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Matching Firms, Managers, and Incentives*

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Abstract

We provide evidence on the match between firms, managers and incentives using a new survey designed for this purpose. The survey contains information on a sample of executives' risk preferences and human capital, on the explicit and implicit incentives they face and on the firms they work for. We model a market for managerial talent where both firms and managers are heterogeneous. Following the sources of heterogeneity observed in the data, we assume that firms differ by ownership structure and that family firms, though caring about profits, put relatively more weight on benefits of direct control than non-family firms. Managers differ in their degree of risk aversion and talent. The entry of firms and managers, the choice of managerial compensation schemes and the manager-firm matching are all endogenous. The model yields predictions on several equilibrium correlations that find support in our data: (i) Family firms use managerial contracts that are less sensitive to performance, both explicitly through bonus pay and implicitly through career development; (ii) More talented and risk-tolerant managers are matched with firms that offer steeper contracts. (iii) Managers who face steeper contracts work harder, earn more and display higher job satisfaction. Alternative explanations may account for some of these correlations but not for all of them jointly.

JEL: J3, J5, G3

Keywords: managerial incentives, matching, firm performance, family firms

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1 Introduction

Given the importance of labor as an input in the production process, human resource management is crucial for the success of many organizations and has long been at the core of a rich case study literature in sociology and business studies. Systematic data collection and statistical analysis by economists have started more recently but are expanding at a rapid pace (Ichniowski and Shaw 2007). Using customized survey data, recent studies present evidence on the heterogeneity of human resource and managerial practices across firms and on their effect on firm performance (Black and Lynch 2001, Bloom and Van Reenen 2007, Boning et al 2007, Ichniowsky et al 1997).

A central tenet of incentive theory is that human resource practices affect performance both by influencing the agents' behavior and by determining the selection of agents into the job. For instance, more able and more risk loving agents will find compensation schemes that reward individual performance more attractive. To the extent that some firms have a comparative advantage in providing high-powered incentives, managerial practices can therefore be the mechanism through which firms and agents match.

While there is evidence of considerable heterogeneity among individual managers that matters for firm performance (Bertrand and Schoar 2003), the link between managerial practices and the selection of managers remains unexplored, as surveys that collect information on firms' managerial practices typically do not have information on managers' characteristics and vice-versa.

This paper aims to provide evidence on the match between firms and managers through the adoption of different managerial practices. Using a survey specifically designed for this purpose we collect detailed information on managerial incentive policies – both explicit as performance bonuses and implicit as career advancement – and on the individual characteristics of managers and firms. Informed by incentive theory, we collect measures of the managers' talent and risk aversion, as both variables affect the managers' preference towards different incentive schemes. Likewise, we follow recent developments in organizational theory and evidence (Burkart, Panunzi and Shleifer 2003, Bertrand and Schoar 2006, Bloom and Van Reenen 2007, Leslie and Oyer 2008), and study firm ownership as the key firm characteristics that drives the adoption of different managerial practices. In particular we focus on the difference between the two most common firm owners: dispersed shareholders and families.[1]

We develop a simple theoretical framework to study the role of incentives schemes in matching firms and managers. The model is based on the following primitives. There is a continuum of potential managers, who are heterogenous in terms of talent and risk aversion,

[1] For evidence on the relevance of family ownership see Claessen et. al. (2000), Faccio and Lang (2002). and La Porta, Lopez-de-Silanes and Shleifer (1999).

and a continuum of potential firms, which can be family-owned firms or diffuse-shareholder firms and which can differ in their idiosyncratic cost or revenue component. There is a set of possible contracts that managers and firms can sign, defined by a fixed compensation and the slope of the performance-based component. The power of the contract should be viewed broadly, both as explicit incentives (bonus) and implicit incentives (promotions and dismissals).

An equilibrium is such that: (i) matches between firms, managers and contract are stable; (ii) firms are active if and only if their expected payoff is positive; (iii) managers are employed if and only if they receive at least their reservation utility.

It is important to stress that our model does not assume an exogenous distribution of family firms and non-family firms. In equilibrium, only firms that generate a non-negative payoff to their owners will be active. Rather than trying ex-post to correct for a "survivorship bias," our model offers a set of testable predictions that build on equilibrium firm entry conditions.

The model is based on two key assumptions. First, in line with the "cultural" view of family firms (Bertrand and Schoar, 2006), we assume that the objective function of family owners contains a non-monetary component. We interpret this as family firms valuing direct control *per se*, so that retaining direct control gives rise to private benefits that the owner (the family) can enjoy in addition to the utility from monetary profits. Private benefits can derive from the status associated with leading a business, from the "amenity potential" of influencing the firm's choices (Demsetz and Lehn, 1985), from the appropriation of firm resources for private use, or from the opportunity to use the firm to address family issues, for example finding a prestigious job for a low ability offspring. Valuing direct control is not inconsistent with family ownership *per se* having a positive effect on performance, because, for instance, trust among family members can substitute for poor governance as suggested by Burkart, Panunzi and Shleifer (2003). Our model indeed allows for family firms to have a comparative advantage on other dimensions.

Second, we assume that the presence of talented and motivated managers makes it harder for the owner of a family firm to extract the control benefit that we have just discussed. To see this, consider a manager who has been promised a sizeable share of the value added he creates (the "motivated" part) and who knows that he has the potential to create value (the "talented" part). This manager stands to receive a high payoff and will vehemently oppose to anything that takes productive resources away from their most efficient use. A family owner who faces such a manager will struggle to get her way when she proposes a pet project, or she pushes for a relative to be hired.

This means that family firm owners may be willing to trade off higher profits arising from

good management to contain the risk of losing control. As one Italian family owner puts it:[2]

> "I'd rather be worth 100 million euros, have fun now and enjoy people's respect when I am the senile chairman of my firm, than be worth a billion and get paid fat dividends by a little ******* with a Harvard MBA, who runs my firm and lectures me at board meetings."

Starting from these parsimonious assumptions about the difference between family and non-family firms, we analyze how firms and managers decide to become active, how they match, and which contracts they choose to sign. Moreover, we describe the effort that each manager will exert once employed and the firm's performance, both in terms of profit and control. While the set of equilibrium variables is large and it requires a certain amount of analysis, the resulting equilibrium characterization is quite simple.

The unique equilibrium is characterized by assortative matching and yields four testable implications: (1) Non-family firms have a comparative advantage in incentive provision and tend to offer more performance-sensitive contracts; (2) In a stable assignment of managers to firms, the slope of the contract a firm offers is positively correlated to the talent of a manager and negatively correlated to its risk aversion; (3) Managerial performance is also linked to incentives: in equilibrium managers who face steep contracts exert a higher level of effort, receive a higher expected compensation (both total and variable), and obtain a higher overall expected utility; (4) The firms that are active in equilibrium are those whose idiosyncratic cost advantage is above a certain threshold, which is endogenously determined and is allowed to differ between family and non-family firms. While each individual predictions is consistent with other models, we are not aware of a framework that can account for all four of them.

Our empirical analysis is based on a novel data set that we collected through a survey specifically designed for this purpose. The distinctive feature of our survey is that it collects detailed information on all three components of the match, namely managers' talent and risk aversion, the sensitivity of their pay and career prospects to their performance, and the ownership structure of the firms they work for. The survey was administered to 603 individuals sampled from the universe of Italian service sector executives. Our sample managers rank high in the hierarchy of the firms they work for: 60% report directly to the CEO and a further 28% to the board. Finally, almost none of our sample managers belong to the family who owns the firm, when this is family-owned. For external validation we confront our survey data with managers' compensation history from social security records, and with firms' performance measures from balance sheet data. To the best of our knowledge, this is

[2] Related to us in an email by a top-50 European CEO, with a Harvard MBA. Our translation.

the first dataset – for any category of workers – that combines individual social security data with individual survey evidence, as well as with firm balance sheet information.

The aim of our empirical analysis is to present evidence on the rich set of equilibrium correlations suggested by the theory. While our data does not allow us to identify causal relations directly, the consistency of all the correlations we estimate with the predictions of the model strongly supports its validity. Furthermore, we show that reasonable alternative stories, while able to account for a subset of the correlations cannot explain the whole set, allowing us to rule them out.

The empirical analysis yields four findings, all in line with the theoretical predictions. First, we find that family firms offer flatter compensation schemes. Namely, family firms are less likely to offer bonuses as a function of individual or team performance, and to promote and fire their managers based on their performance. Differences are sizeable: for instance, the chances that a family firm offers a bonus conditional on performance is 23 percentage points lower than in firms with dispersed shareholders, and the chance that a manager was fired because performed poorly is 25 percentage points lower.

Second, we show that steeper incentives attract managers who are more risk tolerant and more talented. Firms offering a one standard deviation steeper contract are more likely to attract high-talent managers by 16 percentage points of the sample mean and the ones they attract have a degree of risk tolerance that is 10 percent above the mean.

Third, we find that managers who are offered steeper incentives exert more effort, receive higher fixed and variable pay, receive more non-pecuniary benefits and (not obviously) are more satisfied with their job. For instance, raising our incentive index by one standard deviation is associated with an increase in the probability that the manager works more than 60 hours a week by 16% of the sample mean, an increase in variable pay by a third of the sample mean and higher chances that he is very satisfied about his job as large as 12% of the sample mean. Reassuringly, the estimated correlation between incentives and pay is robust to using administrative (and thus error-free) social security earnings data instead of our survey measures: hence, the correlation is not due to reporting errors or to survey reporting biases. Even more interestingly, when we use the time variation in social security earnings to compute the volatility of managers earnings through time, we find that steeper incentives are correlated with observed higher earnings variability, consistent with the fact that steeper contracts (as measured in the survey) implies that the managers bear more risk (as measured in observed time series of earnings).

Fourth, we estimate the correlation between incentives and firm performance measures from balance sheet data and find that firms that offer high powered incentives have higher productivity, profits and returns on capital. As this correlation is known in the literature

we do not view it as an original contribution of this paper, but rather as a further external validation of our survey measure of incentives.

We stress that while plausible alternatives can rationalize each of the findings in isolation, they are unlikely to be able to account for them jointly. One prominent such alternative is that family firms have a more effective monitoring technology and hence they do not need to offer high powered incentives. If that hypothesis were driving the results, however, we would expect managers who are better monitored to work harder and to have a higher fixed wage, to compensate for the higher effort. Our estimates indicate that the opposite is true: managers who face weaker incentives work less hard and have a lower base wage. Section 4 discusses this and other alternative explanations in more detail.

Our paper contributes to the literature on human resources management and, more specifically, managerial practices (Black and Lynch 2001, Bloom and Van Reenen 2007, Boning et al 2007, Ichniowsky et al 1997) by providing evidence on one channel through which the adoption of managerial practices that reward individual performance can affect firm performance, that is the selection of more talented and courageous managers.

Relatedly, we provide evidence in support of the trade-off between risk and incentives. In line with classic agency theory but contrary to most available evidence (Prendergast 2002), measures of risk tolerance and incentive power are positively related in our data. Our findings can however be reconciled with the existing evidence by noting that we measure the agent's risk preferences *directly* rather than relying on proxies for risk aversion such as the agent's wealth or using variation in the riskiness of the environment instead of the agent's preferences. Our estimates do not therefore suffer from the bias due to correlated unobservables or endogenous matching discussed in Prendergast (2002) and Ackerberg and Botticini (2002), respectively.[3]

Our paper also contributes to the large literature on firm-employee matching (see Lazear and Oyer 2008 for a review). The distinctive feature of our work is that we highlight one possible determinant of the match value, namely the firm's and the managers' preferences over high powered incentives. Our paper is therefore complementary to Gabaix and Landier (2008) and Terviö (2008), who model the match between CEOs that differ in talent and firms that differ in size to explain the level rather than the structure of managerial pay. While this

[3] Prendergast (2002) argues that delegation is more likely when the environment is more uncertain, and that, because performance pay is positively correlated with delegation, this generates a spurious positive correlation between environment uncertainty and incentive power when the degree of delegation is unobservable. Ackerberg and Botticini (2002) argue that a spurious positive correlation can emerge because risk loving agents are endogenously matched to risky environments and at the same time prefer high powered incentives. Using agents' wealth as a proxy for risk aversion does not solve the problem because the riskiness of the environment is correlated with the error through the proxy error.

is not the focus of our analysis, our evidence shows that some of the key patterns described by Gabaix and Landier (2008) and Terviö (2008) for CEOs also apply to top executives. In particular, more talented managers are matched with larger firms and the level of managerial pay is increasing in firm size.[4]

Finally, we contribute to the literature on family firms that focuses on the effect of family ownership on performance through the choice of CEO and management (Bertrand and Schoar 2006, Perez and Gonzales, 2006, Bennedsen et al 2007, Lippi and Schivardi, 2008). Like these papers we find that family firms may twist the choice of the manager towards less talented ones and thus provide a rationale for why they end up performing worse even when not intrinsically less efficient - as the family firm owner's quote reported earlier seems to suggest. However, while in these papers what affects firm performance is the refusal to choose from a wider set of managers and rely on the restricted pool of family (or social network) members, in our case performance may be affected because less able and risk tolerant managers self-select into family businesses at any time, not only at succession and even among family businesses that choose to be run by professional managers. Our paper is complementary with work by Cai, Li, Park and Zhou (2008). While in our study we compare managers in non-family firms with non-family managers in family firms, they focus their attention on the difference between family managers and outside managers employed by family firms. Evidence from their detailed survey of Chinese family firms reveals that outside managers are offered contracts that are more performance-sensitive. Our and their papers taken together indicate that governance issues play a key role in the process of selecting and motivating managerial talent.

The rest of the paper proceeds as follows. Section 2 discusses the theoretical model and illustrates its main testable predictions. Section 3 presents our data and shows how we map the model's variables into their empirical counterpart. Section 4 shows the evidence. Section 5 summarizes and concludes.

2 Theory

2.1 Model

To produce, a firm requires one manager. Suppose firm i is matched with manager j. The manager generates a product

$$y_j = \sqrt{\theta_j}\,(x_j + \varepsilon_j)\,,$$

[4] Other examples of recent worker-firm endogenous matching models include Garicano and Hubbard's (2007) for law firms, and Besley and Ghatak (2005) and Francois (2007) for the non-profit sector.

where $x_j \geq 0$ is the effort level chosen by the manager, θ_j is the manager's talent, and ε_j is normally distributed with mean zero and variance σ^2 and it s uncorrelated across firms (or managers). The parameter θ_j will be discussed shortly.

The wage that firm i pays to manager j is a linear function of the productivity signal

$$w_j^i = a^i + b^i y_j$$

The compensation scheme should be interpreted broadly. Besides explicit contingent payments, such as bonuses and stock options, the manager can also be offered implicit incentives (career concerns): if he performs well, he will be promoted.

The manager has a CARA utility function

$$U_j = -\exp \gamma_j \left(w_j^i - \frac{1}{2} x^2 \right),$$

where γ_j denotes j's risk aversion coefficient. There is a mass of potential managers, whose human capital θ_j and risk aversion coefficient γ_j are uniformly and independently distributed on a rectangle $[0, \bar{\gamma}] \times \left[0, \bar{\theta}\right]$. The total mass is $\bar{\gamma}\bar{\theta}$.[5] To avoid difficult signaling and screening issues, we assume that the characteristics of individual managers (θ,γ) are observable.[6]

We now turn to firms, which can be owned either by a family (F) or by disperse shareholders (N). The owners of firm i pursue the following objective:

$$V^i = \Pi^i + \left(1 - \phi_g\right) \Gamma^i,$$

where Π^i denotes the standard corporate profit while Γ^i represents some other form of benefit that the owners may receive from the company. This benefit has to do with direct control and can be material (appropriation or personal use of company resources) or of a less tangible sort (the status that derives from managing a company, the utility of keeping the firm "in the family", or the guarantee of prestigious jobs for relatives). The parameter ϕ_g represents the weight that the owners put on the benefit of direct control and it depends on g, the ownership form (to be discussed shortly).[7]

The firm profit is given by:

$$\Pi^i = y_j - w_j^i + h_g - k^i,$$

[5] An important assumption here is that talent and risk aversion are independently distributed. While there is some evidence that (cognitive) ability is positively related to risk taking (Frederick 2005), in our data there appears to be no correlation between risk attitudes and measures of human capital.

[6] If the characteristics were not observable, the manager will have an incentive to pretend that he is more talented than he actually is. However, given θ_j, the manager would have no incentive to mis-represent his risk attitudes because the contract that he is offered in equilibrium maximizes his expected utility given his risk-aversion coefficient γ_j.

[7] The results would continue to hold if we assumed $V^i = \tilde{\phi}^g \Pi^i + \left(1 - \tilde{\phi}^g\right) \Gamma^i$.

where the production y_j and the compensation w_j^i have already been discussed. The third term, h_g, represents an intrinsic profit differential between family and non-family firms. We remain agnostic as to whether this difference is positive or negative. The fourth term, k^i, represents idiosyncratic fixed costs (or profit opportunities) faced by different firms. For both N-firms and F-firms, there is a potential mass of entrants and each entrant i is characterized by an idiosyncratic cost k^i. We assume that firms are distributed as follows: For every $k \geq 0$, the mass of firms with $k^i \leq k$ is equal to k.[8]

The weight that owners put on direct control is ϕ_F in family firms and ϕ_N in non-family firms. Our key assumption is that families put more weight on direct control than diffuse shareholders.[9]

$$\phi_F < \phi_N.$$

Indeed, in family-owned firms, the firm is often perceived as an opportunity to address family issues and frictions and thus owners of these firms naturally value more its role as an "amenities provider". Alternatively, since the boundaries of the firm and those of the family are less clearly defined in family-firms, the transfer of these amenities from the firm to the family is more efficient in family firms and thus more of these amenities are transferred. In either case, $\phi_F < \phi_N$.

The (potential) control benefit is instead given by

$$\Gamma^i = \Gamma_g - b^i \theta_j,$$

where Γ_g is a constant , which may depend on the ownership form g . The second term, $b^i \theta_j$, captures one of the key ideas of this paper: granting control to an outside manager dilutes the owners' ability to extract private benefits from the firm.[10]

The second term is crucial for our analysis and requires a careful discussion. Why is the control benefit that an owner can extract from her firm decreasing in her manager's talent and incentive? We view the term as the reduced form of an un-modeled subgame between the owner and the manager. Suppose the owner can obtain a private benefit by misusing some of the firm's productive inputs (buying a private jet, hiring friends and family, running

[8] Qualitatively, results would be unchanged if one assumed that the distribution of potential F-firms is different from the distribution of potential N-firms.

The entry condition could be extended to allow for the possibility of N-firms to be bought out by families and F-firms to be sold to the market.

[9] In particular, one can assume – although it is not necessary – that diffuse shareholders have no direct control benefit: $\phi_N = 1$.

[10] Even if one assumes that the benefit Γ^i does not depend on the manager's talent θ_j directly (namely that $\Gamma^i = \Gamma_g - b^i$), there is still an indirect complementarity between incentives and talent, because firms that offer high-performance schemes attract more talented workers. Hence, one should expect all our main results to go through (albeit in a less tractable setting).

a pet project, etc.). This happens after the manager is hired and it is non-contractible ex ante. Suppose that the manager can spend effort to prevent the owner from appropriating resources. How motivated will the manager be to fight back?

Owner appropriation reduces the pool of resources that is available to the manager. It is reasonable to expect that the amount of resources available and the manager's talent are complements in the creation of profits. The manager's bonus is then the product of resources *times* talent *times* profit share. The manager's willingness to fight resource appropriation is an increasing function of $b^i\theta_j$.[11]

Besides fitting the quote in the Introduction, our specification is general enough to accommodate various forms of conflict of interest between managers and owners, such as those identified by Burkart, Panunzi and Shleifer (2003) and discussed in the introduction.

To keep notation to a minimum, we set $\Gamma_N = 0$, and $h_N = 0$ (with the proviso that Γ_F and h_F could in principle be positive or negative).

Firm entry is endogenous. In equilibrium: (i) The owners of every active firm i maximize V^i; (ii) A firm i is active if and only if the maximized V^i is greater than the outside option (normalized at zero).[12]

The timeline is as follows:

1. Each firm chooses whether to become active.

2. A matching market between firms and managers opens. Manager-firm pairs sign linear contracts.

3. Managers who are hired by firms choose how much effort they exert.

2.2 Equilibrium

An equilibrium (in pure-strategies) of this model is a situation where:

- A firm is active if and only if it receives a non-negative expected payoff.

- All manager-firm matches are stable, namely no pair made of one manager and one firm, who are currently not matched to each other, can increase their payoffs by leaving their current partners (if any) and signing an employment contract with each other.

[11] One could make this argument explicit in the model. It would require adding a second dimension to the manager effort (fighting back the owner) and modeling the owner's strategic choices. The theory section would become even more complex and long without much gain.

[12] One could have different outside options for F-firms and N-firms, but that would be equivalent to a change in h_F and h_F.

- All managers choose the optimal level of effort, given the contracts they have signed.

The present section offers an informal analysis of the model. A formal result is provided in the end of the section and proven in the appendix.

Let us begin from the last step: effort choice. Given a contract with slope b^i, manager chooses effort

$$\hat{x}_j = b^i \sqrt{\theta_j}.$$

As the surplus created by the relationship can be allocated costlessly to the firm or the manager through the fixed compensation variable a, the contract between the two parties must maximize the sum of their expected payoffs. The surplus-maximizing contract has slope

$$\hat{b}^i\left(\gamma_j\right) = \frac{\phi_g}{1+\gamma_j\sigma^2}.$$

The contract power is decreasing in the risk aversion coefficient of the manager, γ_j, and in the profit weight of the firm owners, ϕ_g. The manager's product given the optimal contract is

$$y_j = \sqrt{\theta_j}\hat{x}_j = \frac{\phi_g}{1+\gamma_j\sigma^2}\theta_j.$$

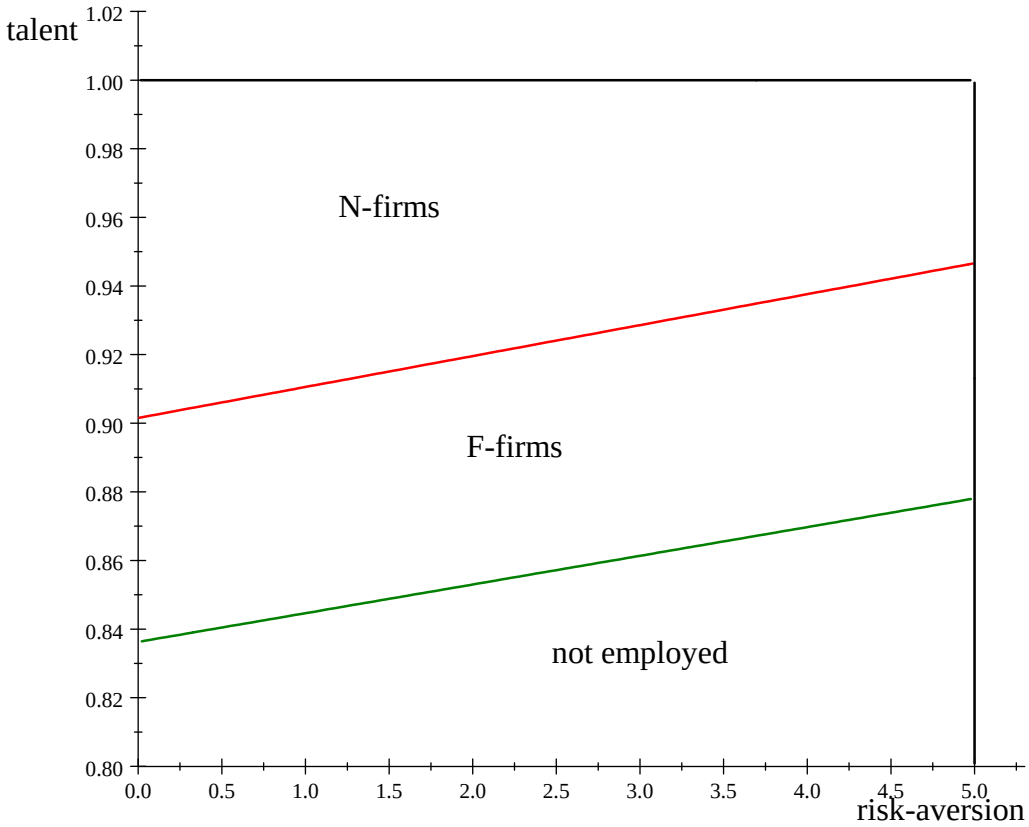
This means that there is a positive complementarity between the profit weight ϕ_g and managerial talent θ_j and a negative complementarity between ϕ_g and the risk-aversion coefficient γ_j. F-firms have a comparative advantage in low-talent, risk-averse managers.

This comparative advantage translates into a matching equilibrium where managers with high talent and low risk aversion work for N-firms, managers with medium talent and higher risk aversion work for F-firms, and less talented managers are unemployed.

To see that this must be the case, consider two managers, a and b, and assume that a is more talented and less risk-averse than b. Suppose for contradiction that a works for an F-firm and b works for an N-firm. The total surplus (the sum of V^i and U_j) generated by the two firms is lower than the total surplus that would be generated by the same two firms if they swapped managers. This means that either the F-firm and manager b or the N-firm and manager a can increase their joint payoff by leaving their current partners and forming a new match. The same line of reasoning applies to an unemployed manager who is more talented and risk tolerant than a manager who is currently employed.

See the figure below for an example of such a matching equilibrium. Managers are uniformly distributed on a two-dimensional space of talent and risk aversion. The space is divided into three regions. The upper left region contains talented risk-takers employed by N-firms. The middle region is made of less talented and more risk-averse managers who work

for F-firms. The managers in the remaining region are unemployed.[13]



Equilibrium allocation of managers to firms

The regions in the figure are determined by indifference conditions. Managers on the line that separates the F-region from the unemployment region receive an expected utility equal to their outside option. Managers on the line between the F-region and the N-region are indifferent between working for N-firm or and F-firm.

The expected payoff of firm i is

$$\begin{aligned} E\left[V^i\right] &= E\left[\Pi^i + \left(1-\phi_g\right)\Gamma^i\right] \\ &= \pi^i + E\left[h_g - k^i + \left(1-\phi_g\right)\Gamma_g\right], \end{aligned}$$

where the term

$$\pi^i = E\left[y_j - w_j^i - \left(1-\phi_g\right)b^i\theta_j\right]$$

[13] The sufficient condition for the equilibrium to be as depicted in the figure is that the upper bound to risk-aversion $\bar{\gamma}$ is not too large. In other words, what is needed is that the heterogeneity in risk attitudes is not as large as the heterogeneity in talent.

can be seen as management-related payoff. Competition among firms guarantees that all active F-firms have the same management-related payoff π^F and all active N-firm have the same management-related payoff π^N. The comparative advantage of N-firms in incentive provision means that $\pi^N > \pi^F$.

The size of the F-region in the figure above corresponds to the mass of F-firms that are active, n_F. Similarly, the size of the N-region equals the mass of N-firms, n_N. The variables n_F and n_N are determined endogenously by the free entry condition. Firm i is active if and only if $E\left[V^i\right] \geq 0$. This means that the F-firm with the lowest payoff satisfies

$$\pi_F + h_F - k^i + (1 - \phi_F)\,\Gamma_F = 0$$

while the N-firm with the lowest payoff satisfies

$$\pi_N - k^i = 0$$

More formally, we have the following equilibrium characterization:[14]

Proposition 1 *Suppose that $\bar{\gamma}$ is sufficiently small. In equilibrium, N-firms and F-firms use contracts with slopes*

$$\begin{aligned} \hat{b}_N\left(\gamma_j\right) &= \frac{\phi_N}{1+\gamma_j\sigma^2} \\ \hat{b}_F\left(\gamma_j\right) &= \frac{\phi_F}{1+\gamma_j\sigma^2} \end{aligned}$$

Manager j is matched with an N-firm if and only if

$$\theta_j \geq \frac{2\left(\pi_N - \pi_F\right)}{\phi_N^2 - \phi_F^2}\left(1+\gamma_j\sigma^2\right) \tag{1}$$

and, if not, he is matched with an F-firm if and only if

$$\theta_j \geq \frac{2\pi_F}{\phi_F^2}\left(1+\gamma_j\sigma^2\right) \tag{2}$$

where

$$\begin{aligned} \pi_F &= \frac{\phi_F^2\left(2+\bar{\gamma}\sigma^2\right)\bar{\gamma}}{D}\bar{\theta}\bar{\gamma} \\ \pi_N &= \frac{\phi_N^2\left(2+\bar{\gamma}\sigma^2\right)\bar{\gamma} + \phi_F^2\left(\phi_N^2 - \phi_F^2\right)}{D}\bar{\theta}\bar{\gamma} \end{aligned}$$

With

$$D = \left(\phi_F^2 + \phi_N^2\right)\left(2+\bar{\gamma}\sigma^2\right)\bar{\gamma} + \left(2+\bar{\gamma}\sigma^2\right)^2\bar{\gamma}^2 + \phi_F^2\left(\phi_N^2 - \phi_F^2\right)$$

[14] The technical condition that $\bar{\gamma}$ is sufficiently small (i.e. there is more heterogeneity in talent than in risk aversion) guarantees that the regions depicted in figure 1 are trapezoids rather than triangles. If the condition fails, one can give an analogous characterization.

Proof. See Appendix. ■

Equation (1) is the condition that determines the boundary between the N-region and the F-region. Similarly, (2) describes the boundary between the F-region and the unemployment region.

From the Proposition, it is also immediate to see that the management-related payoff is greater in N-firms than in F-firms.

2.3 Testable implications

The equilibrium characterization in the main proposition yields four sets of testable implications. Proofs can be found in Appendix.

The first set of predictions relates to incentive power. If an F-firm and an N-firm hire managers with identical risk aversion, the F-firm will offer a flatter contract because it has a higher control premium. Formally, $\phi_F > \phi_N$ implies:

$$\hat{b}_F\left(\gamma_j\right) = \frac{\phi_F}{1+\gamma_j\sigma^2} < \frac{\phi_N}{1+\gamma_j\sigma^2} = \hat{b}_N\left(\gamma_j\right).$$

We can write this result as:

Implication 1 (Firm-Incentive Match) *F-firms offer less steep contracts than N firms.*

This result constitutes a first testable implication: whether one conditions on managers' characteristics or not, F-firms offer contracts that are less performance-sensitive.

Second, the model predicts how managers are matched to incentive schemes:

Implication 2 (Manager-Incentive Match) *The slope of the contract that manager j faces in equilibrium is negatively correlated with his risk aversion coefficient and positively correlated with his talent.*

Proof. See Appendix. ■

Prediction 2 shows how managerial human capital is matched to firms in equilibrium. Managers with high risk aversion and low talent face low-powered incentives. If that was not the case, there could be gains from breaking existing pairs and forming new matches.

We can also predict how the manager's effort and his performance will be related to the incentive scheme he faces:

Implication 3 (Manager Performance) *Controlling for risk aversion, the slope of the contract that manager j faces in equilibrium is positively correlated with the manager's: (a) Effort; (b) Variable compensation; (c) Total compensation; and (d) Utility.*

Proof. See Appendix. ■

Prediction 3 describes what happens to the manager once he is matched to a firm. Managers who face steep contracts work harder. That's both because of the direct incentive effect and because they are more talented (and talent and effort are complements). As a result, they produce more output and they receive more performance-related compensation. Finally, a revealed preference argument shows that managers who are offered a high contract slope must have a higher utility than managers who are offered a less steep contract (because being talented can obtain the same product with less effort).

An additional prediction of our theory is that managers do not have an intrinsic productivity advantage in family or non-family firms. Predictions 2 and 3 imply that all the effects on manager's characteristics and performance come from the incentive structure. Once controlling for incentives, the data should display no residual firm ownership effect.

The model makes also some predictions on the link between incentive provision and firm performance. Before getting into that, it is important to stress that our theory does not say whether performance will be higher in N-firms or in F-firms. This is for two reasons. First, family firms may have some intrinsic business advantage or disadvantage, captured by h_F. Second, the fixed component of Γ_F determines endogenously the threshold of idiosyncratic cost k^i that induce family firms to be active, and hence their performance. As a result, we can construct numerical examples where profits are higher in F-firms and numerical examples where they are higher in N-firms.

However, our model makes predictions on the correlation between firm performance and incentive provision, conditional on governance:

Implication 4 (Firm Performance) *Controlling for ownership, the slope of the contract is positively correlated with the firm's profit* Π^i.

Proof. See Appendix. ■

The intuition for this last prediction is immediate. As an increase in the contract slope b^i reduces control benefits, the firms who choose a higher slope must in equilibrium be compensated with a higher expected profit.

3 Empirical Analysis: Data Description

3.1 Data Sources

Our empirical analysis exploits three data sources: (i) a novel survey of Italian managers that we designed to collect detailed information on their characteristics, the firms they work for and the incentives they face, (ii) Amadeus and the Italian Company Accounts Database, which

contain information on the firms' balance sheets, demographics, and employment levels[15] (iii) the Social Security Database, which contains longitudinal information from administrative records on the managers' job position, pay and employer since they joined the labor force.

The distinctive and unique feature of our survey is that it collects information on both sides of the market: the firms and the managers they employ. In particular, we collect measures of the firms' ownership structure and details on their incentive policies on three dimensions: bonus pay, promotion and dismissal decisions. On the managers' side, we collect information on the managers' risk aversion, talent, work effort, compensation package and job satisfaction.

One advantage of using data from a continental European country like Italy is that all-encompassing rules about collective labor bargaining result in unambiguous job definitions. The job title of "manager" (*dirigente* in Italian) applies only to the set of workers that have a manager collective contract, a fact that is recorded by social security data.[16] Italy has four managerial collective agreements: manufacturing, credit and insurance, trade and services, public sector.

To avoid dealing with sector-specific contractual provisions, we focused on the managers in the trade and service sector. Managers in our sample are selected from the members directory of Manageritalia, an association of professional managers operating in the Italian trade and services sectors. Importantly, Manageritalia members account for 96% of all managers in the trade and service sectors. Hence, by sampling from Manageritalia directory we are sampling from almost the population of managers in that sector. These, in turn, make up for 20% of all Italian managers.[17] The Manageritalia members directory contains 22,100 managers employed by 8,739 firms. To make sure we obtain balance sheet data, we sample from the 2,012 firms that can be matched with Amadeus and the Italian Company Accounts Database. The balance sheet data-sets and, a fortiori, our sampling universe, are skewed towards large

[15] Amadeus is an extensive accounting database covering more than 9 million public and private companies across Europe, of which approximatively 580,000 in Italy. The Company Accounts Database is based on information provided by commercial banks that covers all the banks' largest clients. The data is collected by Centrale dei Bilanci, an organization established in the early 80s by the Bank of Italy and Italian Banks with the purpose of recording and sharing information on borrowers.

[16] There is a very clear distinction between being a manager and the closest collective contract job title, which corresponds to "clerical employee" (quadro in Italian). Indeed the two categories are represented by different trade unions and have different pensions schemes. The difference in terms of social status is also immediately perceived.

[17] Social security data indicate that in 2006, the number of individuals employed on a "manager contract" in the private sector were 117,000. Of these, 23,000 belong to the trade and private service sectors, and 22,100 belong to Manageritalia. Managers working for Italian branches of multinational firms belong to the trade and service sectors even if the firm itself is classified as industry—e.g. car manufacturers—as long as no production plants are located in Italy.

firms. To maintain comparability across managerial tasks we focus on managers employed in the three main operational areas –general administration, finance, and sales. We randomly assign each firm to one of the three areas and randomly select one manager within each firm. The final sampling universe contains 605 each of general directors, finance directors and sales directors, for a total of 1,815 observations.[18]

The administration of the survey was outsourced to Erminero & Co.- a well established survey firm located in Milan, Italy. The 1,815 sample managers were contacted by phone to schedule a subsequent phone interview, administered by a team of 35 analysts trained by Erminero & Co, and closely monitored by our research team. The response rate was 33%, with an average duration of 21 minutes per interview. Thus, our final sample contains 603 observations, equally split across the three operational areas.[19] Our sample managers rank high in the firm hierarchy: most of them (60%) report only to the CEO, and a further 28% directly to the board. Only 2% rank three layers below the CEO. Moreover, 97.5% of sample managers are outsiders, namely they do not belong to the family when the firm is family owned. Reassuringly, respondents and non-respondents are employed by observationally identical firms. Indeed we find no evidence that the probability of participating in the survey is correlated to firm's size, labor productivity, profits, return on capital employed or sector (Table A1 in the Appendix).

3.2 Firm Characteristics and Performance

The main characteristics of our sample firms are summarized in Table 1, Panel A. The table shows that family ownership is the most common ownership structure: 47% of the firms are owned by the founder (19%) or their family (28%). The percentage of family firms is in line with the findings of La Porta et al (1999), who report that 60% of Italian medium-sized publicly traded firms belong to a family (including both founders and second generations firms). Firms owned by dispersed shareholders account for 30% of the sample.[20] The remaining 23% is divided between state-owned and cooperatives (8%), manager owned (2%) and privately owned (13%). As there is no a priori reason to believe that the importance attached to the "amenity potential" of control by these firms is similar to either family firms

[18] We do not sample from the 197 firms for which the Manageritalia member list does not contain managers employed in the main three operational areas.

[19] In our regressions we always include controls for manager operational area. We also collected detailed information on the interview process, including information on the interviewees' tenure in the company, tenure in the post, seniority and gender, and interviewer identifiers. We use these variables to account for measurement error in the survey variables across some specifications.

[20] Dispersed shareholder firms are companies where no party detains more than 25% of the shares. We include in this category also private equity firms (8% of the sample), but the results are qualitatively similar once we include private equity in the residual ownership category.

or dispersed shareholders firms, we keep this category separate in the analysis that follows.

The survey also contains information on firm size, sector and multinational status. Over 90% of the sample firms employ less than 500 people. In more detail, 39% are small firms with 10 or fewer employees, a further 20% have between 50 and 100 employees, and the remaining 41% have more than 100 employees. All sample firms belong to the service sector, within which the three most frequent categories are Wholesale (45% of the sample), Business Services (11%) and Retail and Specialized IT services (4%). Finally, 58% of the firms in our sample are subsidiaries of a multinational company and in 21% of the cases the multinational's headquarters are in Italy.[21]

The last three rows of Table 1, Panel A report measures of firm performance from Amadeus. For each firm we use the last year for which data is available, which is 2007 for 62% of the sample firms and 2006 for 35% of them. We use three measures of performance: labor productivity (defined as operating revenues divided by the number of employees), profits per worker (computed as earnings before interests and tax divided by the number of employees), and ROCE (operating income scaled with capital employed). For each measure we drop the top and bottom 1%, to remove outliers possibly due to measurement errors**.** Table 1 shows that the distribution of productivity and profits is heavily skewed to the left, the median is much smaller than the mean, indicating that there is a long tail of firms that perform considerably better than most of the sample. Finally, we observe considerable heterogeneity along all three measures – the standard deviation is between 1.3 and 2.3 times the mean.

3.3 Incentive Policies

The model in Section 2 makes it precise how different ownership structures affect the choice of incentive policies and how these attract different types of managers. To provide evidence on this issue we collected information on three types of firms' policies that can be made conditional on manager's performance: pay, promotions and dismissals. This way we obtain a detailed picture of the firms' incentive policies and can exploit variation along all three dimensions. For each type of policy we ask whether the outcome depends on the manager's performance and whether this is evaluated through a formal appraisal system. The latter is crucial to ensure that managers know the exact mapping from performance to reward, which determines the effectiveness of the incentive scheme. In fact, our data shows that two thirds of the managers who are formally appraised know exactly how bonus payments are calculated, whereas the corresponding share in firms that do not have a formal appraisal system is one

[21] Most sample firms are incorporated in the region of Lombardy (58%), followed by Emilia (9%), Lazio (9%), Veneto (8%), Piedmont (5%) and Tuscany (5%). This reflects the uneven geographical distribution of firms across the country.

half.

To measure the sensitivity of pay to performance, we asked whether managers can earn a bonus, whether this is a function of performance and whether it is awarded through an established appraisal process. We summarize this information into two variables, *bonus 1* (equal to 1 if bonus is conditional on performance and zero otherwise) and *bonus 2* (equal to 1 if bonus is based on formal appraisal; zero otherwise). Half of the firms in our sample offer bonuses as a function of individual or team performance targets that are agreed in advance;[22] in 33% of firms, bonuses are awarded through a formal appraisal system (Table 1, Panel B).

To measure the effect of performance on the manager's career prospects within the firm we asked whether fast promotion tracks for star performers exist, whether promotions depend on performance (as opposed to tenure or good relationships with the owners) and whether they are decided through formal appraisals. The variable *promotion 1* equals one when fast tracks exist and zero otherwise. We define *promotion 2* to equal one if performance is an important factor for promotion. Finally, *promotion 3* equals one if promotions are decided within a well-defined system of formal appraisal. On average, 37% of sample firms reports to have fast tracks for star performers, promotions depend on performance in 74% of the cases and 34% of firms have a formal appraisal system to determine promotions (Table 1, Panel B).

Finally, we measure whether poor performance can be cause for dismissal, and, again, whether dismissals are decided through a formal appraisal system. The variable *firing 1* is equal to 1 if in the past five years managers have been dismissed due to failure in meeting their performance objectives, and 0 otherwise. Overall, only 11% of firms have dismissed managers in the last five years, and 5% of these report doing so because of poor performance.[23] Finally, *firing 2* equals one when dismissals are decided through a formal appraisal system, and this happens in 23% of the sample firms (Table 1, Panel B) .

For parsimony, we combine the various incentive policies in a sole index that equals the sum of the measures described above. The findings are qualitatively unchanged if we use other summary measures, such as the first principal component. The resulting index takes values between 0 and 7, with higher values denoting policies that create a tighter link between reward and performance. Figure 1 shows there is a considerable amount of variation across firms. Just under 10% of the sample firms offer no explicit reward for performance, while only 0.5% adopt all seven measures. The median firm adopts 2 out of the 7 incentive policies we consider, and the standard deviation of the index is 1.74.

[22] Overall, 70% of the firms offer a bonus scheme, but for 20% the bonus is either a function of firm-wide performance or awarded at the discretion of the owners.

[23] The other, non-exclusive, reasons given for dismissals are "poor market conditions" (4%) and "disagreement with the owners" (6%).

3.4 Manager Characteristics, Pay and Performance

The Manageritalia survey provides a wealth of information on manager characteristics that are summarized in Table 1, Panel C. The average manager is 47 years old, and is male in 90% of the cases.[24]

The theoretical model of Section 2 implies that the key variable driving the firm-manager match is the manager's attitude towards risk. To shed light on this, we follow an emerging literature that tries to elicit individual risk preference parameters and characterize their heterogeneity, either by relying on experiments (e.g. Holt and Laury; 2002) or by using large-scale surveys (e.g. Barsky et. al. 1997; Guiso and Paiella, 2008; Dohmen et al 2005). Thus, our approach differs from most of the literature that analyzes the risk-incentive trade-off using measures of the riskiness of the environment or agents' wealth as a proxy for their risk aversion. As such, it does not suffer from the bias caused by omitted variables and endogenous matching discussed by Prendergast (2002) and Ackerberg and Botticini (2003).

We collected two measures of risk attitudes that aim at measuring the managers' own preference and the riskiness of the choices they make for the firm, respectively. Measures of this sort have been shown to correlate with actual risk taking in a field experiment by Dohmen et al (2005). To measure the managers' own risk preference we ask them to choose between a prospect that yields 1 million euros for sure (the safe choice) and a binary risky prospect that yields 0 with probability p and 10 million with the complementary probability (1-p), where p varies between 0.01 and 0.8 at intervals of size 0.1. Suppose that for very low probability of zero return (and thus a very high probability of making 10 million) the manager prefers the risky prospect to 1 million euro for sure. We take as our risk attitude measure p^*, defined to be the level of p at which the manager switches from the risky to the safe prospect. Obviously p^* is inversely related to risk aversion, that is risk averse managers are willing to bear losses only if the probability is low. Table 1 shows that the average manager prefers the safe prospect when the risky one fails with probability 0.2 or higher. More interestingly, Table 1 also shows that managers' risk attitudes are quite heterogeneous – the standard deviation of our measure is 18.94.

To measure the managers' choice of risk for the firm we ask them explicitly to choose between alternative projects that present a trade-off between risk and expected profits in a qualitative scale from 0 to 10, where 0 indicates the safest and least profitable project.[25] The

[24] This is in line with the figures for the manager population as a whole from social security records. In the last available year (2004), average age was 47 and the share of males 88%. See Bandiera et al (2008) for details.

[25] The question reads as follows: "We would now like you to think to some important decisions you have taken or might take on behalf of your firm. These are strategic decisions whose outcome is uncertain, with a positive correlation between expected earnings and risk. On a scale from 0 to 10, where 0 means you would

average manager is just above the midpoint (5.7) and again there is considerable heterogeneity across managers. Interestingly, the two risk attitudes measures are strongly correlated (correlation coefficient 0.24) consistent with the model idea that managers with a high personal degree of risk tolerance self select into firms where this risk tolerance is required when making strategic decisions for the firm.

To complement our measures of risk aversion we also collect proxy measures for the managers' access to informal insurance. Intuitively, for a given degree of risk aversion, managers who have better access to insurance should be willing to bear more risk in general as this reduces background risk (Kimball, 1993; Gollier, 2004). Following the literature that highlights the importance of inter-vivos transfers from Italian parents to their offsprings,[26] we collect information on the managers' family socio-economic background to proxy for their ability to smooth risk. The underlying assumption is that managers whose parents are wealthy are better equipped to bear risk as the latter can be buffered by their parents' wealth. Throughout we proxy family background by fathers' college education, which is strongly correlated to occupation and income; as Table 1 shows, 16% of the sample managers' fathers have a college degree.

The next set of variables aim to proxy for the managers' talent. The first two refer to the managers' human capital, as measured by college and executive education degrees. In our sample, 50% of the managers hold a college degree, and 56% hold an executive degree.[27] To capture additional aspects of managerial quality beyond education, we measure "desirability" by asking managers whether they received any job offer during the three years prior to the interview; 71% reported that this was the case.

It is important to note that the measures of risk attitudes and talent exhibit independent variation: no correlation between any two measures is higher than 0.06. This is crucial for our purposes as it allows us to identify matching on risk and talent separately.

Finally, Table 1, Panel D reports measures of the managers' effort, remuneration and job satisfaction. We proxy managerial effort by the number of hours worked over a week. In our sample 37% of managers works 60 hours or longer.[28] The average annual fixed salary of a manager is approximately 100,000 Euro, while the bonus amounts on average to 15% of the fixed salary. On average, managers in our sample receive 4.2 non-monetary benefits

choose the safest option with the lowest expected earnings while 10 refers to very risky projects that have a very high rate of return in case of success, what would you choose?"

[26] See, e.g., Cannari and D'alessio (2008) and Guiso and Jappelli (1999).

[27] This relatively low figure is consistent with the information arising from existing surveys of Italian managers (see Bandiera et. al., 2008).

[28] To minimize measurement error due to the choice of a particular week, the survey asks managers to pick the number of hours they work in the "typical" week out of 5 possible choices: (i) 40 hours or fewer, (ii) about 40 hours, (iii) about 50 hours, (iv) about 60 hours, (v)60 hours or more.

out of a list of seven potential benefits.[29] Finally 50% of the managers in our sample report to be "extremely satisfied" about their job. Only 5% report to be "unsatisfied", while the remaining part of the sample is "satisfied".

4 Empirical Analysis: Findings

We organize the empirical evidence in four parts that match the four set of predictions obtained in Section 2. We start estimating the correlation between the firm ownership and the strength of managerial incentives. We will show that, in line with the model, family firms are less likely to adopt bonus systems related to individual or team performance, and to promote and fire their employees based on performance. Second, we estimate the relation between the firms' incentive policies and the risk and talent of the managers they hire in equilibrium. We will show that firms offering stronger incentives attract managers who are more risk tolerant and more talented. Third, we estimate the link between the strength of incentives and managers' outcomes. We will show that managers who are offered stronger incentives exert more effort, receive higher fixed and variable pay, receive more non-pecuniary benefits and are more satisfied with their job. Fourth, we estimate the correlation between incentives and firm performance. We will show that firms that offer high powered incentives have higher productivity, profits and returns on capital.

It is important to make precise that our aim is to present evidence on a rich set of equilibrium correlations that are suggested by the theory. We do not, at any stage, aim at identifying the causal effect of ownership on incentives or incentives on performance, as neither varies exogenously. However, at the end of this section we discuss a number of alternative interpretations of our findings and argue that, when taken together our evidence while consistent with the matching model, is not consistent with any of these alternatives.

4.1 Firm Ownership and Incentives

We first test Prediction 1, namely that, compared to firms owned by disperse shareholders, family firms offer a weaker link between reward and performance. Table 2 shows the means of our personnel policy measures by firm ownership. The Table reveals that on all but one of the seven dimensions, incentives offered by family firms are weaker. Family firms are less likely to offer bonuses based on individual performance (44% versus 57%), to have promotion fast tracks (32% versus 41%) and to have dismissed managers for failure to meet

[29] The list of benefits include: company car (available to 83% of our sample managers), flexible hours (85%), telecommuting (27%), training (71%), sabbatical periods (6%), health insurance (74%) and life insurance (74%).

performance targets (3% versus 6%). Family firms are also less likely to award bonuses, decide on promotions and fire employees through a formal appraisal process and in all cases the gap between the two types of firms is not only statistically significant (see last column) but also substantial. Only performance seems to matter for promotions regardless of ownership.

In Table 3 we test whether these differences are robust to controlling for a rich set of manager and firm characteristics, which might create a spurious correlation between firm ownership and incentive policies. We estimate the conditional correlation:

$$P_{ij} = \alpha^F D_j^F + \alpha^o D_j^o + \mathbf{X}_j \boldsymbol{\beta} + \mathbf{Y}_i \boldsymbol{\delta} + \varepsilon_{ij} \tag{3}$$

where P_{ij} are the different incentive policies adopted by firm j as reported by manager i, $D_j^F = 1$ if firm j belongs to its founder or a family and 0 otherwise, $D_j^O = 1$ if the firm belongs to the government, a cooperative or its managers and 0 otherwise. The coefficient of interest is α^F, namely the difference in incentive policies between family-owned and dispersedly owned firms. Throughout $\mathbf{X}_j$ includes the firm's multinational status, employment levels, and SIC2 industry codes. $\mathbf{Y}_i$ includes the manager's tenure, seniority level, whether he belongs to the owner family, and his operational area (general administration, finance, sales).[30] Finally we insert interviewers' dummies and control for the duration of the interview to account for potential noise in the measurement of the incentive policies.

Table 3 shows that the difference in personnel policies between family firms and firms owned by disperse shareholders are indeed robust to the inclusion of this rich set of controls. The first two columns estimate (3) for the aggregate index built as the sum of all seven policy measures. Both in Columns (1) and (2) α^F is negative and significantly different from zero at conventional levels. The magnitude of the coefficient indicates that the differences between family and dispersed shareholder firms are large: with the full set of controls the incentive index is 0.51 points smaller in family compared to dispersedly owned firms. This difference amounts to 18% of the sample mean and 30% of a standard deviation of the incentive index. The remaining columns estimate (3) for the three subcomponent of the index: bonuses, promotions and dismissals. Throughout α^F is negative and significantly different from zero at conventional levels, indicating that family firms choose low powered incentives on all dimensions.

Table 3 also shows that high powered incentives are more likely to be offered by firms that are part of multinational corporations. None of the other controls are correlated with

[30] On average, managers have 6.6 years of tenure (standard deviation is 3.6). Seniority is characteristic of the standardized managerial contract. In our sample 7% have a lower management contract, 72% a middle management contract and 21% an upper management contract. Only 2.5% of our sample managers belong to the family who owns the firm. Finally, by construction, managers are equally split between the three operational areas.

incentive policies. Namely, the strength of incentives is not correlated with firm size or industry sector, or with the managers' tenure, seniority and operational area.

While the findings are consistent with the Prediction 1, and hence with the assumption that family firms put more weight on the "amenity value" of control, ε_{ij} contains all other unobservable characteristics that differ by ownership and could be driving the results. For instance, family firms might have a better monitoring technology and hence less need to offer performance incentives. We will discuss this and other alternative explanations at the end of this section.

4.2 Incentives and Managers' Characteristics

Next we test Prediction 2, namely that high powered incentives attract managers who are less risk averse and, conditional on risk aversion, more talented. Starting with risk aversion, we estimate the conditional correlation:

$$R_i = \eta^R I_j + \mathbf{X}_j \boldsymbol{\zeta}^R + \mathbf{Y}_i \boldsymbol{\sigma}^R + \epsilon_{ij}^R \tag{4}$$

where R_i is a measure of the manager risk aversion, I_j is the incentive policies index and $\mathbf{X}_j$ and $\mathbf{Y}_i$ are the vectors of firm, manager and interview controls defined above.

Columns (1) and (2) estimate (4) for our measure of the manager own risk preferences with and without the controls vectors $\mathbf{X}_j$ and $\mathbf{Y}_i$. Recall that our risk preference measure –the probability of failure of the risky project the manager is willing to bear– is inversely related to risk aversion. Columns (1) and (2) then show that risk tolerant managers are more likely to be offered high powered incentives. The estimates of η^R are positive and significantly different from zero at conventional levels. Column (2) estimate implies that one standard deviation increase in the index is associated with a 1.75 increase in the risk preference measure, or 10% of a standard deviation of the risk tolerance measure.

It is important to note that the interpretation of the findings is qualitatively unaffected if our measure captures the manager's risk attitudes when he takes a decision on behalf of his firm instead of his individual risk aversion parameter γ_j. If so, our measure effectively captures $b^i\gamma_j$, namely the portion of the risk taken by the firm that ends up to the manager through his incentive scheme. Note that the finding that $b^i\gamma_j$ is smaller when b^i is higher implies a fortiori that γ_j is smaller when b^i is higher.

In Columns (3) and (4) we define R_i directly as the manager's own account of the risks he takes on behalf of the firm using our second measure of the manager's risk attitude. The findings indicate that high powered incentives are associated with managers who take more risks. The estimates in Column (4) show that one standard deviation increase of the index is associated with a 0.17 increase in the risk measure, or 10% of its standard deviation.

As a complement to our measures of attitude towards risk, in Columns (5) and (6) we regress the manager's father education level, as a proxy for the availability of informal insurance through his family, on the incentive index. In line with the earlier results, we find that managers whose fathers are better equipped to offer insurance are matched to firms that offer steeper incentives. One standard deviation increase in the incentive index increases the probability that the manager's father has a college degree by 0.05 (30% of the sample mean).

The second part of Implication 2 indicates that, conditional on risk aversion, high powered incentives attract more talented managers. To test this, in Table 5 we estimate the conditional correlation:

$$T_i = \eta^T I_j + \lambda^T R_i + \mathbf{X}_j \boldsymbol{\zeta}^T + \mathbf{Y}_i \boldsymbol{\sigma}^T + \epsilon_{ij}^T \tag{5}$$

Where T_i are measures of the manager's talent, R_i is the measure of the manager's own risk tolerance and all the other variables are defined above. The findings in Table 5 provide broad support to the prediction that "better" managers are attracted by steep incentives. For all our measures of talent, η^T is positive and significantly different from zero at conventional levels. Namely, managers who work under high powered incentives are more likely to have a college degree, to have attained executive education and to be "desirable", namely to have received job offers from other firms in the last three years. Using the estimates with the full set of controls, we find that one standard deviation increase in the incentive index increases the probability that the manager has a college degree by 0.08 (16% of the unconditional mean), that he has an executive education degree by 0.10 (18% of the mean) and that he has received outside offers by 0.08 (17% of the mean). Finally, we note that there is a positive correlation between firm size and managerial talent: larger firms are more likely to hire more skilled managers. This is in line with the prediction of a large class of manager-firm matching models, from Lucas (1978), to Rosen (1982) and Tervio (2008).

4.3 Incentives and Managers' Outcomes

Implication 3 links the firms' incentive policies to managers' effort, pay and job satisfaction. It predicts that, holding constant their risk tolerance, managers who are offered steeper incentives work harder, receive higher fixed and variable pay and have higher utility. To provide evidence on this, Table 6 reports estimates of the conditional correlation:

$$O_i = \eta^O I_j + \lambda^O R_i + \mathbf{X}_j \boldsymbol{\zeta}^O + \mathbf{Y}_i \boldsymbol{\sigma}^O + \epsilon_{ij}^O \tag{6}$$

Where O_i are our measures of managers' outcomes and all the other variables are defined above. Proxying effort by hours worked, Columns (1) and (2) show that managers who are

offered steeper incentives work longer hours. The estimate of η^O is positive, and statistically and economically significant. One standard deviation increase in the incentive index is associated with a 0.06 increase in the probability that the manager works more than 60 hours per week, which corresponds to 16% of the sample mean.

Columns (3) to (6) show that managers who are offered steeper incentives receive higher fixed and variable pay. The estimates of η^O with the full set of firm and manager controls indicate that one standard deviation increase in the incentive index is associated with an increase of 2,900 euros in fixed pay and an even larger amount of 4,375 euros in variable pay. These correspond to 10% and 25% of one standard deviation in fixed and variable pay, respectively. Managers who are offered steeper incentives also receive a larger number of job benefits. The estimates in Column (8) imply that one standard deviation increase in the incentive index is associated with 0.24 more benefits, equal to 17% of a standard deviation of the number of benefits in the sample.

Finally, to measure the managers' level of utility we ask them to report their level of satisfaction on the job. Only 5% report to be unsatisfied, while 45% is satisfied and 50% is very satisfied. Columns (9) and (10) show that managers who are offered steeper incentives feel happier. According to the estimate in Column (10), one standard deviation increase in the incentive index is associated with a 0.06 increase in the probability that the manager reports to be very satisfied, which is as large as 12% of the sample mean.

4.4 Incentives and Firms' Outcomes

The final step of our analysis presents evidence on Prediction 4, which suggests a positive correlation between incentive policies and firm performance. Though, as said, our data does not allow us to identify a causal relationship, we are nevertheless interested in establishing whether the data are consistent with this model prediction.

In Table 7 we estimate the conditional correlation over a repeated cross section:

$$Z_{jt} = \theta I_j + \mathbf{X}_{jt}\vartheta + \boldsymbol{\kappa}_t + \omega_{jt} \tag{7}$$

where Z_{jt} measures the performance of firm j in year t, $\boldsymbol{\kappa}_t$ are year fixed effects and all other variables are as defined above. We consider three alternative measures of firm performance a) labour productivity (log of sales/employees); b) profits per employee; and c) return on capital employed, all measured yearly for the period 2004 to 2007. To account for the fact that error terms ω_{jt} are correlated within firm across years we cluster the standard errors at the firm level. Firm performance measures are obtained by matching our survey data with Amadeus, an extensive accounting database covering more than 9 million public

and private companies across Europe, of which approximately 580,000 in Italy.[31] Once we clean the accounting data dropping the first and the bottom percentiles of the performance variables and taking into account missing observations for some items, we end up with a sample of 554 observations.[32]

The estimation results are reported in Table 7. Two points are worth noticing. First, the incentive index carries a positive coefficient significant at conventional levels for all measures of productivity. A one standard deviation increase in the incentive index is associated with a 5%, 8% and 9% of a standard deviation increase of log-productivity, profits and return on capital, respectively. Second, this finding is robust to controlling for ownership structure; namely it is not merely due to the incentive index capturing systematic differences in performance directly due to different ownership structures. The estimates of the coefficient on family ownership is negative throughout but only precisely estimated for labor productivity. Thus, once differences in the power of incentives are accounted for, we find no evidence of a systematic difference in profits between family and shareholder owned firms, a feature itself in line with the implications of our model with endogenous firm entry.

4.5 Alternative Interpretations and Other Concerns.

Taken together our findings are consistent with the rich set of equilibrium correlations suggested by the model outlined in Section 2. Ownership type is correlated with incentive policies: compared to firms owned by disperse shareholders family firms offer lower powered incentives. In turn, incentive policies are correlated with the type of managers hired in equilibrium: the strength of incentives is positively correlated with the managers risk tolerance and with their talent. Incentive policies are also correlated with managers' effort, their compensation package and their utility: managers who face stronger incentives work harder, receive higher fixed and variable pay, and (not obviously) are happier. Finally, stronger incentives are positively correlated with firm performance.

We stress again that we do not aim, at any stage, to identify the causal effect of ownership on incentives or of incentives on performance, as neither varies exogenously. Rather, the purpose of our empirical analysis is to show evidence on a comprehensive set of correlations that are predicted by our theoretical framework. The force of the evidence rests on the consistency of the findings across different domains. In this final section we discuss whether our findings can also be consistent with some plausible alternatives. We will show that while single findings may indeed be consistent with one or another of these stories, the entire set is not.

[31] To match the two datasets we use the unique company identifier *Codice Cerved*.

[32] The results are qualitatively similar without these cleaning procedures.

We first note that while the estimates of (3) are consistent with the interpretation that family firms offer weaker incentives because they put relatively more weight on the amenity value of control than non-family firms, other interpretations are possible. In fact, the error term ε_{ij} contains unobservable firm characteristics that may be correlated with both ownership and incentives.

A first concern is that both ownership and incentives are reported by the same survey respondent and might therefore be correlated through the response error. To allay this concern we use external ownership information from the AMADEUS data base and find that the estimates of (3) are qualitatively and quantitatively similar to those reported in Table 2.[33]

A second possibility is that family firms have a better monitoring technology and hence less need to offer explicit performance incentives (Roe, 2003; Mueller and Philippon, 2008). This would explain the observed correlation between ownership and incentives. However, such a hypothesis implies that family firms have a comparative advantage in incentive provision, which in turn would lead to three conclusions, which are all falsified in the data.

First, managers who face better monitoring should work harder. To the extent that hours worked are a proxy for effort, the estimates of (6) indicate that the opposite is true: managers who face weaker explicit incentives work less hard.[34]

Second, better monitoring implies higher productivity. In a competitive labor market, where firms are competing to hire managers, then more productive managers should be paid more. The estimates in Table 6 show that the opposite is true: both fixed and variable pay are lower in family firms.

Third, if effort and talent are complements in the production function (as it is standard to assume), a comparative advantage in monitoring should translate in a comparative advantage in employing talented managers. But the estimates of (5) suggest the opposite: managers who face stronger incentives are more talented.

A related hypothesis is that family firms have access to other technologies to motivate managers, e.g. non-taxable benefits, and hence need not offer explicit monetary incentives to reward performance so that effective performance is better rewarded when our measure of incentives is low. If this were the case, however, we should observe low powered incentives to be correlated with higher managerial talent and effort. The estimates of (5) and (6) indicate the opposite.

A second class of concerns arises because the residuals in (4),(5) and (6), contain unobserv-

[33] AMADEUS contains ownership information for 552 of the 603 sample firms. Results, not reported for reasons of space, are available upon request.

[34] Of course, one can always argue that the number of hours and weekends worked is not a good proxy of effort.

able managers' characteristics that can generate a spurious correlation between the incentive index and the outcome of interest. This concern is particularly serious in survey-data because unobservable psychological characteristics of the respondent may lead to systematic mis-reporting.

For instance, managers who are more self-confident might be more likely to overestimate their control over their pay, hence more likely to report facing high powered incentives, and at the same time more likely to take risks and to overestimate their earnings. Unobservable self-confidence could therefore generate a spurious correlation between incentive power and risk tolerance, and between incentive power and earnings.

We begin by noting that, at a minimum, the estimated correlations cannot be *entirely* driven by unobservable characteristics, because, as we have seen in the previous sections, *the incentive policies reported by managers* are significantly correlated with a number of firm variables which we obtained from objective balance sheet information (see for instance Table 7)

Next, we can probe the robustness of our survey data directly using social security records that contain detailed information on the managers' pay and occupation since the beginning of their careers. Hence we can estimate (6) using the social security administrative earnings data that are not affected by perception errors or other managers' unobservable traits that may contaminate self-reported variables. Table 8 reports the estimates of:

$$Q_i = \varphi I_j + \mathbf{Y}_i \psi + \zeta_i \tag{8}$$

where Q_i is the logarithm of manager i's pay and the vector of controls $\mathbf{Y}_i$ includes the manager's seniority level, whether he belongs to the owner family, his tenure in the current firm and category (general administration, finance, sales), overall tenure since his first job, the number of firms he has worked for, and the average number of weeks worked in a year, duration of the interview and interviewer dummies. For comparison, columns (1) and (2) report the estimate of (8) using pay data from the survey, whereas in Columns (3) and (4) we use pay data from the social security records. Throughout φ is positive and precisely estimated. Moreover, the estimates of φ obtained with our survey data or with the social security records are quantitatively similar, reassuring us directly on the reliability of our survey earnings and indirectly on our incentive index.

Since the social security records contain information on the managers' entire careers, we can further refine the evidence that incentive policies are matched to the managers' type by regressing managerial pay in *previous* jobs on current incentives. Under the plausible assumption that managers' risk attitudes and ability are stable traits one should find that a given managers matches with firms that offer similar types of incentive contracts. Consistent

with this, columns (5) and (6) show that managers who currently face high powered incentives, had higher levels of pay throughout their career.

Finally, while the social security records do not contain information on the managers' risk preferences, it allow us to measure earnings variability, which, by revealed preference, is an indicator of the risk the manager is willing to bear. To provide further evidence on the validity of our incentive measure we exploit the time variation in earnings in the social security records and test whether high powered incentives result in a higher earnings variability, as they should if the managers who face steep incentives bear more risk in equilibrium.[35]

We estimate the same specification as in (8) with the standard deviation of yearly pay computed over the managers' time at the firm on the left hand side. Columns (7) to (10) show that earnings variability and the power of incentives are correlated: managers hired by firms that offer high powered incentives face more earnings variability, and have done so throughout their careers. This is additional evidence in support of our matching model: throughout his career, a bold, talented manager tends to be matched with firms that offer steep incentives.

5 Conclusions

Models of corporate control, theories of the firm and models of entrepreneurship have each emphasized a particular type of heterogeneity: corporate control models have stressed the distinction between family and non-family firms; heterogeneity in managerial ability has been argued to be central for understanding the size and success distribution of firms; diversity in preference for risk has been taken to be a critical feature in models of occupational choice and entrepreneurship. In this paper we argue that these three fundamental sources of heterogeneity, when brought together, can shed light on the matching of firms and managers. We show theoretically that the greater weight attached by family firms to benefits from control induces a conflict of interest between family-firm owners and high-ability, risk tolerant managers. Since family firms attach higher value to control at the expense of profits while managers only value profits - the more so the more able and risk tolerant they are - if matched with a family firm high-talent and adventurous managers would be a source of internal conflict over control. Hence, to avoid it, in equilibrium family firms will offer less powered contracts than widely held firms and attract more conservative and less talented managers.

[35] In our model, earnings variability can be computed directly. The realized wage variance is

$$Var\left(w\right) = Var\left(b^i y_j\right) = \left(b^i\right)^2 \sigma^2.$$

Hence the realized standard deviation is linear in the power of the incentive contract faced by the manager.

We test a rich set of equilibrium correlation that stem from our theoretical framework with endogenous matching on a dataset tailored to this scope; it uniquely features information on firms corporate ownership, on one side, managers traits on the other and, in between, detailed information on pay, promotions and incentives design.

We find strong empirical support for the correlations predicted by the model. Family firms are shown to systematically offer low powered incentive contracts to external managers compared to widely held firms and the differences are economically large. The power of incentives is positively correlated with managers risk tolerance and measured ability and where incentives are more powerful managers exert more effort, are paid more and are more satisfied, as implied by our theory. We also show that firms that offer high powered incentives perform better and this result holds even after controlling for the type of ownership. Though this is only a conditional correlation, it suggests a possible channel, not emphasized in the literature, through which family firms may underperform widely held ones even when they may have some direct productive advantage: their failure to offer high-powered incentives.

We discuss plausible alternatives and argue that while they may explain some of the predicted correlations, they cannot consistently account for all of them.

At a general level, our contribution highlights the role of firms' and managers' preferences over incentives as determinants of the match value. Our focus on equilibrium relations shows clearly the difficulties in identifying any casual effects of managerial policies on firms performance, as they arise as equilibrium phenomenon.

Our focus on corporate ownership and heterogeneity in talent and risk aversion to understand the market for managers may have more general implications when integrated with a theory of the diffusion of family firms as that developed by Burkart et al (2003). Economies where family firms prevail because of institutional or cultural constraints, are also economies were the demand for highly-skilled and risk tolerant managers languishes. Individuals with these attributes will accordingly opt out of business and self-select into personally more rewarding but probably less socially productive occupations, such as political careers. It may than be that relaxing these institutional constraints may have little impact on corporate ownership and control (and on the average size of the firm) as family-firm owners may not find enough attractive managers to manage their firms.

6 References

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7 Appendix: Proofs

7.1 Proof of proposition 1

Given the CARA assumption, if w is normally distributed, the manager's expected payoff can be written as

$$E[u] = E[w] - \frac{1}{2}\gamma V[w] - \frac{1}{2}x^2.$$

Given a and b, the manager chooses x to maximize $E(u)$:

$$\begin{aligned}
\hat{x} &= \arg\max_x E[w] - \frac{1}{2}\gamma V[w] - \frac{1}{2}x^2 \\
&= \arg\max_x a + bE[y] - \frac{1}{2}b^2\gamma V[y] - \frac{1}{2}x^2 \\
&= \arg\max_x a + bE\left[\sqrt{\theta_j}(x+\varepsilon)\right] - \frac{1}{2}b^2\gamma V\left[\sqrt{\theta_j}(x+\varepsilon)\right] - \frac{1}{2}x^2 \\
&= \arg\max_x a + b\sqrt{\theta_j}x - \frac{1}{2}b^2\gamma\theta_j\sigma^2 - \frac{1}{2}x^2
\end{aligned}$$

The first-order condition on x yields

$$\hat{x}_j = b^i\sqrt{\theta_j}.$$

The manager's expected payoff is hence

$$\begin{aligned}
E[U_j] &= a^i + b^i\sqrt{\theta_j}\hat{x} - \frac{1}{2}\left(b^i\right)^2\gamma_j\theta_j\sigma^2 - \frac{1}{2}\hat{x}_j^2 \\
&= a^i + \left(b^i\right)^2\theta_j - \frac{1}{2}\left(b^i\right)^2\gamma\theta_j\sigma^2 - \frac{1}{2}\left(b^i\right)^2\theta_j
\end{aligned}$$

The expected payoff for a firm that employs manager j at wage (a,b) is

$$\begin{aligned}
E\left[V^i\right] &= E\left[y_j - w_j^i + h^g - k^i\right] + \left(1-\phi_g\right)\left(\Gamma - b^i\theta_j\right) \\
&= b^i\theta_j - a^i - \left(b^i\right)^2\theta_j + h^g - k^i + \left(1-\phi_g\right)\left(\Gamma - b^i\theta_j\right)
\end{aligned}$$

Let $S_j^i = E[U_j] + E\left[V^i\right]$ denote the total surplus generated by the match between firm i and manager j. As the fixed component can be used to distribute the surplus between the firm and the worker, it is easy to see that the firm will always want to maximize surplus and pay the manager her reservation wage (determined in equilibrium by what he could get if he worked for another firm).

The surplus is

$$\begin{aligned}
S_j^i &= E[U_j] + E\left[V^i\right] \\
&= \left(\phi_g b^i - \frac{1}{2}\left(1+\gamma\sigma^2\right)\left(b^i\right)^2\right)\theta_j + \left(h^g - k^i + \left(1-\phi_g\right)\Gamma\right)
\end{aligned}$$

Differentiating the surplus function with respect to b^i we obtain the optimal contract slope:

$$b^i = \frac{\phi_g}{1+\gamma_j\sigma^2}$$

Hence, the maximal surplus is

$$\begin{aligned} S_j^i &= \left(\phi_g \frac{\phi_g}{1+\gamma_j\sigma^2} - \frac{1}{2}\left(1+\gamma\sigma^2\right)\left(\frac{\phi_g}{1+\gamma_j\sigma^2}\right)^2\right)\theta_j + \left(h^g - k^i + \left(1-\phi_g\right)\Gamma\right) \\ &= \frac{1}{2}\frac{\phi_g^2}{1+\gamma_j\sigma^2}\theta_j + \left(h^g - k^i + \left(1-\phi_g\right)\Gamma\right) \end{aligned}$$

Restrict attention to the first term of S_j^i, which can be thought of as the management-related component of the match surplus. It depends on ϕ_g. We let:

$$\begin{aligned} S_F\left(\theta_j,\gamma_j\right) &= \frac{1}{2}\frac{\phi_F^2}{1+\gamma_j\sigma^2}\theta_j \\ S_N\left(\theta_j,\gamma_j\right) &= \frac{1}{2}\frac{\phi_N^2}{1+\gamma_j\sigma^2}\theta_j \end{aligned}$$

Next, we examine match stability. Note that, for all θ_j and γ_j,

$$S_N\left(\theta_j,\gamma_j\right) > S_F\left(\theta_j,\gamma_j\right)$$

Also, given $\theta_j \geq \theta_k$ and $\gamma_j \leq \gamma_k$ (with at least a strict inequality), the following three inequalities hold

$$\begin{aligned} S_N\left(\theta_j,\gamma_j\right) - S_F\left(\theta_j,\gamma_j\right) &> S_N\left(\theta_k,\gamma_k\right) - S_F\left(\theta_k,\gamma_k\right) \\ S_N\left(\theta_j,\gamma_j\right) &> S_N\left(\theta_k,\gamma_k\right) \\ S_F\left(\theta_j,\gamma_j\right) &> S_F\left(\theta_k,\gamma_k\right) \end{aligned}$$

Given two managers j and k with $\theta_j > \theta_k$ and $\gamma_j < \gamma_k$, the following three statements are always false (otherwise one of the firms involved could increase its management-related surplus, and hence its payoff, by forming a new match):

- Manager k works for an F-firm and manager j is unemployed
- Manager k works for an N-firm and manager j is unemployed
- Manager k works for an N-firm and manager j works for an N-firm

This restricts the shape of the regions of manager types that work for N, F or are unemployed. It is easy to see that if $\bar{\gamma}$ is sufficiently small, the regions must be trapezes, as in figure **??**.Note that we can write

$$\begin{aligned} S_F\left(\theta_j,\gamma_j\right) &= E\left[U_j\right]+\phi_F b^i\theta_j-a^i-\left(b^i\right)^2\theta_j \\ S_N\left(\theta_j,\gamma_j\right) &= E\left[U_j\right]+\phi_N b^i\theta_j-a^i-\left(b^i\right)^2\theta_j \end{aligned}$$

Perfect competition among firms means that all F-firms must have the same management-related payoff

$$\pi_F=\phi_F b^i\theta_j-a^i-\left(b^i\right)^2\theta_j$$

and all N-firms must have the same management-related payoff

$$\pi_N=\phi_N b^i\theta_j-a^i-\left(b^i\right)^2\theta_j$$

A manager j who is employed by an F-firm receives expected utility

$$u_j=S_F\left(\theta_j,\gamma_j\right)-\pi_F$$

and every manager j that is employed by an N-firm receives utility

$$u_j=S_N\left(\theta_j,\gamma_j\right)-\pi_N$$

The managers on the line that separates the F region from the unemployement region receive their outside option: zero. Hence all the surplus goes to the firm

$$S_F\left(\theta_j,\gamma_j\right)=\pi_F$$

The managers on the line that separates the F region and the N region are indifferent between working for an N firm and an F-firm. Hence

$$S_N\left(\theta_j,\gamma_j\right)-\pi_N=S_F\left(\theta_j,\gamma_j\right)-\pi_F$$

These two indifference condition can be applied to the extreme cases: $\gamma_j=0$ and $\gamma_j=\bar{\gamma}$, yielding

$$\begin{aligned} S_F\left(t_F,0\right) &= \pi_F \\ S_F\left(s_F,\bar{\gamma}\right) &= \pi_F \\ S_N\left(t_N,0\right)-S_F\left(t_N,0\right) &= \pi_N-\pi_F \\ S_N\left(s_N,\bar{\gamma}\right)-S_F\left(s_N,\bar{\gamma}\right) &= \pi_N-\pi_F \end{aligned}$$

We can re-write the first four equations as

$$\begin{aligned}
\frac{1}{2}\phi_F^2 t_F &= \pi_F \\
\frac{1}{2}\frac{\phi_F^2}{1+\bar{\gamma}\sigma^2} s_F &= \pi_F \\
\frac{1}{2}\phi_N^2 t_N - \frac{1}{2}\phi_F^2 t_N &= \pi_N - \pi_F \\
\frac{1}{2}\frac{\phi_N^2}{1+\bar{\gamma}\sigma^2} s_N - \frac{1}{2}\frac{\phi_F^2}{1+\bar{\gamma}\sigma^2} s_N &= \pi_N - \pi_F
\end{aligned}$$

That is

$$\begin{aligned}
t_F &= \frac{2\pi_F}{\phi_F^2} \\
s_F &= \frac{2\pi_F}{\phi_F^2}\left(1+\bar{\gamma}\sigma^2\right) \\
t_N &= \frac{2\left(\pi_N - \pi_F\right)}{\phi_N^2 - \phi_F^2} \\
s_N &= \frac{2\left(\pi_N - \pi_F\right)}{\phi_N^2 - \phi_F^2}\left(1+\bar{\gamma}\sigma^2\right)
\end{aligned}$$

The area of the regions (trapezes) correspond to the mass of firms in business. Hence

$$\begin{aligned}
\frac{\left(t_F + s_F\right)\bar{\gamma}}{2} &= \bar{\theta}\bar{\gamma} - n_F - n_N \\
\frac{\left(t_N + s_N\right)\bar{\gamma}}{2} &= \bar{\theta}\bar{\gamma} - n_N
\end{aligned}$$

Then

$$\frac{\pi_F}{\phi_F^2}\left(2+\bar{\gamma}\sigma^2\right)\bar{\gamma} = \bar{\theta}\bar{\gamma} - n_N - n_F \tag{9}$$

$$\frac{\pi_N - \pi_F}{\phi_N^2 - \phi_F^2}\left(2+\bar{\gamma}\sigma^2\right)\bar{\gamma} = \bar{\theta}\bar{\gamma} - n_N \tag{10}$$

Finally, the entry condition on F-firms implies that the expected payoff of the least profitable F-firm (let's call it $\bar{\imath}$) is zero:

$$\begin{aligned}
E\left[V^i\right] &= E\left[y_j - w_j^i + h_F - k^i\right] + \left(1-\phi_F\right)\left(\Gamma_F - b^i\theta_j\right) \\
&= b^i\theta_j - a^i - \left(b^i\right)^2\theta_j + h_F - k^i + \left(1-\phi_F\right)\left(\Gamma_F - b^i\theta_j\right) \\
&= \pi_F + h_F - k^{\bar{\imath}} + \left(1-\phi_F\right)\Gamma_F = 0
\end{aligned}$$

implying

$$k^{\bar{\imath}} = \pi_F + h_F + \left(1-\phi_F\right)\Gamma_F$$

As there are $k^{\bar{\imath}}$ F-firms with a lower k, the mass of active F-firms is

$$n_F = \pi_F + h_F + (1 - \phi_F)\,\Gamma_F$$

Similarly, the mass of active F-firms is

$$n_F = \pi_F$$

Hence (9) and (10) become

$$\begin{aligned}
\pi_F \left(2 + \bar{\gamma}\sigma^2\right)\bar{\gamma} &= \phi_F^2 \left(\bar{\theta}\bar{\gamma} - \pi_N + h_N + (1 - \phi_N)\,\Gamma - \pi_F - h_F - (1 - \phi_F)\,\Gamma\right) \\
(\pi_N - \pi_F)\left(2 + \bar{\gamma}\sigma^2\right)\bar{\gamma} &= \left(\phi_N^2 - \phi_F^2\right)\left(\bar{\theta}\bar{\gamma} - \pi_N\right)
\end{aligned}$$

Let $G_F = h_F + (1 - \phi_F)\,\Gamma_F$, $H = \left(2 + \bar{\gamma}\sigma^2\right)\bar{\gamma}$, $F \equiv \phi_F^2$ and $N \equiv \phi_N^2 - \phi_F^2$. Then,

$$\begin{aligned}
\pi_F H &= F\left(\bar{\theta}\bar{\gamma} - \pi_N - \pi_F - G_F\right) \\
(\pi_N - \pi_F)\,H &= N\left(\bar{\theta}\bar{\gamma} - \pi_N\right)
\end{aligned}$$

with solution

$$\begin{aligned}
\pi_F &= F\frac{H\theta\gamma - (H + N)\,G_F}{2FH + FN + HN + H^2} \\
\pi_N &= \frac{FH\theta\gamma + FN\theta\gamma + HN\theta\gamma - FHG_F}{2FH + FN + HN + H^2}
\end{aligned}$$

which can be written as

$$\begin{aligned}
\pi_F &= \frac{\phi_F^2 \left(2 + \bar{\gamma}\sigma^2\right)\bar{\gamma} - \left(2 + \bar{\gamma}\sigma^2 + \phi_N^2 - \phi_F^2\right)G_F}{D}\bar{\theta}\bar{\gamma} \\
\pi_N &= \frac{\phi_F^2 \left(2 + \bar{\gamma}\sigma^2\right)\bar{\gamma}\bar{\theta}\bar{\gamma} + \phi_F^2 \left(\phi_N^2 - \phi_F^2\right)\bar{\theta}\bar{\gamma} + \left(2 + \bar{\gamma}\sigma^2\right)\bar{\gamma}\left(\phi_N^2 - \phi_F^2\right)\bar{\theta}\bar{\gamma} - \phi_F^2 \left(2 + \bar{\gamma}\sigma^2\right)\bar{\gamma}G_F}{D} \\
&\quad \frac{\phi_F^2 \left(\phi_N^2 - \phi_F^2\right)\bar{\theta}\bar{\gamma} + \phi_N^2 \left(2 + \bar{\gamma}\sigma^2\right)\bar{\theta}\bar{\gamma}^2 - \phi_F^2 \left(2 + \bar{\gamma}\sigma^2\right)\bar{\gamma}G_F}{D}
\end{aligned}$$

With

$$\begin{aligned}
D &= 2FH + FN + HN + H^2 \\
&= 2\phi_F^2 H + \phi_F^2 \left(\phi_N^2 - \phi_F^2\right) + H\left(\phi_N^2 - \phi_F^2\right) + H^2 \\
&= \phi_F^2 H + \phi_F^2 \left(\phi_N^2 - \phi_F^2\right) + \phi_N^2 H + H^2 \\
&= \phi_F^2 \left(2 + \bar{\gamma}\sigma^2\right)\bar{\gamma} + \phi_N^2 \left(2 + \bar{\gamma}\sigma^2\right)\bar{\gamma} + \left(2 + \bar{\gamma}\sigma^2\right)^2 \bar{\gamma}^2 + \phi_F^2 \left(\phi_N^2 - \phi_F^2\right) \\
&= \left(\phi_F^2 + \phi_N^2\right)\left(2 + \bar{\gamma}\sigma^2\right)\bar{\gamma} + \left(2 + \bar{\gamma}\sigma^2\right)^2 \bar{\gamma}^2 + \phi_F^2 \left(\phi_N^2 - \phi_F^2\right)
\end{aligned}$$

7.2 Proof of implication 2

Manager j is characterized by talent θ_j and risk aversion γ_j. An increase in the risk-aversion coefficient γ_j leads to a decrease in

$$\hat{b}^i\left(\gamma_j\right) = \frac{\phi_g}{1+\gamma_j\sigma^2},$$

both because $\frac{\phi_g}{1+\gamma_j\sigma^2}$ is decreasing in γ_j and because, for γ_j large enough, the value of $\hat{b}^i\left(\gamma_j\right)$ jumps from $\frac{\phi_N}{1+\gamma_j\sigma^2}$ down to $\frac{\phi_F}{1+\gamma_j\sigma^2}$.

The contract slope $\hat{b}^i$ is non-decreasing in θ_j: while $\frac{\phi_g}{1+\gamma_j\sigma^2}$ does not depend on θ_j, for θ_j large enough, the value of $\hat{b}^i\left(\gamma_j\right)$ jumps from $\frac{\phi_F}{1+\gamma_j\sigma^2}$ up to $\frac{\phi_N}{1+\gamma_j\sigma^2}$.

7.3 Proof of implication 3

For (a), note that the manager's effort is $\hat{x}_j = b^i\sqrt{\theta_j}$. Hence, it is positively correlated to b^i both directly and indirectly (because, by implication 2 the contract slope is positively correlated with θ_j).

Part (b) is immediate as the (expected) variable compensation is $b^i\hat{x}_j$. Hence, it is increasing in b^i both directly and indirectly (through $\hat{x}_j$, as per (a)).

For Part (c), we need to use a revealed preference argument. Consider two employed managers with the same risk-aversion coefficient γ, but different talent levels: $\theta'' > \theta'$.

Recall that we defined

$$\begin{aligned}\pi_F &= \phi_F b^i\theta_j - a^i - \left(b^i\right)^2\theta_j \\ \pi_N &= \phi_N b^i\theta_j - a^i - \left(b^i\right)^2\theta_j\end{aligned}$$

There are three cases: (i) both managers are employed by F-firms; (ii) both are employed by N-firms; (iii) the more talented one works for an N-firm and the other for an F-firm.

In cases (i) and (ii), both firms have the same π and hence

$$\phi b'\theta' - a' - \left(b'\right)^2\theta' = \phi b''\theta'' - a'' - \left(b''\right)^2\theta'',$$

which can be re-written as

$$(1-\phi)\left(b'\theta'\right) - a' - b'\theta' - \left(b'\right)^2\theta' = (1-\phi)\,b''\theta'' - a'' - b''\theta'' - \left(b''\right)^2\theta'',$$

and hence

$$\left(a''+b''\theta''\right) - \left(a'+b'\theta'\right) = \left((1-\phi)\,b''\theta'' - \left(b''\right)^2\theta''\right) - \left((1-\phi)\left(b'\theta'\right) - \left(b'\right)^2\theta'\right)$$

The two firms that emply them can either have the same

It is useful to show (d) before (c). The proof relies on a revealed preference argument. Consider two employed managers with the same risk-aversion coefficient γ, but different talent levels: $\theta'' > \theta'$. In equilibrium, the first manager has contract (a'', b'') while the second receives (a', b'). We already know that $b'' \geq b'$, but we cannot say anything about the fixed part.

The two managers have respectively expected utilities

$$\begin{aligned} U'' &= a'' + \left(b''\right)^2 \theta'' - \frac{1}{2}\left(b''\right)^2 \gamma\theta''\sigma^2 - \frac{1}{2}\left(b''\right)^2 \theta'' \\ U' &= a' + \left(b'\right)^2 \theta' - \frac{1}{2}\left(b'\right)^2 \gamma\theta'\sigma^2 - \frac{1}{2}\left(b'\right)^2 \theta' \end{aligned}$$

If the θ''-manager were offered contract (a', b') and exerted the same effort as the other manager, he would still have a higher utility because he is more productive. By a revealed preference argument, if the manager chooses to work for a firm that offers contract (a'', b'') and chooses a higher level of effort, he must get a utility level that is at least as high.

For (c), consider the same two managers as in point (d) and note that $U'' \geq U'$ implies that the difference between the expected total compensation of the two managers can be written as:

$$\begin{aligned} \left(a'' + \left(b''\right)^2 \theta''\right) - \left(a' + \left(b'\right)^2 \theta'\right) &\geq \left(\frac{1}{2}\left(b''\right)^2 \gamma\theta''\sigma^2 + \frac{1}{2}\left(b''\right)^2 \theta''\right) - \left(\frac{1}{2}\left(b'\right)^2 \gamma\theta'\sigma^2 + \frac{1}{2}\left(b'\right)^2 \theta'\right) \\ &= \frac{1}{2}\left(\gamma\sigma^2 + 1\right)\left(\left(b''\right)^2 \theta'' - \left(b'\right)^2 \theta'\right) \\ &\geq 0 \end{aligned}$$

7.4 Proof of implication 4

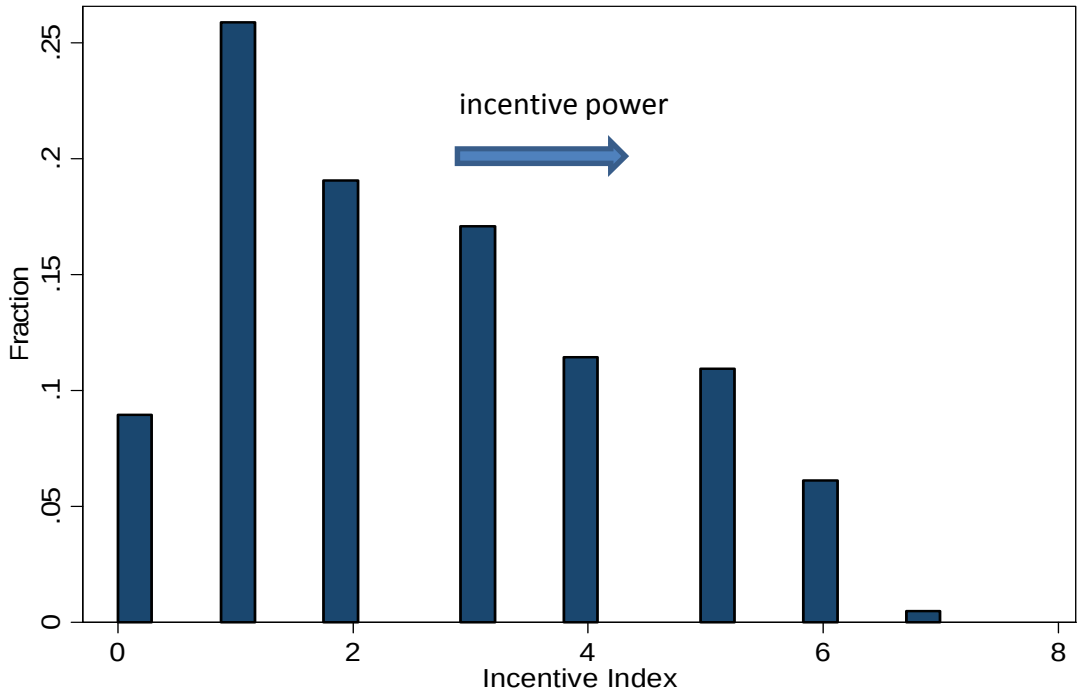
As we saw in the proof of proposition 1, in equilibrium all F-firms have the same management-related payoff π_F and all N-firms have the same management-related payoff π_N.

Recall that management-related payoff is defined as

$$\pi_g = \phi_g b^i \theta_j - a^i - \left(b^i\right)^2 \theta_j$$

Hence, if π_g is constant and the direct-control part of the payoff, namely $-\left(b^i\right)^2 \theta_j$, becomes more negative, the profit part $\phi_g b^i \theta_j - a^i$ must increase.

Figure 1. Incentive index.



Notes: The incentive index is computed as the sum of seven policy indicators. These are equal to 1 if there is a bonus based on individual or team performance (bonus 1); if the bonus is based on formal appraisals (bonus 2); if the firm has fast tracks for star performers (promotion 1); if promotions depend on performance (promotion 2); if promotions are based on formal appraisals (promotion 3); if managers were fired in the last 3 years due to poor performance (firing 1); if the decisions to dismiss is based on formal appraisals (firing 2).

Table 1 - Summary Statistics

Panel A - Firm Characteristics	**Obs**	**Mean**	**Median**	**Standard Deviation**
Ownership: Family of Founder	603	0.47	0	0.50
Ownership: Dispersed Shareholders	603	0.30	0	0.46
Ownership: Other	603	0.23	0	0.42
Size: between 50 and 100 employees	603	0.20	0	0.27
Size: over 100 employees	603	0.41	0	0.49
Multinational (=1 if firm is a subsidiary of a multinational)	603	0.58	1	0.49
Productivity (x 1000 USD)	547	1720.14	895.80	2310.40
Profits (x 1000 USD)	561	74.90	32.29	169.80
ROCE	541	17.04	15.71	23.36
Panel B - Incentive Policies	**Obs**	**Mean**	**Median**	**Standard Deviation**
Bonus depend on team or individual performance (bonus 1)	603	0.50	1	0.50
Bonus based on formal appraisals (bonus 2)	603	0.33	0	0.47
The firm has fast tracks for star performers (promotion 1)	603	0.37	0	0.48
Promotions depend on performance (promotion 2)	603	0.74	1	0.44
Promotions based on formal appraisals (promotion 3)	603	0.34	0	0.47
Managers fired in the last 3 years due to poor performance (firing 1)	603	0.05	0	0.22
Decisions to dismiss based on formal appraisal(firing 2)	603	0.23	0	0.42
Incentive Index (Sum across variables listed in Panel B)	603	2.56	2.00	1.74
Panel C - Manager Characteristics	**Obs**	**Mean**	**Median**	**Standard Deviation**
Demographic				
Age	603	46.98	46	7.12
Gender (1=men)	603	0.90	1	0.30
Risk and Insurance				
Risk preferences (investment lottery)	603	20.36	20	18.94
Risk choices	603	5.70	6	1.74
Father has College Degree	603	0.16	0	0.37
Talent				
College Degree	603	0.50	1	0.50
Executive Education	603	0.56	1	0.50
Manager has received offers over past 3 years	603	0.71	1	0.46
Panel D - Manager Outcomes	**Obs**	**Mean**	**Median**	**Standard Deviation**
Works 60 or more hours per week	603	0.37	0	0.48
Fixed pay (Euros x Week)	603	1903.70	1682.7	568.2
Variable pay (Euros x Week)	603	299.60	216.3	325.6
Number of benefits	603	4.20	4	1.38
Manager is very satisfied about his job (=1 if yes)	603	0.50	0	0.50
from Social Security Records				
Total pay, current firm, last available year (Euros x Week)	572	1830.10	1658.7	877.30
Average total pay, all past firms and years (Euros x Week)	527	588.90	521.9	324.3
Yearly standard deviation of pay, current firm	419	443.30	333.9	526.88
Average yearly standard deviation of pay, all firms and years	465	221.69	159.7	282.46

Notes: All variables are from the ManagerItalia survey, with the exception of Productivity, Profits and ROCE, from AMADEUS and Compensation data in Panel D from INPS (Social Security) records. Other ownership includes: government owned, manager owned and cooperatives. Productivity is defined as operating revenues over the number of employees. Profits are defined as earnings before interests and taxation over the number of employees. ROCE is defined as operating income over capital employed. The number of observations for Social Security records variables is smaller due to missing values. The last available year is 2004 for 75% of the sample, 2005 for 2.5%, 2006 for 2.5% and 2007 for the remaining 20%. The average fixed compensation is computed over all years and firms the manager has worked for (including non-managerial positions). The standard deviation is computed only if the manager has worked for at least 3 years in the same firm.

Table 2: Personnel Policies by Firm Ownership

Ownership:	Dispersed Shareholders	Family	p-value (H0: equal means)
Bonus depend on team or individual performance (bonus 1)	.573	.442	.006
	(.037)	(.029)	
Bonus based on formal appraisals (bonus 2)	.404	.263	.001
	(.037)	(.026)	
The firm has fast tracks for star performers (promotion 1)	.415	.323	.042
	(.037)	(.028)	
Promotions depend on performance (promotion 2)	.741	.747	.889
	(.033)	(.026)	
Promotions based on formal appraisals (promotion 3)	.432	.270	.000
	(.037)	(.026)	
Managers fired in the last 3 years for poor performance (firing 1)	.056	.031	.195
	(.017)	(.010)	
Decisions to dismiss based on formal appraisal(firing 2)	.286	.193	.019
	(.034)	(.023)	

Table 3 - Firm Ownership and Personnel Policies

	Incentive Index		Bonus Index		Promotions Index		Dismissal Index	
Family or Founder Ownership	-0.640***	-0.527***	-0.272***	-0.178**	-0.250***	-0.197**	-0.118**	-0.152***
	(0.164)	(0.186)	(0.072)	(0.084)	(0.087)	(0.100)	(0.047)	(0.055)
Other Ownership	-0.203	-0.240	-0.063	-0.051	-0.118	-0.109	-0.021	-0.080
	(0.194)	(0.216)	(0.085)	(0.097)	(0.103)	(0.116)	(0.056)	(0.064)
MNE		0.836***		0.417***		0.309***		0.110**
		(0.159)		(0.072)		(0.086)		(0.047)
50-100 employees		-0.220		-0.060		-0.059		-0.102*
		(0.199)		(0.090)		(0.107)		(0.059)
100+ employees		-0.035		0.018		0.027		-0.080
		(0.172)		(0.077)		(0.092)		(0.050)
Constant	2.910***	0.196	0.978***	-0.303	1.590***	0.346	0.343***	0.153
	(0.129)	(2.556)	(0.056)	(1.149)	(0.068)	(1.375)	(0.037)	(0.752)
Observations	603	603	603	603	603	603	603	603
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Notes:.Robust standard errors in parenthesis. *** (**) (*) indicates significance at the 1%, 5% and 10% level, respectively. The incentive index is the sum of all seven incentive policies listed in Panel B, Table 1. The bonus index is the sum of *bonus1* and *bonus2* , as defined in Table 1. The promotions index is the sum of *promotion1, promotion2, promotion3.* The dismissal index is the sum of *firing1, firing2.* Controls include the manager's seniority level, whether he belongs to the owner family, his tenure and category (general administration, finance, sales), indicators for the firm's SIC 2 codes, duration of the interview and interviewer dummies.

Table 4 - Incentives and Risk

	Risk: Individual Preference		Risk: Firm Investment Choices		Informal Insurance: Father's Education	
Incentive Index	0.868**	0.989**	0.113***	0.100**	0.023***	0.023**
	(0.423)	(0.481)	(0.042)	(0.048)	(0.009)	(0.010)
MNE		-0.157		-0.005		-0.019
		(1.852)		(0.161)		(0.036)
50-100 employees		-0.686		0.146		0.047
		(2.187)		(0.209)		(0.046)
100+ employees		2.407		0.093		0.021
		(2.200)		(0.186)		(0.036)
Constant	18.141***	67.973***	6.418***	5.817***	0.100***	-0.161
	(1.317)	(8.970)	(0.132)	(1.171)	(0.025)	(0.227)
Observations	603	603	603	603	603	603
Controls	No	Yes	No	Yes	No	Yes

Notes: Robust standard errors in parenthesis. *** (**) (*) indicates significance at the 1%, 5% and 10% level, respectively. Controls include the manager's seniority level, whether he belongs to the owner family, his tenure and category (general administration, finance, sales), indicators for the firm's SIC 2 codes, duration of the interview and interviewer dummies. Risk preference is the probability of failure the manager is willing to bear to choose a risky investment project that yields 10 million euros if successful and 0 if not, instead of a safe project that yields 1 million with certainty. Risk choices is the self reported riskiness of investment choices on behalf of the firm overa a 1-10 scale. Father's Education equals 1 if the manager's father has a college degree, 0 otherwise.

Table 5 - Incentives and Manager Talent

	Manager College Degree (=1 if yes)		Manager Executive Education (=1 if yes)		Desirability (=1 if Manager has received job offers in past three years)	
Incentive Index	0.045***	0.043***	0.060***	0.050***	0.050***	0.043***
	(0.012)	(0.013)	(0.011)	(0.013)	(0.010)	(0.012)
Risk Preference	0.001	0.001	0.001	0.001	0.002***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
MNE		-0.013		0.118**		0.014
		(0.047)		(0.048)		(0.044)
50-100 employees		0.060		0.098		-0.003
		(0.060)		(0.061)		(0.057)
100+ employees		0.100*		0.117**		0.063
		(0.052)		(0.051)		(0.045)
Constant	0.360***	0.301	0.380***	0.072	0.532***	1.440***
	(0.040)	(0.300)	(0.040)	(0.381)	(0.038)	(0.317)
Observations	603	603	603	603	603	603
Controls	No	Yes	No	Yes	No	Yes

Notes: Robust standard errors in parenthesis. *** (**) (*) indicates significance at the 1%, 5% and 10% level, respectively. Controls include the manager's seniority level, whether he belongs to the owner family, his tenure and category (general administration, finance, sales), indicators for the firm's SIC 2 codes, duration of the interview and interviewer dummies. Risk preference is the probability of failure the manager is willing to bear to choose a risky investment project that yields 10 million euros if successful and 0 if not, instead of a safe project that yields 1 million with certainty.

Table 6 - Incentives and Manager Behavior

	Works more than 60 hours per week		Fixed Pay		Variable Pay		Number of Benefits		Job satisfaction (=1 if very happy)	
Incentive Index	0.036***	0.035***	0.043***	0.033**	0.056***	0.048***	0.160***	0.136***	0.030***	0.035***
	(0.011)	(0.013)	(0.013)	(0.015)	(0.007)	(0.008)	(0.031)	(0.036)	(0.011)	(0.013)
Risk Preference	-0.000	-0.000	0.002	0.003**	0.003***	0.003***	0.002	0.002	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.001)	(0.001)
MNE		-0.060		0.018		0.093***		0.208		-0.020
		(0.045)		(0.050)		(0.029)		(0.129)		(0.049)
50-100 employees		-0.042		0.144**		0.036		0.093		-0.028
		(0.059)		(0.067)		(0.039)		(0.155)		(0.060)
100+ employees		0.093*		0.159***		0.009		0.056		-0.034
		(0.050)		(0.057)		(0.033)		(0.138)		(0.054)
Constant	0.285***	-0.263	1.752***	0.955***	0.102***	0.154	3.745***	7.099***	0.401***	1.498***
	(0.039)	(0.259)	(0.047)	(0.287)	(0.024)	(0.189)	(0.110)	(0.862)	(0.041)	(0.359)
Observations	603	603	603	603	603	603	603	603	603	603
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Notes: Robust standard errors in parenthesis.*** (**) (*) indicates significance at the 1%, 5% and 10% level, respectively. Controls include the manager's seniority level, whether he belongs to the owner family, his tenure and category (general administration, finance, sales), indicators for the firm's SIC 2 codes, duration of the interview and interviewer dummies. Risk preference is the probability of failure the manager is willing to bear to choose a risky investment project that yields 10 million euros if successful and 0 if not, instead of a safe project that yields 1 million with certainty.

Table 7- Incentives, Ownership and Performance

	Ln(Sales/Employees)	Profits/Employees	Roce	Ln(Sales/Employees)	Profits/Employees	Roce
Incentive Index	0.044*	7.606**	1.185**	0.038*	7.287**	1.225**
	(0.023)	(3.717)	(0.574)	(0.023)	(3.705)	(0.575)
Family or Founder Ownership				-0.221**	-15.406	0.956
				(0.100)	(13.051)	(2.191)
Other Ownership				-0.082	-26.486*	-1.239
				(0.121)	(14.816)	(2.993)
MNE	0.059	12.536	-3.074*	-0.011	8.677	-2.709
	(0.080)	(10.578)	(1.764)	(0.083)	(10.634)	(1.817)
50-100 employees	0.153	42.616***	6.934***	0.154	43.345***	6.969***
	(0.108)	(13.162)	(2.334)	(0.108)	(13.133)	(2.328)
100+ employees	0.746***	77.305***	5.461**	0.727***	77.194***	5.629**
	(0.119)	(19.358)	(2.427)	(0.118)	(19.311)	(2.436)
Constant	8.827***	65.308	-12.018	8.911***	65.505	-11.970
	(0.365)	(50.027)	(7.626)	(0.356)	(50.376)	(7.833)
Observations	1813	1851	1792	1813	1851	1792
Number of firms	557	568	567	557	568	567
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes:. Robust standard errors clustered at the firm level in parenthesis.*** (**) (*) indicates significance at the 1%, 5% and 10% level, respectively. The number of observations varies due to the different availability of the performance measures. In all columns we drop the top and bottom 1% firms ranked by performance. Controls include indicators for the firm's SIC 2 codes, duration of the interview and interviewer dummies.

Table 8- Incentives and Managerial Pay (Social Security Data)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable	**ln(Pay) Survey Data**		**ln(Pay) INPS Records**				**ln(Standard Deviation Pay)**			
Statistics computed over	**Current Firm**		**Current Firm-Last Available Year**		**Average over past jobs**		**Current Firm**		**Average over past jobs**	
Incentive Index	0.050***	0.049***	0.045***	0.044***	0.048***	0.037**	0.071***	0.055**	0.059**	0.060**
	(0.008)	(0.009)	(0.011)	(0.010)	(0.015)	(0.014)	(0.021)	(0.025)	(0.023)	(0.029)
MNE		0.027		0.045		0.099*		0.019		0.029
		(0.033)		(0.036)		(0.056)		(0.091)		(0.094)
50-100 employees		0.083**		0.116**		0.046		0.085		0.031
		(0.041)		(0.045)		(0.075)		(0.112)		(0.118)
100+ employees		0.097***		0.056		0.043		0.059		0.067
		(0.036)		(0.038)		(0.056)		(0.098)		(0.101)
Constant	7.510***	6.765***	7.304***	6.498***	6.102***	6.027***	5.626***	5.221***	4.924***	4.741***
	(0.025)	(0.281)	(0.031)	(0.261)	(0.046)	(0.446)	(0.061)	(0.887)	(0.068)	(1.168)
Observations	572	572	572	572	527	527	419	419	465	465
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Notes:. Robust standard errors in parenthesis.*** (**) (*) indicates significance at the 1%, 5% and 10% level, respectively.
The number of observations is smaller due to missing values in the Social Security records. The last available year is 2004 for 75% of the sample, 2005 for 2.5%, 2006 for 2.5% and 2007 for the remaining 20%. The average compensation in columns (5) and (6) is computed over all years and firms the manager has worked for (including non-managerial positions). The standard deviation in columns (7) and (8) is computed over the years worked in the current firm. The dependent variable in columns (9) and (10) is computed as the mean of the standard deviations of yearly earnings in all the firms the manager has worked for. All standard deviations are computed only if the manager has worked for at least 3 years in the same firm. Controls include: the manager's seniority level, whether he belongs to the owner family of the current firm, his tenure in the current firm and category (general administration, finance, sales), overall tenure since his first job, the number of firms he has worked for, and the average number of weeks worked in a year, duration of the interview and interviewer dummies.

Table A1 Sample Selection

Probit Estimates

Dependent variable equals 1 if the firm is in the sample, 0 otherwise

Log(Employment)	-0.032	-0.041	-0.034	-0.033
	(0.024)	(0.026)	(0.024)	(0.024)
Log(Sales/Employees)		-0.027		
		(0.033)		
Profits/Employees			-0.000	
			(0.000)	
ROCE				-0.001
				(0.001)
Observations	5500	5286	5389	5202
Time Period	2004-2007	2004-2007	2004-2007	2004-2007
Number of Firms in Population	1660	1660	1660	1649
Number of Firms in Sample	560	560	560	557
Sic2 dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes

Notes: *** (**) (*) indicates significance at the 1%, 5% and 10% level, respectively. Robust standard errors clustered at the firm level in parenthesis. The number of firms is lower than the population we sampled from (1815) due to missing values in the balance sheet data.