of good managers to the risky projects. Hence, paradoxically, in a situation where managers are very risk-averse, an increase in the tail risk of projects would lead to more tail-risk seeking.

A limitation of the model considered so far is that risky projects are perfectly informative about the quality of managers, when these are assigned for two periods to the same risky project. In the next section, we consider a more general version of the model, where we expand the choice of projects to include also a risky project that is not always informative about the managers’ quality, even when a manager is assigned to it in the same firm for two or more periods.

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11 If managers have CRRA utility $u(w) = \frac{w^{1-\gamma}}{1-\gamma}$ (with $\gamma \geq 0$), then the optimal number of churning periods can be shown to be

$$K^* = \max \left\{ \frac{(T - 3)(x - gy) - 2(g - 1)(x - (1 - p)c)}{g[x - y - (1 - p)c] + (1 - p)c}, 0 \right\},$$

where $g \equiv \left[ \frac{\frac{1}{x-y}}{\frac{1}{x-y}-\frac{1}{1-p}} \right] > 1$. Figure 4 plots this expression for $K^*$, assuming $x = 10$, $y = 1$, $\gamma = 7.5$, $p = 0.99$ and $c$ ranging between $x - y$ and $(x - y)/(1 - p)$, i.e. the bounds defined by assumption (1).
4.4 Aggregate risk as a source of insurance

We now consider a setting where managers can be lucky for some time, in the sense that their type is not recognized even if they stick with the same employer for two or more periods. This occurs because the firm has wider choice of projects: besides the risky and safe projects described in the previous section, the firm can choose a new type of risky project, whose payoff does not depend only on the manager’s quality, but also on the realization of an aggregate shock. We refer to this as project $A$, as a mnemonic for “aggregate risk”. Formally, at time $t$ firm $k$ can assign manager $i$ to project $P_{ikt} \in \{A, R, S\}$.

More specifically, we modify the model as follows. First, the risk of project $R$ arises not only from its possible mismatch with managers, but also from intrinsic risk: its first-period payoff is a random variable $\tilde{x} = x + \tilde{u}$, where $\tilde{u}$ is a zero-mean project-specific shock, so that its expected value is $x$ as in the baseline model; its second-period payoff is exactly as in the baseline model: $0$ if the manager is good and $-c$ if he is bad.

Second, project $A$ has the same expected payoff as project $R$ but different risk characteristics. With probability $\beta$, it reflects aggregate risk and not the quality of the manager in charge: its first-period payoff is a random variable $\tilde{a} = x + \tilde{v}$, where $\tilde{v}$ is a zero-mean economy-wide shock, while its second-period payoff does not depend on the manager’s type but has the same mean value as that of project $R$, that is, $-(1-p)c$. With complementary probability $1 - \beta$, project $A$ has the same payoffs as project $R$, and therefore it is sensitive to the manager’s quality. Hence, $\beta$ captures project $A$’s sensitivity to aggregate risk, and

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12 If project $A$ had a lower expected payoff than project $R$, it would be dominated from the firms’ viewpoint, and therefore it would never be chosen. If instead it had a higher expected payoff, firms would prefer it to project $R$ in the interval $K^*$ when managers do not want to have their identity disclosed. Otherwise, the results would be similar to those obtained to those in the text, except that the value of $K^*$ chosen by managers will generally differ from that of the baseline model, since their equilibrium wealth level will be greater.
1 − β its sensitivity to managerial quality.

Employers can correctly identify instances in which project A reflects aggregate risk, since they can observe the performance of other such projects in their own and other firms, and the shock \( \tilde{\nu} \) is common to all of them. In those instances, firms will consider the payoff of project A as uninformative about managers’ quality: if unknown, their quality will remain unknown, even if they do not to switch to a new employer. Managers will then be indifferent between staying with the initial employer or moving to another one, since in either case their type will not be learnt. But assuming a tiny moving cost to break the tie, they will prefer to remain with the initial employer. Instead, when project A turns out to be sensitive to managerial quality, it is completely equivalent to project R, so that managers who wish their type not to be learnt will have to switch to a new employer.

Consider now the firm’s optimal project assignment. When the manager does not want his type to be learnt, project A and project R have the same expected payoff, so that from a firm’s viewpoint they are equivalent. Again, if managers have a tiny moving cost, it is natural to break the tie by assuming that firms will pick project A, which with probability \( \beta \) allows managers to save the moving cost. When the manager is willing to have his type disclosed, so that he does not keep churning if assigned to project R, instead, it will be more efficient to assign him to project R than to project A, since the former will entail faster learning about his type than the latter. Once the manager’s type is revealed, it becomes optimal to assign good managers to project R, by the left-hand side inequality in condition (1); it will also be optimal to assign bad managers to project S if \( y > x - c + \beta pc \), which is a more stringent condition than the right-hand side inequality in (1). Otherwise, project A will dominate project S, which will therefore never be adopted. To preserve the similarity with the equilibrium in the baseline model, we assume that this tighter condition
holds: it effectively requires an upper bound on project $A$’s systematic risk component:
\[ \beta < (y + c - x)/pc. \]

To summarize, from the manager’s standpoint the presence of a project with aggregate risk is a source of insurance that substitutes for switching to a new employer whenever the project’s payoff happens to be determined by aggregate risk, which happens with probability $\beta$. Under the above tie-breaking conditions, this form of insurance is superior to that obtained by churning, so that the mobility of managers will be reduced compared to the baseline model, and firms will assign managers to project $A$ rather than to project $R$ until their type becomes known.

How long will managers want to delay learning their type? It turns out that they will do so for the same number of periods, $K^*$, for which they choose to churn in the baseline model. To see this, consider that the payoff that the managers get in each of these $K^*$ periods is $x - (1 - p)c$ as in the baseline model, since it is efficient for firms to insure them against the risk arising from the aggregate shock $\bar{v}$. The payoffs that managers get once their type is learnt are also the same as in the baseline model, that is, $x$ for good managers and $y$ for bad ones. Hence, their lifetime payoffs $W_G$ and $W_B$ are again defined by expressions (15) and (16), and their choice problem by expression (14). The only difference is that the solution $K^*$ to this problem is no longer the churning interval, but the interval in which managers will prevent their type from becoming known: the only difference relative to the baseline model is that in these $K^*$ periods managers will stay in the same firm with frequency $\beta$ and will churn with frequency $1 - \beta$. Now the firm partly synthesizes an insurance for the manager using the project with aggregate risk, and thus the manager needs to churn less. Since this occurs more frequently the greater is the project’s aggregate risk sensitivity $\beta$, the expected number of periods in which managers churns is decreasing in $\beta$. 
It is worth noticing that the analysis of the first-best case is identical to that of Section 4.1: it is optimal to discover the type as soon as possible and then assign the $R$ project to the good manager and the $S$ project to the bad one. Similarly, the cutoff $\hat{T}$, which defines the maximum career duration that allows the firm to retain its managers in case of competition, does not change. Hence the extent of the inefficiency due to delayed disclosure of the managers’ types is the same as in the baseline model – only the way this outcome is achieved is different.

This discussion is summarized in the following proposition:

**Proposition 5 (Project-level risk)** In a competitive managerial market with $T > \hat{T}$, if firms can choose projects with aggregate risk whose payoff is uninformative about managers’ quality with frequency $\beta$ and is on average equal to that of the risky and informative project, then on average managers churn for $(1 - \beta)K^* \text{ periods and stay in the same firm } \beta$, where $K^*$ satisfies condition (17).

This proposition predicts that, if the aggregate risk $\beta$ exposure of the financial sector increases, managers are less inclined to churn across firms. The inefficiency in managerial assignment is the same as in the basic model: rather than via managerial mobility, delayed recognition of managers’ true skill partly occurs by aggregate risk-taking. If managers could not move across firms, such aggregate risk would not be undertaken, since firms would learn managers’ types as quickly as possible and would never assign managers to project $A$. Hence, the key implication that competition in the managerial labor market leads to inefficiency is present also in this more general version of the model – and indeed under the above assumptions it is the same as in the baseline model.
4.5 Empirical predictions

The model delivers several important predictions that are potentially testable with micro data on the compensation and mobility of low- and middle-level managers or security traders.

First, in the presence of low labor mobility, pay should be high on average but insensitive to the individual ability of employees. This follows from the results of Proposition 1: with low labor mobility, the average pay level should be high because employees are allocated efficiently across projects, and the insensitivity of pay to ability should derive from employees being insured against uncertainty about their own quality.

Second, to the extent that there is labor mobility across firms, employees should switch jobs early in their career, when the risk of being revealed to be low-quality would affect employees’ income for a long part of their overall career, as implied by Propositions 2 and 3. Further, since junior managers are more likely to switch jobs than senior ones, they are more likely to be associated with excess risk-taking by firms.

Third, once employees stop switching across firms, that is, in case of senior employees, wages should become more differentiated across employees, and become more sensitive to individual ability. In other words, in the presence of labor mobility there should be greater cross-sectional dispersion of pay within older cohorts than in younger ones.

Fourth, since by Proposition 5 undertaking projects with high aggregate risk is an alternative to churning, the model predicts that junior employees of financial firms are assigned to projects with greater exposure to aggregate risk-taking and lower sensitivity to individual managerial ability than senior ones, and more so when there is greater labor mobility or competition for talent.
These predictions differ from those delivered by a search model, where workers stop searching upon finding a better match, and therefore a higher wage, than in their previous job. In our model, when workers stop churning, their quality is revealed, and therefore their salary becomes permanently higher (for good types) or lower (for bad types).

5 Extensions

In this section we extend the model analyzed so far, in order to investigate how its insights change when two of its key assumptions are modified. In Section 5.1 we explore how the model’s results change when firms are not allowed to defer all managerial compensation until the end of the employment relationship. In Section 5.2 we consider how frictions in the labor market or in financial markets affect the extent to which managers wish to churn across firms: we consider first an informational friction in the market for managers, arising from the presence of adverse selection, and then a friction arising from search costs in the managerial labor market or from liquidation costs in the market for incomplete projects.

5.1 Limits to deferring compensation

An important assumption made in deriving all the results so far is that there are no constraints on withholding compensation to a manager who resigns. In practice, however, this assumption may neglect legal restrictions: it may be illegal to write an employment contract where the manager is denied compensation for past work because he chooses to switch to a new employer. In practice, at least a portion of the total compensation is paid in the form of salary, to fund intermediate consumption (possibly because otherwise managers would be unable to achieve the desired consumption smoothing due to borrowing constraints).

Limited liability would prevent the initial employer from reclaiming such interim salary
payments: hence, limits to deferred compensation reduce the parameter region where the first-best can be attained, compared to the region described in Proposition 2. Intuitively, the more the firm is constrained in deferring compensation, the lower is the penalty that it can threaten to inflict on resigning managers, and therefore the smaller is the parameter region where it can attain the same employees’ loyalty as in the non-competitive regime – and offer risk-sharing to them. Specifically, it is easy to show that, if part of the total compensation is paid as non-recoverable per-period salary $w > 0$, the maximum career duration for which the first-best outcome can be attained is:

$$\hat{T}(w) = 3 + 2 \frac{x - (1 - p)c - w}{(1 - p)(x - y)};$$

which is strictly decreasing in $w$.

5.2 Imperfections in the labor or asset markets

In this section we consider the effects of imperfections in either the labor or the financial markets that (directly or indirectly) increase the cost of churning, and investigate how these imperfections affect the extent to which workers will churn across employers to delay the revelation of their type.

5.2.1 Asymmetric information

Our assumption of symmetric information between firms and managers is critical to our results. If managers knew their type, then in equilibrium no insurance can be obtained through churning: good managers would stay in their initial firm so that they are revealed as good and can enjoy higher pay. Bad managers would then also be revealed and assigned to safe projects from period 2 onwards.

A less extreme case is one where only a fraction $\phi$ of managers know their type from
the start. In this case, we expect churning to decrease in equilibrium for two reasons: (i) mechanically, the fraction $p\phi$ of managers who know to be good will stick with their initial employer; (ii) managers of unknown type will get pooled with those who know to be bad, and therefore will wish to churn for a shorter period than in the baseline model.

Since by churning a manager of unknown type is pooled with the bad type, the price for an unfinished project becomes $x - (1 - \hat{p})c$, where $\hat{p}$ is the updated probability that the project was started by a bad manager:

$$\hat{p} = \frac{p(1 - \phi)}{(1 - \phi) + \phi(1 - p)} = p\frac{1 - \phi}{1 - p\phi} < p.$$ 

Since $\hat{p}$ is decreasing in the severity of the asymmetric information $\phi$, with $\phi > 0$ the payoff in case of churning decreases from $x - (1 - p)c$ to $x - (1 - \hat{p})c$. Mathematically, the manager’s problem is identical to the case described in Section 4.3 when we considered the effect of a change in $c$. As in that case, the conflict between substitution and wealth effect prevents us to sign the effect on $K$ of this case. If we assume a CARA utility function, it follows from Proposition 4 that the optimal length of the churning period $K^*$ declines with the severity of the adverse selection problem $\phi$, as the cost of insurance increases.

### 5.2.2 Search costs

Consider next the impact of search costs: when the manager leaves his employer, he must hire a headhunter or be unemployed for some time before finding a new job. If we denote this search cost by $s$, the payoff in case of churning drops from $x - (1 - p)c$ to $x - (1 - p)c - s$. Similarly, the market for incomplete projects could be illiquid, in which case firms would have to accept a discount $s$ when selling these projects. This will affect the payoff of the manager in case of churning: his payoff would decrease from $x - (1 - p)c$ to $x - (1 - p)c - s$ because of the search cost. These two imperfections have a similar effect on the churning
equilibrium. The only change in the manager’s problem (14) is that now his final wealth is defined as follows:

\[
\widehat{W}_G = K [x - (1 - p)c - s] + 2 [x - (1 - p)c] + (T - 3 - K)x
\]

for a good manager, and

\[
\widehat{W}_B = K [x - (1 - p)c - s] + 2 [x - (1 - p)c] + (T - 3 - K)y
\]

for a bad manager.

The optimal churning interval \( \hat{K} \) solves the first order condition:

\[
\frac{u'(\widehat{W}_B)}{u'(\widehat{W}_G)} = \frac{p [(1 - p)c + s]}{(1 - p) [x - y - (1 - p)c - s]].
\]

(19)

Notice that this expression exceeds the right-hand side of equation (17) for any \( s > 0 \) and is strictly increasing in \( s \). Also note that if \( s > x - y - (1 - p)c \) then the first order condition (19) cannot hold. Then, the optimal choice is to set \( \hat{K} = 0 \). Intuitively, when the search cost is very high, there is no more churning and no more excessive risk taking. In this case, managers are better off obtaining insurance by choosing the safe project rather than churning.

As before, the conflict between substitution and wealth effects prevents us from assessing whether in general \( \hat{K} \) is smaller or greater than \( K^* \). Following the steps in Proposition 4, this ambiguity disappears in the CARA utility case, where:

\[
\hat{K} = \max \left\{ T - 3 - \frac{\log(\hat{g})}{x - y}, 0 \right\},
\]

and

\[
\hat{g} \equiv \left\{ \frac{p [(1 - p)c + s]}{(1 - p) [x - y - (1 - p)c - s]]} \right\}^{1/\gamma}.
\]

Hence, \( \hat{K} < K^* \) and \( \partial \hat{K} / \partial s < 0 \): an increase in search costs in their job market leads managers to churn less. The same holds true if the parameter \( s \) is interpreted as capturing
frictions in the secondary market for projects, such as illiquidity in the market for loan sales or lack of well-developed securitization markets.

However, as we know from Proposition 4, with different utility functions the effect may go in the opposite direction: with constant relative risk aversion, churning may actually increase in response to greater search frictions if managers are highly risk-averse and these frictions are already severe or project tail-risk is already high (a large $s$ being equivalent to a large $c$). This indicates that frictions are not necessarily stabilizing in the presence of high tail risk.

6 Conclusions

An important economic purpose of the firm is to gather information about its employees’ talents and use it to allocate them efficiently to projects. Such efficient allocation of talent is also considered to be the key role of a competitive market for managers (see Gabaix and Landier, 2008, among others). In this paper we show, however, that when projects have risks that materialize only in the long term, there may be a dark side to competition for managers: by destroying the boundary of the firm that encapsulates its employees, short-run labor market opportunities interfere with the long-run information gathering function of the firm. Indeed, this dark side gets exploited by managers by taking on projects with tail risk and using the labor market to move across firms, delaying the resolution of uncertainty about their talent.

Beside producing a number of testable predictions, the model presented in this paper generates several policy implications. In our inefficient churning equilibrium, no individual bank has the incentive to deviate and unilaterally stop competing for other banks’ managers: in the words of the initial quote by Tett (2009), banks “feel utterly trapped”, and only the
intervention of a public authority (such as FIFA for soccer) can stop banks from poaching employees from each other. No employer can insulate itself from such competition unless all its employees were to sign a no-compete clause and this clause were enforceable – an assumption ruled out in our ex-post competition regime. This assumption is consistent with the fact that we do not observe such no-compete clauses in finance, probably reflecting the scarcity of potentially talented managers and their low loyalty to employers. As a result, in our setting policies that discourage managerial mobility, for instance taxing managers who switch jobs at a higher rate than loyal ones, can improve efficiency: if such a tax is set at a sufficiently high rate, it would effectively move the economy to the first best, although the tax would not be paid in equilibrium, since managers would not switch to other employers. Therefore, a policy prescription from the model is to “throw sand in the wheels” of the managerial labor market.

Another hotly debated policy is to impose a cap on managerial compensation, especially in the financial sector. How would such a policy change the equilibrium in our model with managerial competition? Specifically, would it make churning – and the associated excess risk taking – less attractive to managers? In the model, capping managerial compensation at the first-best level would prevent employers from poaching high-quality managers from each other in the competitive regime, and make the perfect risk-sharing and no-churning outcome sustainable in equilibrium. Hence, capping the pay of top managers of financial institutions may have an efficiency rationale, not just a basis in ethical or political concerns (though this efficiency rationale is yet to be spelled out by those proposing caps). Indeed, according to the model, an appropriately set pay cap would raise the expected utility of managers themselves. It is interesting to note that Bénabou and Tirole (2012) show that also in their setting a cap on managerial pay, and thus a reduction in its sensitivity to
performance, can restore the first best.

Yet another proposal frequently heard in the debate about the design of managerial compensation is its partial deferral (“claw back”) and indexation of deferred compensation to long-term managerial performance. Our model provides a rationale for this kind of proposal: as shown in Section 5.1, anything that constrains the firms’ ability to defer compensation is inefficient.

Admittedly, in richer models some of these policy interventions would also have efficiency costs. Both a salary cap and the equivalent tax on managerial mobility would redistribute income from good to bad managers, which could decrease efficiency in a model in which managers invest in their quality *ex ante* at a private cost – for instance, by taking an MBA, they can raise their probability of being a good manager. In this case, capping their salary (or not revealing MBA grades to employers) would reduce the “average alpha” of managers in equilibrium. Moreover, preventing reallocation of managerial talent may have efficiency costs that are not captured by the present model: if both managers and firms are heterogeneous, they may both learn gradually about the quality of their match, so that it may be efficient for bad matches to be dissolved and new ones be formed. Finally, limiting managerial mobility may confer market power to firms, and thereby create holdup problems. In our setting, this is inconsequential because of *ex-ante* competition, but in reality this assumption may not hold either. Such considerations are worthy of further modeling in the context of our setup, which focused exclusively on one dark side to managerial mobility.
Proofs

**Proof of Proposition 3.** Since in this setting the only reason for switching employer is to preserve uncertainty about one’s type, in a given period \( t \in [2, T - 1] \) a manager will leave the current employer only if he has done so also in previous periods \( t' \in [1, t) \). Otherwise, his type is already known and there is no reason to churn. Conversely, if a manager chooses to stay with the same employer in a given period \( t \in [2, T - 1] \), he has no reason to leave in subsequent periods \( t'' \in (t, T - 1] \). This is because his quality is already known and again there is no reason to churn. Therefore, the equilibrium simplifies to the choice of the length of the churning period \( K \) that maximizes the manager’s expected utility in (14). This is defined by the first-order condition (17). The second order condition is satisfied, since

\[
p_{\pi''} (W_G) (1-p)c^2 + u'' (W_B) [x - y - (1-p)c]^2 < 0,
\]

recalling that \( u'' (\cdot) < 0 \).

**Proof of Proposition 4.** Total differentiation of the first-order condition (17) with respect to \( K \) and \( c \) yields:

\[
\frac{dK^*}{dc} = \frac{pu'(W_G) + (1-p)u'(W_B) + (1-p)(K+2) \{u''(W_B)[x - y - (1-p)c] - u''(W_G)pc\}}{(1-p)pu''(W_G)c^2 + u''(W_B)[x - y - (1-p)c]^2}
\]

Since the denominator is negative, the sign of \( dK^*/dc \) is the opposite of that of the numerator, that is, is the sign of the expression:

\[
-pu'(W_G) - (1-p)u'(W_B) + (1-p)(K+2) \{u''(W_B)[x - y - (1-p)c] - u''(W_G)pc\}.
\]

Upon dividing this expression by \( u'(W_G) \), dividing and multiplying the second term by \( u'(W_G) \), and substituting from (17), one obtains:

\[
\text{sign} \left( \frac{\partial K^*}{\partial c} \right) = \text{sign} \left\{ -\frac{x - y}{c} - (1-p)[x - y - (1-p)c](K+2) [A(W_G) - A(W_B)] \right\},
\]

(20)
where \( A(W) \) is the absolute risk aversion (ARA) coefficient for wealth \( W \). The first term is negative, while the second is negative, zero or positive depending on whether the manager’s ARA is increasing, constant or decreasing in wealth. So a sufficient condition for \( K^* \) to be a decreasing function of \( c \) is that the manager’s utility function features constant or increasing ARA (i.e., is CARA or IARA). But this is a sufficient, not a necessary condition: it may be satisfied even if ARA decreases with wealth. In particular, it is satisfied for constant relative risk aversion (CRRA) utility, provided the relative risk aversion coefficient \( \gamma \) is equal to 1 (log utility) or less than 1, as can be seen by rewriting expression (20) as follows:

\[
\text{sign} \left( \frac{\partial K^*}{\partial c} \right) = \text{sign}(1 - p) \left\{ \frac{x - y}{(1 - p)c} - \frac{W_B - (T - 1)y W_G - W_B}{W_B W_G} \gamma \right\}.
\]

The first term in curly brackets exceeds 1 (by assumption), while the two fractions in the second term are smaller than 1: hence, if \( \gamma \leq 1 \), \( K^* \) is decreasing in \( c \). \( \blacksquare \)
References


Figure 1. First-best equilibrium: career duration $T$ and fraction of good managers $p$

Figure 2. First-best equilibrium: career duration $T$ and high payoff $x$ of risky project
Figure 4. Churning period $K^*$ as a function of tail risk $c$