Why and when Family Firms Are Doing the Right Thing when Hiring a Family Manager with Low Skills in Economic Tasks*

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Abstract

Prior economic research is very critical about family CEOs and family management. Nepotism, altruism, lower managerial abilities, and a small pool of qualified family candidates are cited as reasons that speak against family management. Still, the empirical reality is different. A surprisingly large share of firms is run by family managers. Our study provides a rational economic explanation for this paradox, linked to the multitasking problem in managing family firms. We compare the performance of family and non-family managers in a moral-hazard model with imperfect performance measures, where managerial tasks are related to the economic and non-economic goals of the business-owning family. While incentive pay is more effective for nonfamily managers, the associated effort distortion towards economic outcomes is less pronounced for family managers. When economic and non-economic tasks are strong substitutes, the family hires a non-family manager at the expense of its non-economic goals. However, the more complementary the tasks, the more aligned the performance measure with the family's goals, and the less severe the moral-hazard conflict, the more likely a family manager is optimal. We find that family managers can be preferred even if they have lower ability than non-family managers on average. Our study contributes to the literature about family management and agency costs in family firms and has practical implications for family businesses deciding between hiring managers in or outside the family.

Keywords: family firms, family management, multitask model, incentives, non-economic goals

JEL Classifications: D82, D86, M12, M21, M52, M54

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"...if [non-economic] goals benefit family managers but not nonfamily managers, the latter will resist the adoption of these goals, especially if it lowers the firm's profitability and, thus, the managers' performance pay (...). Incentives can serve to align the interests of owners and managers but are costly remedies and some of the benefits from adopting [non-economic] goals (...) are not transferrable to nonfamily managers." (Chrisman et al. 2012, p. 272)

1 Introduction

Many firms in the world are owned and controlled by families. In fact, it is the dominant form of ownership in many countries and industries (Claessens et al. 2000, Villalonga and Amit 2010). Family firms can be large or small as well as public or private. A large share of these firms is run by family managers, that is, the CEO is a member of the owning family. Villalonga and Amit (2006) report that 26% of all firms in the Fortune 500 have at least one family officer and one family director in their boards; Miller et al. (2013) even find that 69% of all CEOs in Italian family-owned firms with a turnover of over 50 million euros are run by family CEOs. This is surprising since prior research has identified a number of reasons that speak against family management such as nepotism (Morck and Yeung 2003, Pérez-González 2006), altruism (Schulze et al. 2001), lower managerial abilities (Bloom and Van Reenen 2007), and a relatively small pool of qualified family candidates (Burkart et al. 2003).

Our study contributes to solving this puzzle by showing that employing a family manager is oftentimes the optimal decision when managers have to take care of both economic and non-economic goals of the business-owning family (Gómez-Mejía et al. 2007, Chrisman et al. 2012). While managerial tasks related to economic goals are concerned with the firm's profitability, the tasks associated with non-economic goals are comprised of, amongst other things, maintaining family harmony and reputation, family tradition, and dynastic family control (Gómez-Mejía et al. 2007, Deephouse and Jaskiewicz 2013). Typically, the achievement of these goals differs in verifiability and, moreover, the corresponding managerial tasks will interrelate with each other. It is exactly these two features that, in the context of providing managerial incentives, explain why family managers may be the optimal choice.

We build on the well-known work regarding optimal incentive contracts in multitasking settings (Holmstrom and Milgrom 1991, Baker 1992, 2002) and extends it to the specific context of family firms. In our model, the family firm owner (principal) chooses as a manager (agent) either a family or a non-family member.[1] The family firm owner values both economic and non-economic goals, and the manager has to work on tasks related to both types of goals. In the sense of Baker (2002), the firm owner's objective is not contractible, but there is a distorted contractible performance measure on which the manager's contract is based. This measure is

[1] Throughout the paper, we will use the male pronoun for the agent (manager) and the female pronoun for the principal (family firm owner).

jointly affected by the manager's efforts in both types of tasks. While it fully accounts for the impact of the manager's effort in the economic task on the owner's objective, the impact of his effort in the non-economic task is typically captured only imperfectly. This assumption reflects the fact that the family's non-economic goals are often characterized by intangible aspects and are thus, generally more difficult to measure. Moreover, in line with Holmstrom and Milgrom (1991), from the manager's perspective, the tasks are interdependent; they may be complements or substitutes, i.e., working on one type of task may facilitate or impede performing also the other task. As an example for task substitutes, consider the task of shutting down an unprofitable business unit in the family's home region and consequently laying off its employees. By performing that task, the manager will have succeeded in achieving economic goals but will have thereby sacrificed the attainment of the family's non-economic goals, e.g., maintaining the family's reputation of being a good, local employer. By contrast, complementarity exists if economic and non-economic tasks facilitate each other. For instance, a family firm may set up a philanthropic foundation alongside its core business. This foundation helps family and firm reputation but it can also help the manager in achieving the firm's economic goals by attracting more customers and competent employees. Moreover, we model two important characteristics in which the two types of managers differ. First, different from family managers, non-family managers are selected from a relatively larger pool of suitable candidates in a competitive labor market (Pérez-González 2006, Burkart et al. 2003). Our model reflects the foregoing observation by assuming that the non-family manager will typically have a higher ability than the family manager with regard to performance in economic tasks. We argue that the family manager, in contrast, will usually have a higher ability in fulfilling the family's non-economic goals. This is because, as part of the family, he knows better how to communicate with the family and is more familiar with the family's objectives. Second, we posit that family managers who are part of the business-owning family may have a personal interest in the wellbeing of the family and hence the pursuit of its goals.

In this framework, we derive four main results highlighting the rationale as to why the family firm owner may find it optimal to hire either a family or non-family manager. First, if the managers have the same ability on average, the family firm owner will always hire the non-family manager because he is more skilled in the economic task, which can be more effectively incentivized than the non-economic task. Second, the foregoing result reverses if the family manager has sufficient personal interest in the wellbeing of the family because this lowers the moral-hazard problem. Third, the family firm owner's optimal hiring decision is determined by the interdependence between the economic and non-economic tasks when the managers differ in their abilities across tasks on average. A family manager may then be preferred regardless of his personal interest for the family's wellbeing and of whether he exhibits higher or lower average skills across both tasks. The higher the complementarity between economic and non-economic tasks, the more likely it gets that a family manager will be hired and vice versa. This follows because the imperfect performance measure leads to an effort distortion towards the economic task at the expense of the non-economic task, which is, however, less severe for the family manager. The more complementary the two types of tasks, the lower the effort distortion, and the more effectively the family manager can make use of his excellence in the non-economic task. If the tasks are strong substitutes, however, the firm owner may turn to hiring the non-family manager, thereby deliberately neglecting the family's non-economic goals. Finally, the family manager is more likely to be hired if the performance measure is more aligned with the family firm owner's value because the managers' effort distortion is then mitigated, which, due to his ability advantage in the non-economic task, has a relatively stronger effect on the family manager.

With the aforementioned results, our study contributes to the literature on family firms in several ways. First, our study adds to the literature about the benefits and selection of (non)family managers (Burkart et al. 2003, Miller et al. 2013, Lemos and Scur 2018). Unlike previous studies that ascribe the preference for non-family managers mainly to their higher managerial abilities impacting firm performance (Burkart et al. 2003, Bennedsen et al. 2007, Bloom and Van Reenen 2007), we show that a strong substitutability between economic and non-economic tasks is another important reason for a higher attractiveness of non-family managers, whereas a complementarity between tasks favors family managers. Additionally, in contrast to most prior research on this issue, our model suggests that a family manager is the better choice if he or she has a personal interest in both economic and non-economic goals. This way, we formally verify the desirable impact of a family manager's personal interest in the goals of the family on the magnitude of the moral-hazard conflict, which reinforces the reasoning regarding the negative effects of a separation of ownership and control suggested by Jensen and Meckling (1976). Second, our study contributes to the literature about agency costs in family firms and the role of family ties in agency contracts, but in another dimension (Gómez-Mejía et al. 2001, Schulze et al. 2001, Morck and Yeung 2003, Cai et al. 2013, Bandiera et al. 2015). This literature has not considered agency costs resulting from the managers' multitask problem in family firms. Unlike prior work, our model shows that it can be perfectly rational and utility-maximizing to employ a family CEO who is less skilled in economic tasks than a non-family manager. In particular, in a situation where economic and non-economic tasks are complements, the agency costs for contracting a non-family manager can be higher than that of contracting a family manager under equal average abilities and even if the family manager is less skilled on average. Finally, our study extends the literature on how economic and non-economic goals of family firm owners influence the organizational structure and governance of family firms (Gómez-

Mejía et al. 2007, Chrisman et al. 2012, Bandiera et al. 2015, Williams Jr et al. 2018). Our study shows that it is not only the goals as such but also the measurement of their achievement and their interrelationships that influence optimal hiring decisions, particularly the decision of whether to hire a family or a non-family manager.

Next to its contribution to research about family firms, our paper also contributes to the extensive work on the optimal design of incentive contracts in multitask principal-agent settings. Three recent papers have employed similar multitask models for investigating different research questions. Kragl and Schöttner (2014) focus on homogeneous agents and analyze how an imposed minimum wage affects the optimal job design when tasks can be separated. In our framework, we also impose the assumption of non-negative wages but study the optimal incentive contracts and hiring decision when tasks cannot be separated and agents are heterogeneous. Bénabou and Tirole (2016) assume that the agents' abilities are not observable but one agent is always more productive than the other in both tasks, whereby tasks are substitutes. Conversely, we do not investigate adverse selection and do not limit the analysis to cases where one manager is superior to the other.[2] Finally, Mauch and Schöndube (2019) use a similar model to investigate the agents' time allocation between two tasks that can be independent or substitutes. In contrast to both of these studies, our study highlights that the complementarity between tasks represents a particularly important aspect of the optimal hiring decision. Further related to our work, Block (2011) analyzes optimal incentive contracts for non-family managers in family businesses. The present paper is, however, to our knowledge, the first to propose a multitask model specifically tailored to the context of family business that allows an investigation of the hiring decision between heterogeneous agents who are family and non-family managers.

The remainder of the paper is organized as follows. In the next section, we present the model. In the third section, we solve for the optimal incentive contracts for each manager type under a perfect and imperfect performance measure respectively, and discuss the effects of task interdependence and the quality of the performance measure on the managers' relative attention to the tasks. The fourth section analyzes the owner's optimal hiring decision for managers with symmetric and asymmetric abilities and provides a brief outlook on manager comparisons of the same type. The final section offers a discussion of our main results, highlights the avenues for further research, and presents practical implications. All proofs and some important technical findings are relegated to the Appendix.

[2]Notably, introducing an adverse-selection problem with respect to ability types in our model does not affect the main findings. See the concluding section for a discussion.

2 The Model

We model a principal-agent relationship in which the family firm owner (principal) selects one out of two candidate types (agents) $i \in \{F, N\}$ to manage the firm. The former has two options; hiring a family manager ($i = F$), that is, a person with family ties to the firm, or a non-family manager ($i = N$), that is, somebody who is not part of the business-owning family. All parties are risk neutral. Managing the firm requires fulfilling two tasks; enhancing the firm's economic performance (henceforth denoted by task 1) and realizing the family's non-economic goals such as preserving and fostering the family harmony and reputation (henceforth denoted by task 2). The tasks cannot be split between managers; that is, just one manager will be hired.[3] By effort $e_{i,1}$ we refer to all the activities that manager i undertakes to raise the firm's economic performance, e.g., the firm's financial value in general or, more specifically, the value of patents or trademarks. Effort $e_{i,2}$ summarizes the manager's efforts related to achieving the family's non-economic goals. The exerted effort levels are not observable by the firm owner, implying a moral-hazard problem.

The firm owner derives a non-verifiable value $V_i \in \{0, 1\}$ from the efforts undertaken by the manager. For short, we will refer to V_i as the firm owner's value in the remainder of the paper. The probability for $V_i = 1$ is given by:

$$\Pr[V_i = 1 | e_{i,1}, e_{i,2}] = \Omega \left(e_{i,1} + e_{i,2} \right) \tag{1}$$

That is, for simplicity, we assume that both tasks equally contribute to the realization of the firm owner's value, i.e., both goals are equally important to the family.[4] The parameter Ω ensures that the probability in function (1) remains strictly below 1 for any effort levels exerted. Later, without loss of generality, we set $\Omega = 1$.[5]

We assume that achievement cannot be measured individually in either task. However, similar to Baker (2002), there is a contractible joint performance measure $P_i \in \{0, 1\}$ with

$$\Pr[P_i = 1 | e_{i,1}, e_{i,2}] = \Omega \left(e_{i,1} + \alpha e_{i,2} \right), \tag{2}$$

where $\alpha \in (0, 1]$ denotes the marginal impact of effort in the non-economic task on the expected

[3] Note that, in the majority of management contexts, only a single manager will be hired to run the firm so that separating the tasks between two managers is rarely plausible in the given context. However, even if task separation is allowed, hiring just one manager will be optimal in many cases when tasks are interdependent.

[4] We impose this assumption to focus on the distortion caused by an imperfect performance measure. The assumption can, however, easily be relaxed. More specifically, our main results also continue to hold under different valuations of economic and non-economic tasks as long as the performance measure captures the economic task better than the non-economic task as compared to the owner's real valuation reflected in V_i.

[5] Note that Ω has only a rescaling effect. To keep the notation parsimonious, we set it to 1. All our results remain qualitatively unchanged. Alternatively, additional parametrizations can be envisioned, which, admittedly, come at the cost of tedious algebra.

value of the performance measure. Accordingly, increasing effort in either task raises the expected realization of both V_i and P_i. If $\alpha = 1$, the manager's efforts have the same impact on both the owner's value V_i and the performance measure P_i. In this case, we speak of a *perfect* performance measure. However, if $\alpha < 1$, the impact of task 2 on the performance measure falls below its true value for the firm owner, and the performance measure is *imperfect*. The latter case reflects the more realistic scenario in which the performance measure does not fully account for the non-economic task.[6] In the sense of Baker (2002), the performance measure is hence distorted towards task 1 and becomes more misaligned with the firm owner's value as α decreases (and vice versa).[7]

The firm owner pays manager i a fixed wage w_i and, in addition, a bonus $\gamma_i \in [0,1]$ if the performance measure is favorable, i.e., if $P_i = 1$. Moreover, to approach reality, we assume that a manager's wage cannot be negative in any state, i.e., we impose limited liability on the side of the manager.

The firm owner's expected utility when hiring manager i is thus given by:

$$\pi_i = (1-\gamma_i)(e_{i,1} + \alpha e_{i,2}) + (1-\alpha)\, e_{i,2} - w_i \tag{3}$$

In the spirit of Holmstrom and Milgrom (1991), manager i's private cost of exerting effort is described by

$$C(e_{i,1}, e_{i,2}; a_{i,1}, a_{i,2}, s) = \frac{a_{i,1}}{2} e_{i,1}^2 + \frac{a_{i,2}}{2} e_{i,2}^2 + s e_{i,1} e_{i,2}, \tag{4}$$

where $a_{i,1}$ and $a_{i,2}$ are inverse measures of manager i's ability in task 1 and 2 respectively, and the parameter $s \in \left(-\sqrt{a_{i,1}a_{i,2}}, \sqrt{a_{i,1}a_{i,2}}\right)$ measures the degree and type of task interdependence.[8] If $s > 0$, the tasks are *substitutes*, i.e., the tasks compete for the manager's attention so that he finds it harder to engage in one task when he is already working on the other. Formally, other things being equal, exerting effort in one task increases the manager's marginal effort costs for the other task. By contrast, if $s < 0$, the tasks are *complements*. In that case, performing one task facilitates the manager's efforts in the other task, i.e., ceteris paribus reduces his marginal effort costs for the other task. Obviously, tasks are independent if $s = 0$.

[6] To stress the impact of an imperfect assessment of task 2, we assume that task 1 is perfectly captured by the performance measure. However, our main results still hold if $\Pr[P_i = 1 | e_{i,1}, e_{i,2}] = \Omega(\beta e_{i,1} + \alpha e_{i,2})$ with $\beta \geq \alpha$, that is, the performance measure generally captures task 1 better than task 2.

[7] In Baker's model, the non-contractible firm value with two tasks is given by $V = f_1 a_1 + f_2 a_2 + \varepsilon$, where a_1, a_2 are the effort levels in the two tasks, $f = (f_1, f_2)$ is the vector of the marginal products, and ε is a random term. The contractible performance measure is given by $P = g_1 a_1 + g_2 a_2 + \phi$, where $g = (g_1, g_2)$ is the vector of the tasks' marginal products in the performance measure, and ϕ is the random term. The misalignment between V and P is reflected by the angle between f and g. Applying this framework to the expected values of V_i and P_i in our model, we have $f = (1,1)$ and $g = (1, \alpha)$. Accordingly, the lower α, the larger will be the angle between f and g and the higher will thus be the misalignment.

[8] The restriction on s ensures that the first-order conditions of the optimization problems are sufficient for interior solutions.

In line with the arguments regarding the managers' relative abilities across tasks and manager types presented in the Introduction, we make the following assumptions:

Assumption 1 *(i)* $a_{N,1} < a_{N,2}$*, (ii)* $a_{F,2} < a_{F,1}$*, (iii)* $a_{F,2} < a_{N,2}$*, and (iv)* $a_{N,1} < a_{F,1}$*.*

Assumption 1 ensures that, within each manager type, (i) the non-family manager is more skilled in task 1 than in task 2 whereas (ii) the family manager is more skilled in task 2 than in task 1. Across manager types, (iii) the family manager is more skilled in task 2 than the non-family manager whereas (iv) the non-family manager is more skilled in task 1 than the family manager.

For the further exposition of the model, we introduce the following definition:

Definition 1 *Family and non-family managers are symmetric in terms of ability if* $a_{N,2} = a_{F,1}$ *and* $a_{F,2} = a_{N,1}$ *and asymmetric in terms of ability otherwise.*

That is, managers are said to be symmetric if the family manager is as skilled in task 2 as the non-family manager is in task 1 and vice versa. In other words, both manager types have the same ability in the task in which they perform better (worse), respectively.

Manager i's expected utility is given by:

$$U_i = w_i + \gamma_i (e_{i,1} + \alpha e_{i,2}) - \frac{a_{i,1}}{2} e_{i,1}^2 - \frac{a_{i,2}}{2} e_{i,2}^2 - s e_{i,1} e_{i,2} + \theta_i \pi_i, \qquad (5)$$

where $\theta_N = 0$ and $\theta_F \in [0, \frac{1}{2}]$ measures the family manager's personal (intrinsic) interest in the net value generated for the owner of the family firm.[9] That is, the non-family manager is purely self-regarding while the family manager may exhibit an other-regarding preference towards his family's firm. More specifically, if $\theta_F > 0$, the family manager attaches a personal value to the family's wellbeing so that the firm owner's utility positively enters his own utility function. Below we verify the intuitive conjecture that θ_i indeed serves as an inverse measure of the magnitude of the moral-hazard conflict, ceteris paribus.[10]

The timing is as follows. First, the firm owner decides whether to hire the family or the non-family manager. Then, she offers the manager an employment (incentive) contract (w_i, γ_i). Third, the manager decides whether to accept the contract or reject it. If the manager rejects the offer, both parties receive their outside option which we, for simplicity, set to zero. Conversely, if the manager accepts the contract, he allocates efforts to task 1 and 2. Finally, the firm owner's

[9] Alternatively, $\theta_F \pi_F$ can be interpreted as the present value of the family manager's future heritage with respect to the family firm. We restrict $\theta_F \in [0, \frac{1}{2}]$ because, as we show later, for $\theta_F = \frac{1}{2}$, the family manager's optimal incentive pay shrinks to zero. In that case, the family manager so strongly cares for the family firm that he is also willing to work in the absence of incentive pay. For $\theta_F > \frac{1}{2}$, the manager would even be inclined to put funds in the firm. However, that case is beyond the scope of the given paper.

[10] As noted before, this finding is in line with the well-known reasoning regarding the effects of a separation of ownership and control on the moral-hazard problem (see Jensen and Meckling 1976).

value V_i and the performance measure P_i are realized and the manager is paid according to the contract.

3 Optimal Incentive Contracts

Because the manager's effort levels are his private information and the firm owner's value V_i is non-verifiable, the firm owner uses an incentive contract based on the performance measure P_i to mitigate the moral-hazard problem. In this section, we derive the optimal incentive contract for manager $i = \{F, N\}$.

The firm owner's expected-utility maximization problem when hiring manager i is given by:

$$
\begin{aligned}
\max_{w_i,\gamma_i,e_{i,1},e_{i,2}} \quad & \pi_i = (1-\gamma_i)(e_{i,1} + \alpha e_{i,2}) + (1-\alpha)\, e_{i,2} - w_i && (I) \\
s.t. \quad & U_i = w_i + \gamma_i\,(e_{i,1} + \alpha e_{i,2}) - C(\cdot) + \theta_i \pi_i \geq 0, && (PC) \\
& e_{i,1}, e_{i,2} \in \underset{\hat{e}_{i1},\hat{e}_{i2}}{\arg\max}\; U_i = w_i + \gamma_i\,(\hat{e}_{i,1} + \alpha \hat{e}_{i,2}) - C(\cdot) + \theta_i \pi_i, && (IC) \\
& w_i, w_i + \gamma_i \geq 0 && (NNC)
\end{aligned}
$$

The first constraint (PC) is the participation constraint, which guarantees that the manager is not worse off if he accepts the contract rather than rejecting it in favor of his outside option. Condition (IC) yields the incentive-compatibility constraints according to which the manager chooses his effort levels so as to maximize his own expected utility for any given incentive contract. The last constraint stated in (NNC) ensures that manager i's wage payment is non-negative for any pair of efforts $(e_{i,1}, e_{i,2})$ in any possible state. Throughout the paper, we focus on cases with both effort levels strictly positive, i.e., we assume that s is not too large.

We solve the problem (I) for both manager types and $\alpha \in (0, 1]$ in Appendix A1. There, we derive the optimal effort levels $e^*_{i,1}(\cdot, \alpha), e^*_{i,2}(\cdot, \alpha)$ in the two tasks, the optimal incentive contract, and the firm owner's expected utility under the optimal contract, respectively. Further, we summarize some comparative-statics results in lemmas that will be useful for our subsequent analysis. The following lemma characterizes the optimal incentive contract.

Lemma 1 *The optimal incentive contract $\langle \gamma^*_i, w^*_i \rangle$ for manager $i \in \{F, N\}$ is given by:*

$$
w^*_i = 0, \tag{6}
$$

$$
\gamma^*_i = \frac{1-2\theta_i}{1-\theta_i} \times \frac{(a_{i,2} - \alpha s) + (a_{i,1}\alpha - s)}{2[(a_{i,2} - \alpha s) + \alpha(a_{i,1}\alpha - s)]} \tag{7}
$$

As verified in Appendix A1, the manager always obtains an information rent and the firm owner will thus set the fixed wage as low as possible to minimize wage costs. Given the lower bound on the manager's payment in (NNC), the optimal fixed wage hence becomes zero. Due to the limited liability of the manager, the well-known trade-off between information rent and efficiency arises, and the first-best solution cannot be implemented for any α.

In the following two subsections, we discuss the optimal incentive contracts and the associated results regarding the manager's multitasking problem and the firm owner's expected utility for the two manager types in greater detail. As a benchmark, we first consider contracts based on a perfect performance measure with $\alpha = 1$. Then, we turn to the more general case of contracts based on an imperfect performance measure with $\alpha < 1$.

3.1 Incentive Contracts Based on a Perfect Performance Measure

Under a perfect performance measure (i.e., $\alpha = 1$), the manager's achievement in the economic task 1 and the non-economic task 2 are both perfectly captured by P_i. In this case, the firm owner's expected value and the expected performance measure used in the incentive contract coincide. We discuss the impact of θ_i on the owner's expected utility in the first proposition and otherwise focus on purely self-regarding preferences ($\theta_i = 0$) for simplicity throughout this subsection.

Before further analysis, we firstly summarize a few intuitive findings regarding the impact of task interdependence and managerial abilities on the optimal effort levels, $e^*_{i,1}(\cdot, \alpha = 1)$, $e^*_{i,2}(\cdot, \alpha = 1)$. First, by Assumption 1, it holds that either manager exerts less effort in the task in which he is less skilled (compare equations (10) and (11) in Appendix A1). If tasks are complements ($s < 0$), a low ability in one task also negatively affects effort in the respective other task. However, if tasks are substitutes ($s > 0$), a lower effort in one task leads to higher efforts in the other task because the manager reallocates effort in line with his abilities.

Second, by Lemma 3 in Appendix A1.1, each manager always reduces his effort in the task he is less skilled in as s increases. That is, the non-family manager's effort in task 2 and the family manager's effort in task 1 are both strictly decreasing in s. Intuitively, as tasks get less complementary or become stronger substitutes, a manager finds it too costly to work much in the harder task. The same is true for the task in which a manager is more skilled unless s becomes too large. In the latter case, the manager will start to increase his effort in his more productive task again. Intuitively, when tasks are sufficiently strong substitutes, the manager will be better off by devoting his capacity mainly to the task in which he is more skilled.

The previous observations lead to the following conclusion regarding the impact of the manager's abilities and task interdependence on the firm owner's expected utility.

Proposition 1 *Under a perfect performance measure, for manager $i \in \{F, N\}$, the firm owner's expected utility is decreasing in $a_{i,1}$, $a_{i,2}$ and s. For the family manager, it is, moreover, strictly increasing in θ_F.*

From the above, we know that decreasing ability in a task (i.e., an increase in $a_{i,1}$ or $a_{i,2}$) leads to a reduction of the manager's effort levels in both tasks if tasks are complements ($s < 0$). Due to the resulting lower productivity, the firm owner's expected utility decreases. If tasks are substitutes ($s > 0$), the optimal levels of effort in task 1 and 2 alter in different directions as $a_{i,1}$ or $a_{i,2}$ increase. However, due to the convexity of the effort-cost function in each task, a more uneven effort allocation across tasks is more costly while the marginal productive return is constant. As a result, overall less efficient effort levels will be implemented, thereby lowering the firm owner's expected utility.

As to the negative impact of task interdependence on expected utility, note that varying s from its lower to its upper bound implies that tasks are highly complementary initially but strong substitutes for large s. That is, the manager's benefit from concurrently working on both tasks first diminishes and then turns into a cost. As s increases, effort costs increase ceteris paribus and as a consequence total exerted effort goes down, in turn reducing the firm owner's overall expected utility.

Finally, the last result of Proposition 1 verifies that the parameter θ_i is in fact an inverse measure of the magnitude of the moral-hazard conflict between the owner and the manager of the family firm. Intuitively, the more the manager personally cares for the family firm, the harder he will, ceteris paribus, work for a given bonus and the higher the owner's expected utility will be. Clearly, in terms of the manager types' relative performance, this result implies a relative advantage for the family manager when $\theta_F > 0$ compared to the non-family manager for whom $\theta_N = 0$. As we will show in the next subsection, the result extends to the case of an imperfect performance measure (i.e., $\alpha < 1$).

From the foregoing analysis follows a corollary regarding the manager's multitasking problem, i.e., the relative attention that the managers devote to the different tasks, depending on their type.

Corollary 1 *Under a perfect performance measure, for any given s, the non-family manager focuses more on task* 1 *while the family manager focuses more on task* 2*. A manager's effort difference across tasks is smallest when tasks are independent; otherwise the difference in effort is increasing in the absolute value of s.*

Intuitively, a manager will pay more attention to the task he is more skilled in because, ceteris paribus, his marginal effort cost of performing that task is lower than for the other task while the marginal productivity of the tasks is equal. How strongly a manager focuses on one task depends on the task interdependence. As shown in Lemma 3, if tasks are complements ($s < 0$) and s increases, the difference between effort in task 1 and 2 is decreasing in s for both managers. Intuitively, as s increases, a manager's ability advantage of doing the more productive task diminishes so that he will focus less strongly on that task and pay relatively more attention also to the other task. At the point $s = 0$, i.e., when tasks are independent, the manager's effort difference between the two tasks is the lowest. As s increases further, tasks become substitutes ($s > 0$) and the manager lowers his effort in the task in which he is less skilled. At the same time, he also lowers his effort in the more productive task, as long as s is not too large. In that case, however, he reduces his effort in the less productive task even more such that the effort difference across tasks is increasing. As shown in Lemma 3, once s is sufficiently large, the manager starts increasing his effort in the more productive task, thereby reinforcing the increasing effort difference across tasks.

3.2 Incentive Contracts Based on an Imperfect Performance Measure

As discussed above, more generally, the manager's achievement in the non-economic task 2 can certainly not be measured as well as achievement in the economic task 1. In this section, we thus analyze the case where the firm owner uses an incentive contract based on an imperfect performance measure P_i with $\alpha < 1$. In the following, we discuss the optimal incentive contract and the multitasking problem for both types of managers. More specifically, we analyze the impact of managerial abilities, task interdependence, and the distortion created by the performance measure on the firm owner's expected utility. We further discuss the impact of the manager's personal interest in the total value of the family firm.

Initially, consider the optimal incentive pay γ_i^* stated in Lemma 1 for the case $\alpha < 1$. It is easy to show that, for given θ_i, the optimal bonus is lowest as α approaches 1. Intuitively, a strongly aligned performance measure is very effective in terms of incentivizing the manager in both tasks. This allows for setting a smaller bonus at the optimum so as to keep the rent paid to the manager and hence the owner's wage costs low. A few further observations regarding the optimal incentive pay across managers and depending on θ_i should be noted. Recall that $\theta_N = 0$ and $\theta_F \in [0, \frac{1}{2}]$. First, if $\theta_F = 0$, the optimal incentive pay is higher-powered for the family manager; $\gamma_F^* (\cdot, \theta_F = 0) > \gamma_N^*$ (see the proof of Corollary 3iv) in Appendix 1.2 for verification). Intuitively, since the bonus is based on the distorted performance measure P_i, it less strongly rewards effort in task 2 than effort in task 1. As verified below, for every optimal bonus, both managers' effort levels will consequently be distorted towards task 1 when $\alpha < 1$. However, for given $\alpha < 1$, the effort distortion will be stronger for the non-family manager because he is relatively more skilled in task 1 than the family manager. The firm owner will hence set his bonus lower at the optimum to avoid that the manager (too) strongly neglects task 2.

Second, the optimal bonus is, ceteris paribus, decreasing in θ_i because an increased personal valuation of the family firm leads to intrinsic work motivation and hence allows for a lower bonus. This implies that the bonus pay for the two manager types converge as θ_F becomes positive and eventually, for sufficiently large θ_F, it may become higher-powered for the non-family manager; $\gamma_F^*(\cdot, \theta_F > 0) < \gamma_N^*$.[11] In fact, previous literature on incentive payment in family firms shows that family CEOs oftentimes receive lower compensation than non-family CEOs (McConaughy 2000, Gómez-Mejía et al. 2003). Finally, the family manager's bonus shrinks to zero for $\theta_F = \frac{1}{2}$ since he is then sufficiently intrinsically motivated due to his strong attachment to the family firm and the associated personal expected utility from raising firm value.[12] Clearly, this is an extreme case of a family manager who strongly identifies with the family business, shares the same values and goals with the family firm, and commits himself strongly to the family business.

In the following, we analyze the impact of the measurement problem on the relative attention that managers pay to the different tasks. In contrast to the case with a perfect performance measure presented above, the manager's effort allocation will now depend not only on their abilities and the task interdependence but also on the (mis)alignment of the performance measure with the owner's value. For the sake of exposition, in the next two corollaries, we focus on the case where $\theta_F = 0$. That is, we assume that both managers have no emotional attachment to the family firm and are thus distinguished only by their abilities to perform the tasks. We reconsider the impact of θ_i on the firm owner's value in Proposition 2 at the end of this subsection and further analyze its impact on the relative performance of the manager types in Section 4. The following corollary establishes the effort distortion caused by an imperfect performance measure for any manager i in our model.

Corollary 2 *Under an imperfect performance measure, both managers' efforts are distorted towards task* 1 *compared to a perfect performance measure. That is,* $e_{i,1}^*(\cdot, \alpha < 1) > e_{i,1}^*(\cdot, \alpha = 1)$ *while* $e_{i,2}^*(\cdot, \alpha < 1) < e_{i,2}^*(\cdot, \alpha = 1)$. *For both managers, the effort distortion gets more severe as* s *increases.*

The result above shows that, under an incentive contract based on an imperfect performance measure, a manager's effort in task 1 will be larger while effort in task 2 will be lower than under a perfect measure. Intuitively, since effort exerted in task 1 affects an imperfect performance measure to a larger extent than effort exerted in task 2, it is more rewarding for both manager types to pay relatively more attention to task 1. This effort distortion is amplified as tasks become either less complementary or stronger substitutes because performing both tasks concurrently becomes then more costly. Consequently, both managers will pay even more attention to the more rewarding task 1 as compared to the case of a perfect measure.

[11] Despite a possibly lower bonus, the family manager may however earn a larger rent than the non-family manager due to the additional expected utility generated by the personal attachment to the family firm (see equation (12) in Appendix A1 and the ensuing explanation).

[12] Notably, the family manager in this case still earns a positive rent. This follows from setting $\theta_F = \frac{1}{2}$ in equation (12) in Appendix A1, which yields a positive rent.

The foregoing results imply that the non-family manager's focus on task 1 under a perfect performance measure (see Corollary 1) will be reinforced under an imperfect measure while the family manager's focus on task 2 will be counteracted. A convenient way to measure the strength of the effort distortion for either manager type is to consider the difference in effort allocated to the two tasks, $e^*_{i,1}(\cdot,\alpha) - e^*_{i,2}(\cdot,\alpha)$. It then follows that the larger this difference is, the more distorted are a manager's efforts towards task 1, ceteris paribus. In the following corollary, we analyze this effort difference to derive important results regarding the strength of the effort distortion and the effect thereof on the two manager types' relative attention across tasks. These insights will prove useful to better grasp the intuition behind our main findings concerning the firm owner's hiring decision.

Corollary 3

i) For both managers i, the effort difference across tasks, $e^*_{i,1}(\cdot,\alpha) - e^*_{i,2}(\cdot,\alpha)$, is decreasing in α.

ii) The non-family manager focuses more on task 1 than task 2 ($e^*_{N,1} - e^*_{N,2} > 0$) for any given α and s.

iii) The family manager:

a) focuses more on task 2 than task 1 ($e^*_{F,1} - e^*_{F,2} < 0$) if tasks are sufficiently strong complements, the manager's ability in task 2 is sufficiently large ($a_{F,2} + s < 0$), or α is sufficiently large;

b) focuses more on task 1 than task 2 ($e^*_{F,1} - e^*_{F,2} > 0$) if tasks are substitutes or weak complements, the manager's ability in task 2 is sufficiently small ($a_{F,2} + s > 0$), and α is sufficiently small.

iv) If the managers are symmetric in terms of ability, for any given α and s, the non-family manager pays more attention to task 1 than the family manager ($e^*_{N,1} > e^*_{F,1}$) whereas the family manager pays more attention to task 2 than the non-family manager ($e^*_{F,2} > e^*_{N,2}$). Moreover, it always holds that $e^*_{N,1} - e^*_{N,2} > \left|e^*_{F,1} - e^*_{F,2}\right|$.

The result of Corollary 3i) is straightforward, in accordance with the previous discussion regarding the impact of α on the manager's effort allocation. Clearly, the effort distortion is mitigated for either type when α increases, because exerting effort in task 2 then more strongly affects the manager's expected reward.[13] The following results of the corollary report the associated implications for the two manager types' relative attention to the tasks, also taking into account their abilities and the task interdependence.

[13] Note that, as shown in Corollary 3iii), the effort difference $e^*_{i,1}(\cdot,\alpha) - e^*_{i,2}(\cdot,\alpha)$ may be positive or negative for the family manager.

Corollary 3ii) shows that, similar to the case of a perfect performance measure, the non-family manager also pays relatively more attention to task 1 under an imperfect measure. Intuitively, that manager is more productive in task 1 and, in addition, exerting effort in this task is more effective in raising his expected bonus than exerting effort in task 2. By Corollary 2, the non-family manager's focus on task 1 will, however, be even more pronounced than under a perfect measure.

By contrast, Corollary 3iii) shows that the family manager's relative attention under an imperfect measure now depends on the strength of the measurement problem and the task interdependence. More specifically, by Corollary 3iii)a), the family manager - because of his ability advantage in task 2 - pays relatively more attention to this task when α is sufficiently large. Note that this result includes the case of a perfect performance measure ($\alpha = 1$), presented in Corollary 1. However, by Corollary 1i), as the performance measure becomes more and more imperfect (i.e., as α decreases), the family manager's attention will be increasingly distorted towards task 1. It is straightforward that the distortion is less severe when the manager's ability advantage in task 2 is large (i.e., $a_{F,2}$ is rather small). Similarly, the effort distortion is lower when tasks are highly complementary because working on the more productive task 2 then strongly facilitates also performing task 1 (see Corollary 2). That is, for sufficiently small $a_{F,2}$ and s, the family manager pays more attention to task 2 than task 1, even if the performance measure is imperfect.

However, by Corollary 3iii)b), as α becomes sufficiently small, the family manager's ability advantage in task 2 is outweighed by the distortion created by the performance measure and he will, despite his relatively low ability, also focus on task 1. This result is reinforced when the family manager's ability advantage in task 2 is rather small (i.e., $a_{F,2}$ is rather large) or when performing both tasks concurrently becomes more costly (i.e., s increases). Altogether, under an imperfect performance measure, the non-family manager puts more effort into task 1 for any s and α while the family manager focuses on task 2 for low s and large α but also switches his main attention to task 1 once s is large or α small enough.

Finally, as verified by Corollary 3iv), the types' ability differences imply that, in the symmetric case, the family manager will always exert a higher effort in task 2 than the non-family manager, while the opposite is true for task 1.[14] Intuitively, regardless of the effort distortion caused by the imperfect measure, the non-family manager's higher ability in task 1 provides an incentive to exert higher effort in task 1 than the family manager. The same logic applies for the family manager with respect to task 2. The result implies that the family manager allocates effort more evenly across tasks than the non-family manager because, for the latter, the absolute effort difference across tasks is strictly larger ($e^*_{N,1} - e^*_{N,2} > \left| e^*_{F,1} - e^*_{F,2} \right|$).

[14] We will discuss the asymmetric case in Section 4.

Note that the foregoing findings affirm the introductory quotation by Chrisman et al. (2012). In fact, our results imply that "non-family managers resist the adoption of non-economic goals" more strongly than family managers when performance measures are imperfect. Notably, the result arises even in the absence of the family managers' personal care for the family firm, which would clearly reinforce the aforementioned statement. In addition, we highlight that the problem is amplified when tasks become more exclusive because, in this case, even family managers will be reluctant to focus on the non-economic task. Altogether, the finding that family managers are less inclined than non-family managers to neglect the non-economic task will be decisive for the subsequent analysis of the optimal hiring decision because the managers' effort misallocation directly impacts the owner's utility. In order to analyze this question in the next section, we finally summarize how the owner's expected utility is affected by the (mis)alignment of the performance measure, the task interdependence, and the family manager's personal care for the family firm.[15]

Proposition 2 *Under an imperfect performance measure, for both managers $i \in \{F, N\}$, the firm owner's expected utility is decreasing in s and increasing in α. For the family manager, it is, moreover, strictly increasing in θ_F.*

In Lemma 4 in the Appendix, we verify that, similar to the case of a perfect measure, a manager's effort and hence his expected productivity is decreasing in s for both tasks when tasks are complements ($s < 0$). The same is true if tasks are substitutes ($s > 0$), unless a manager's ability in one task is sufficiently low. In the latter case, the manager's effort in the respective other task may be increasing in s, however this will not outweigh the associated increase in total effort costs. Accordingly, the firm owner's expected utility is decreasing as tasks become less complementary initially and then stronger substitutes.

Moreover, as discussed above, when the performance measure becomes more aligned with the owner's value, the effort distortion caused by the incentive contract will be less severe. The firm owner can then provide more efficient incentives by better directing the manager's efforts towards both tasks. Consequently, the firm owner's expected utility increases because the moral-hazard problem is more effectively mitigated. Altogether, note that Proposition 2 implies that, ceteris paribus, the firm owner is always better off under a perfect performance measure.

Finally, the last result of Proposition 2 extends the equivalent finding from Proposition 1 to imperfect performance measures. Altogether, for any α, a larger parameter θ_F implies a reduced moral-hazard conflict in the relationship between the owner and the family manager and thus,

[15] In contrast to the case with a perfect performance measure, the impact of managerial abilities is now more complex and depends on the absolute levels of $a_{i,1}, a_{i,2}$ as compared to α and s. It is hence excluded from the proposition and studied in the following section by investigating the impact of manager type and the associated abilities on the owner's utility.

ceteris paribus, raises that manager's performance relative to the non-family manager.

4 The Optimal Hiring Decision

In this section, we analyze which manager (type) the owner of the family firm should optimally hire under the given circumstances. Therefore, we consider the firm owner's value function when hiring manager i, i.e., the owner's expected utility under the optimal contract, $\pi_i^* = \pi_i\left(w_i^*, \gamma_i^*, e_{i,1}^*, e_{i,2}^*\right)$, given in equation (13) in Appendix A1. In our model, the owner hires the manager whose running of the firm provides her with a larger expected utility.

According to our results thus far, it is straightforward that the relative performance of the managers will be determined by the interplay of several factors, namely the alignment of the performance measure with the firm owner's value as reflected by α, the degree and type of task interdependence s, the manager's abilities, and, finally, the manager's personal valuation of the family firm θ_i. As will become clear later, in this respect, not only do the managers' relative abilities matter (i.e., who is more skilled in which task) but the managers' absolute abilities also matter (i.e., how high is a manager's skill in a task). In the following, we illustrate how the optimal hiring decision depends on all the aforementioned parameters.

For the sake of exposition, in the following two subsections, in addition to formal propositions, we use numerical results obtained from the model to present graphical illustrations of the two manager types' relative performance. In all graphs, we plot the firm owner's value functions for both manager types, π_F^*, π_N^*, depending on the task interdependence s and for different values of α and θ_F. We initially consider the managers with symmetric abilities and then turn to asymmetric managerial abilities. In line with the model, we focus on cases for which effort in both tasks is strictly positive for both managers also in the graphs.[16]

4.1 Symmetric Abilities

In this subsection, we consider the optimal hiring decision when the non-family and the family manager are symmetric in terms of ability according to Definition 1. The following proposition reports our main results, depending on the family manager's personal valuation of the family firm.

Proposition 3 *Suppose that the family and the non-family manager are symmetric in terms of ability. Then it holds that:*

[16]Note that this restricts the range of s for which the functions are shown. Once s is so large that the manager totally neglects one of the tasks, the firm owner's value function becomes independent of task interdependence and, in the figures, would resemble a horizontal line starting at the lowest utility level shown. Consequently, the relative performance of the managers would be unchanged for any higher level of s. Moreover, to allow for easier comparisons within one figure, all subfigures are presented on the same scale, respectively.

i) Under a perfect performance measure, the firm owner is indifferent as to which manager to hire if $\theta_F = 0$; she hires the family manager if $\theta_F > 0$ for any s.

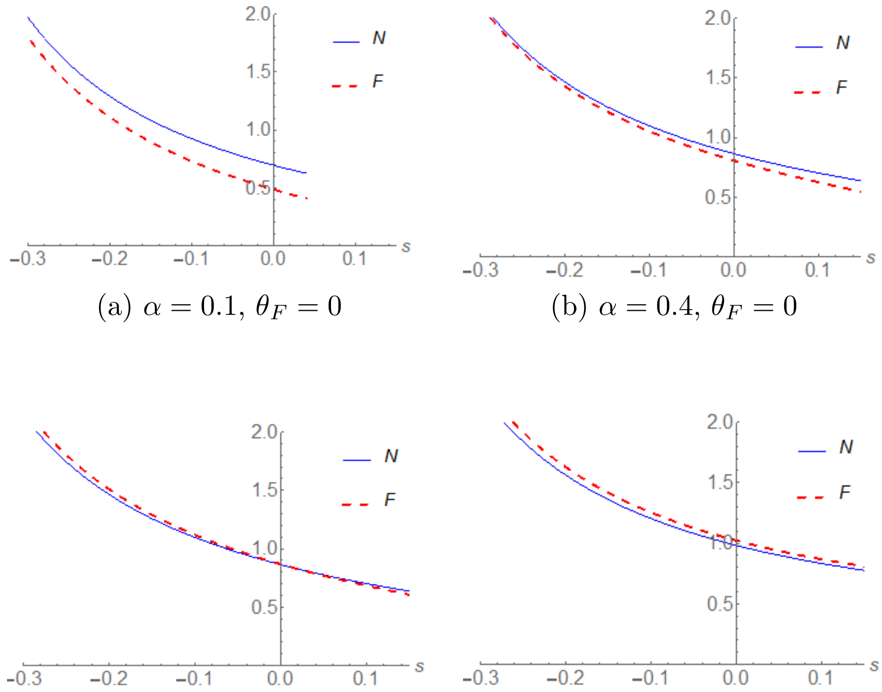
ii) Under an imperfect performance measure, the firm owner hires the non-family manager if $\theta_F = 0$; she hires the family manager if $\theta_F > 0$ is sufficiently large for given values of s and α.

The result of Proposition 3i) continues the analysis presented in Section 3.1. By the owner's value function in equation (18) in Appendix A1.1, it is straightforward that, when $\theta_F = 0$, the firm owner's expected utility coincides for symmetric managers. Recall that both tasks are equally important for the firm owner and, moreover, equally well measured by a perfect performance measure. Although the two manager types focus on different tasks (see Corollary 1), the symmetric abilities imply the same expected utility to the firm owner. Moreover, by Proposition 1, it is straightforward that, with symmetric abilities, the family manager outperforms the non-family manager once he exhibits personal care for the family firm due to the reduced moral-hazard problem.

For a discussion of Proposition 3ii) and to illustrate the results of the proposition, we plot the firm owner's expected utility $\pi_i^* (a_{i,1}, a_{i,2})$ for two symmetric managers $i \in \{F, N\}$ as a function of the task interdependence s in Figure 1. Throughout Figures 1-3, solid curves indicate the firm owner's value function when hiring a non-family manager, $\pi_N^* (a_{N,1}, a_{N,2})$, while dashed curves show the value function when hiring a family manager, $\pi_F^* (a_{F,1}, a_{F,2})$. We use $a_{N,1} = a_{F,2} = 0.4$ and $a_{F,1} = a_{N,2} = 0.7$ as numerical examples in all panels of Figure 1 but vary α and θ_F across panels. In panels (a) and (b), we set $\theta_F = 0$ while we assume $\theta_F > 0$ in panels (c) and (d). The figure shows that, in line with Propositions 1 and 2, all curves are sloping downward. That is, the firm owner's expected utility is decreasing for both managers as tasks become less complementary or stronger substitutes. Notice that the curve is steeper for the family manager in panels (a) - (c), i.e., the owner's expected utility decreases at a faster rate as tasks become more exclusive.[17] To understand this difference, recall from Corollary 2 that, for $\alpha < 1$, both managers distort effort more strongly towards task 1 as s increases. However, this distortion is more costly overall for the family manager since he is less skilled in task 1, implying a relatively larger reduction of the owner's expected utility.

Whereas, for $\theta_F = 0$, the owner is indifferent between managers under a perfect performance measure, Proposition 3ii) shows that the result changes in favor of the non-family manager when the performance measure is imperfect. Accordingly, Figure 1(a) and (b) show that the non-family manager outperforms the family manager for any s when managers are symmetric and $\theta_F = 0$. The reason is that the non-family manager is more skilled in the economic task

[17] It is easy to show that this holds for all symmetric cases with $\alpha < 1$.



(a) $\alpha = 0.1$, $\theta_F = 0$ (b) $\alpha = 0.4$, $\theta_F = 0$

(c) $\alpha = 0.4$, $\theta_F = 0.04$ (d) $\alpha = 1$, $\theta_F = 0.04$

Figure 1: Value functions $\pi_N^*\ (0.4, 0.7)$ and $\pi_F^*\ (0.7, 0.4)$

which, at the same time, is the task that can be better measured and incentivized. In contrast to the case of a perfect measure in Proposition 3i), the family manager is now put at a disadvantage compared to the non-family manager in the sense that the non-economic task in which he is more skilled does not affect his pay as strongly as the economic task. From the firm owner's perspective, this implies that, although both managers distort efforts towards task 1 (Corollary 2), it is more harmful in the case of hiring a family manager because that manager is less skilled in this task.

A comparison of Figures 1(a) and (b) shows that, in line with Proposition 2, the firm owner's expected utility shifts upwards for both managers as α increases but more so for the family manager. This is explained by the reduced effort distortion as a result of a better alignment of the performance measure with the firm owner's value. For all symmetric cases, the upward shift is stronger for the family manager so that, with $\theta_F = 0$, the curves converge as α approaches 1. Intuitively, a more aligned performance measure provides more effective incentives for task 2, which affects the family manager more than the non-family manager because he is more skilled in that task and hence more responsive to the improved incentives. As a result, the family manager's relative disadvantage is reduced and so is the difference in the owner's value functions. Notice that the foregoing implies the first result of Proposition 3i) for $\alpha = 1$.

A comparison of Figures 1(b) and (c) shows that, in line with Proposition 2, an increase in the family manager's personal care for the family firm ($\theta_F > 0$) shifts the owner's value function upwards for this type of manager. Accordingly, as stated in Proposition 3ii), if θ_F is sufficiently large, the family manager outperforms the non-family manager.[18] As obvious from the pictures, due to the steeper slope of the family manager's value function, this happens for relatively lower levels of personal care when tasks are more complementary. In fact, the intersection of the value functions in Figure 1(c) indicates that, in the given example, the family manager is essentially hired when tasks are complements while the non-family is hired only when tasks are substitutes. Finally, Figure 1(d) represents the latter finding of Proposition 3i) by illustrating that, under a perfect measure, a family manager characterized by $\theta_F > 0$ is preferred for any s.

4.2 Asymmetric Abilities

In this subsection, we analyze the optimal hiring decision when the managers are asymmetric in terms of ability. For simplicity, in the remainder we will focus on purely self-regarding family managers (i.e., $\theta_F = 0$) in our formal results and figures. This is, however, innocuous because the impact of θ_F on the owner's value function π_F^* is strictly positive as studied in Propositions 1 and 2. We will revert to its effect on the managers' relative performance in the text.

The next proposition considers the case of a *perfect performance measure* and shows that the optimal hiring decision depends on the manager's specific ability levels when managers are asymmetric.

Proposition 4 *Under a perfect performance measure, for any given s, manager $i \in \{F, N\}$ is preferred to manager $j \in \{F, N\}$ with $i \neq j$ if $\min\{a_{i,1}, a_{i,2}\} \leq \min\{a_{j,1}, a_{j,2}\}$ and either (i) $a_{i,1} + a_{i,2} < a_{j,1} + a_{j,2}$ or (ii) $\min\{a_{i,1}, a_{i,2}\}$ is sufficiently small.*

Notice that the proposition is consistent with the first result of Proposition 3i) for symmetric managers because, for them, it holds that $\min\{a_{i,1}, a_{i,2}\} = \min\{a_{j,1}, a_{j,2}\}$ and $a_{i,1} + a_{i,2} = a_{j,1} + a_{j,2}$ so that neither manager is preferred.

For asymmetric managers, Proposition 4 implies that if managers differ in their ability with respect to one task only, i.e., if either $a_{N,2} \neq a_{F,1}$ or $a_{F,2} \neq a_{N,1}$, then the manager with higher average skills will be hired, i.e., the manager for whom $(a_{i,1} + a_{i,2})$ is lower.[19]

If managers are asymmetric with respect to both tasks, a necessary condition for the firm owner to prefer one of them is that a manager's skills in his more productive task exceed the other candidate's skills in his respectively more productive task ($\min\{a_{i,1}, a_{i,2}\} < \min\{a_{j,1}, a_{j,2}\}$). Under this condition, a manager will be hired if he is either (i) overall more 'efficient', i.e., more

[18] In the proof of Proposition 3ii) we show that, in our setting, such a θ_F exists for all α, s, and abilities.

[19] Notice that, for the result, it is not important in which task their ability differs.

skilled on average or (ii) particularly skilled in his more productive task. Intuitively, part (ii) of the proposition shows that, even if manager i is less skilled on average ($a_{i,1} + a_{i,2} > a_{j,1} + a_{j,2}$), this may be outweighed by an extraordinary performance in one task.

Next, we consider the case of an *imperfect performance measure*. Intuitively, the conditions for the superiority of either manager type under a perfect performance measure in Proposition 4 need to be adjusted for the impact of α on each manager's performance. As explained before, the imperfect performance measure affects both managers but provides a relative disadvantage to the family manager (recall from Proposition 3ii) that the family manager never outperforms the non-family manager if $\theta_F = 0$ and abilities are symmetric). Accordingly, the family manager can only outperform the non-family manager if he has some (sufficient) advantage over the latter in terms of absolute abilities.

In the following two subsections, we illustrate our main findings for the asymmetric case using graphical representations. We consider two possible scenarios. In the first, the family manager is more skilled on average ($a_{F,1} + a_{F,2} < a_{N,1} + a_{N,2}$) while, in the second scenario, the non-family manager is more skilled on average ($a_{F,1} + a_{F,2} > a_{N,1} + a_{N,2}$). We will show that, depending on the alignment of the performance measure α and the task interdependence s, either manager can be preferred by the firm owner *in both scenarios* and discuss the associated conditions.

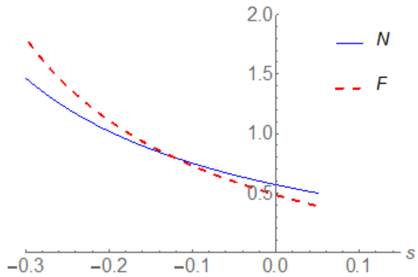
4.2.1 More Skilled Family Manager

As in the previous subsection, we assume that $a_{F,1} = a_{N,2} = 0.7$ and $a_{F,2} = 0.4$ but, different from before, we set $a_{N,1} = 0.5$. That is, the managers' abilities are asymmetric with respect to only one task and this asymmetry is in favor of the family manager. Specifically, the family manager's ability of doing (his more productive) task 2 is higher than the non-family manager's ability of doing (his more productive) task 1 ($a_{F,2} < a_{N,1}$).[20] Accordingly, in the given example, the family manager is more skilled on average than the non-family manager ($a_{F,1} + a_{F,2} < a_{N,1} + a_{N,2}$). Recall that, under a perfect performance measure, the firm owner would thus always hire the family manager (Proposition 4).

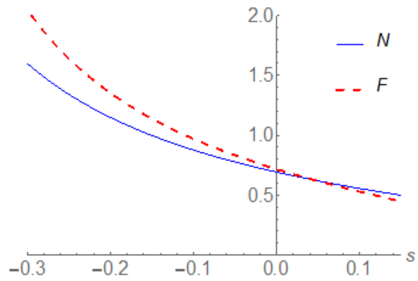
Figure 2(a) - (c) presents the firm owner's respective value functions depending on s and for three different values of α.

First consider Figure 2(a) showing the case of a strongly misaligned performance measure ($\alpha = 0.1$). A comparison with the equivalent symmetric case in Figure 1(a) shows that the value function for the non-family manager has shifted downwards in the asymmetric case due to his relatively lower ability in task 1. Because that manager's abilities have become more similar in

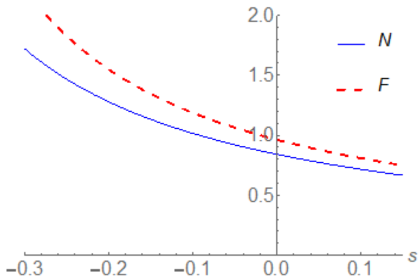
[20] Similar examples can be produced by lowering $a_{F,2}$ and/or $a_{F,1}$, and/or raising $a_{N,2}$ compared to the values used in the last subsection. In all these cases, the family manager obtains a relative advantage compared to the symmetric case.



(a) $\alpha = 0.1$



(b) $\alpha = 0.3$



(c) $\alpha = 0.75$

Figure 2: Value functions π_N^* (0.5, 0.7) and π_F^* (0.7, 0.4) with $\theta_F = 0$

the two tasks, the curve has, moreover, become flatter.[21] As a result, the curves in Figure 2(a) intersect so that the firm owner's optimal hiring decision depends on the task interdependence s. In particular, the family manager outperforms the non-family manager if the two tasks are sufficiently strong complements, i.e., if s is relatively small. Notably, this happens although the family manager's ability advantage is in task 2, which hardly affects the performance measure. Intuitively, because, for low values of s, performing one task facilitates the manager to also work on the other, the impact of the strongly misaligned performance measure is not too harmful, and the family manager is hired due to his larger average skill level. However, as s increases, tasks become more exclusive, and both managers' efforts will become more strongly distorted towards task 1 (Corollary 2). Because the value function decreases faster for the family manager, the value functions converge and eventually intersect for some $s < 0$. For any s above this level (and all $s > 0$), the non-family manager will thus be preferred over the family manager although he is less skilled on average. Intuitively, the effort distortion caused by large values of s leads to lower performance, in particular for the family manager when α is small.

Comparing panels (a) - (c) of Figure 2 highlights that the optimal hiring decision depends not only on the task interdependence but also on the alignment of the performance measure.

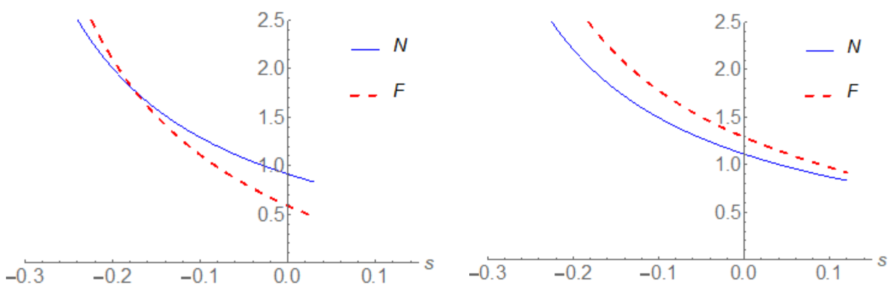
[21] Similar to the symmetric case, for the asymmetric case presented it can also be shown that the owner's value function decreases in s at a faster rate for the family manager than for the non-family manager when $\alpha < 1$.

The figures show that, as α increases, the range of task interdependence for which the family manager outperforms the non-family manager is strictly increasing. For an intermediate value of α in panel (b), the family manager is preferred whenever tasks are complements, while, for a sufficiently large α in panel (c), the family manager outperforms the non-family manager regardless of task interdependence. That is, as the performance measure becomes more aligned with the firm owner's value, the family manager is more likely hired. Intuitively, an improved performance measure counteracts the family manager's distortion of efforts towards task 1 so that he works relatively more in his more productive non-economic task, and he will thus overall contribute more to the firm owner's value.

Finally, notice that the firm owner's hiring decision in general also depends on the family manager's personal valuation of the family firm. Similar to the symmetric case, in all panels of Figure 2, the firm owner's respective value function shifts upwards as θ_F increases, thereby making it more likely that the family manager will get hired.

4.2.2 More Skilled Non-family Manager

Recall from Proposition 4 that, for the optimal hiring decision under a perfect performance measure, not only a manager's overall skill level $(a_{i,1} + a_{i,2})$ but also the manager's excellence in his more productive task $(\min\{a_{i,1}, a_{i,2}\})$ matters. In the following, we illustrate that a similar reasoning holds for imperfect performance measures. More specifically, we show that a family manager who exhibits sufficiently strong skills in the non-economic task may be hired even if he is less skilled on average $(a_{F,1} + a_{F,2} > a_{N,1} + a_{N,2})$.[22] As in the previous case, the range for which the family manager will be preferred depends on α and s, as illustrated by Figure 3.



(a) $\alpha = 0.1$ (b) $\alpha = 0.4$

Figure 3: Value functions π_N^* (0.3, 0.6) and π_F^* (0.8, 0.2) with $\theta_F = 0$

Figure 3(a) shows the firm owner's expected utility for the two managers and for a strongly distortive performance measure ($\alpha = 0.1$). Similar to Figure 2(a), the value functions intersect

[22] It is straightforward that a non-family manager who is more skilled in the economic task than in the symmetric case will have yet another advantage, thereby reinforcing the results of Subsection 4.1.

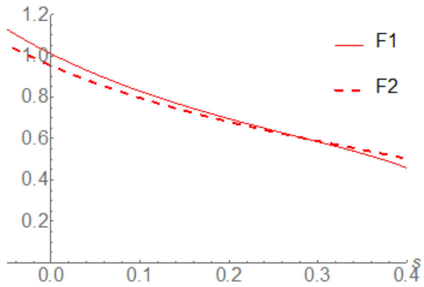


Figure 4: Value functions $\pi^*_{F1}(0.6, 0.4)$ and $\pi^*_{F2}(0.7, 0.4)$ with $\theta_F = 0$

and the family manager outperforms the non-family manager if tasks are sufficiently strong complements while the non-family manager is hired otherwise. Intuitively, if tasks are complements, the family manager's excellence in the non-economic task not only facilitates his working in the economic task but moreover compensates for his low ability in the latter task and his lower average skills. Figure 3(b) shows that this effect is amplified as the alignment of the performance measure increases. As a result, the family manager becomes the optimal hire for a larger range of s. In panel (b), the family manager will always be hired for an intermediate $\alpha = 0.4$, although his skills are lower on average than those of the non-family manager.

Altogether, these results show that a family manager who is less skilled on average will still be the optimal hire provided that he has an excellent ability of doing the task he is good at. The more aligned the performance measure is with the owner's value, the more efficiently the family manager can use his ability advantage, which in turn lowers the requirement regarding his excellence in that task.

4.2.3 Two Family Managers

Finally, it is worth noting that our model can also be employed to compare managers of the same type by using Assumptions 1(i) and 1(ii). We briefly present one case showing that the optimal hiring decision is then not trivial either. For instance, suppose that the firm owner chooses between two family managers; $i = F1, F2$, where manager $F1$ is more skilled on average than manager $F2$ ($a_{F1,1} + a_{F1,2} < a_{F2,1} + a_{F2,2}$). Further assume that both family managers are equally skilled in the non-economic task ($a_{F1,2} = a_{F2,2} = 0.4$) but manager $F1$ has a higher ability in the economic task ($a_{F1,1} = 0.6 < a_{F2,1} = 0.7$). Figure 4 presents a surprising result by plotting the firm owner's value functions for $\alpha = 0.7$, where the solid curve depicts manager $F1$ and the dashed curve manager $F2$.

The figure shows that, when tasks are sufficiently strong substitutes, the firm owner optimally hires the overall less skilled manager $F2$ although he exhibits no particular excellence in either task. To understand this finding, recall that both family managers distort effort towards the (less productive) economic task 1. Recall from Corollary 2 that this distortion gets more severe as tasks become more exclusive. Notably, the distortion will, however, be less severe for manager $F2$ because, due to his relatively lower ability in task 1, he is less inclined than manager $F1$ to strongly focus on that task.[23] For low values of s, manager $F1$'s relatively higher ability in task 1 will enable him to work sufficiently on task 2 as well, implying an overall better performance. However, as s increases, manager $F1$ will more strongly neglect task 2, thereby forgoing his ability advantage in that task, while manager $F2$ will more evenly allocate efforts across tasks. When s is large enough, this feature will outweigh manager $F2$'s overall lower ability and make him the optimal hire.

5 Discussion and Conclusion

Our multitask model shows that ability differences, task interdependence, personal interest in the family's goals, and difficulties in the measurement of achievement in non-economic tasks are interrelated aspects which appear to be relevant to understanding why either family or non-family managers are the optimal hiring choice in family firms. It generates several predictions that could be tested in empirical research. Given our model findings, the likelihood that family-owned firms hire members of their own family (Burkart et al. 2003, Pérez-González 2006, Bennedsen et al. 2007) is very context-specific and, in particular, increases with the complementarity of economic and non-economic tasks. As explained in the introduction, such task complementarity exists when pursuing the family's non-economic goals has positive spillover effects to the business, e.g., setting up a philanthropic foundation that increases employer and customer reputation, restoring family harmony that facilitates strategic decision making in the firm, or maintaining family dynasty that facilitates long-term investments in R&D and innovation. Our model also predicts that the likelihood of family members being hired as managers of family-owned firms is larger when available performance measures are well aligned with the family owner's value derived from the manager's overall achievements. An example of such a well measurable non-economic goal would be educating future family successors or keeping the workforce of the family firm stable. By contrast, when the attainment of non-economic goals is difficult to measure objectively, family firms may revert to hiring professional outsiders to run the firm, thereby deliberately neglecting the family's non-economic goals. This is the case, for example, with less tangible non-economic goals such as family dynasty and family reputation.

The forgoing results about the selection of family managers have implications for the relative economic performance of family-managed versus professional-led family firms (Pérez-González

[23] Recall that, by Corollary 3iii), family managers focus more on task 1 than task 2 for sufficiently large values of s and on task 2 otherwise. In the given example, manager $F1$ focuses on task 1 for $s > 0.07$ while manager $F2$ focuses on task 1 only for $s > 0.3$.

2006, Bennedsen et al. 2007, Sraer and Thesmar 2007, Miller et al. 2013) because the hiring of family managers may come along with lower abilities regarding the economic task. Accordingly, the relative economic firm performance of family-managed companies should be, ceteris paribus, lower in the above described situations of task complementarity. Finally, our model results offer a possible explanation for why family managers often receive lower (incentive) pay than non-family managers in their executive compensation contracts (McConaughy 2000, Gómez-Mejía et al. 2003). In fact, in our model, this finding directly follows from the family manager's aforementioned personal interest in the family's goals and the concomitant intrinsic work motivation.

Our model can be extended in several ways that offer interesting avenues for further research. First, we model how family and non-family managers differ regarding their abilities and personal interests in the goals of the family firm owners. Yet, there are further factors in which these manager types may differ and that may impact the optimal hiring decision. For example, we assume that family and non-family managers do not differ in their extent of limited liability. In many family business settings, it may, however, be plausible to assume that family managers (but not non-family managers) can be asked to make (short-term) payments to the firm. Such payments would allow for the provision of more efficient incentives to family managers and hence reinforce our result on the relatively better alignment of objectives for this type of manager.[24] Furthermore, family firm owners might be able to better assess, predict, and monitor family members' behavior on the job. This would mitigate adverse-selection and moral-hazard problems when hiring a family member because of a lower degree of uncertainty regarding optimal incentives and future performance. It is worthwhile to discuss how introducing ex-ante asymmetric information on the managers' abilities would affect our results. Specifically, it can be argued that family firm owners can observe and assess the abilities of a family member better than those of non-family managers. In such a case, the family firm would have to pay an additional informational rent to non-family managers due to self-selection problems arising during the hiring process when their abilities are unknown. Consequently, hiring non-family managers becomes more costly compared to our model. Moreover, we do not consider risk aversion of managers in our model. However, Gómez-Mejía et al. (2007) suggest that the family (and hence also the family manager) may be willing to make risky decisions that can harm the firm's financial performance in order to preserve its socioemotional wealth (captured by non-economic goals in our model). Hence, it may be interesting to consider how family and non-family managers differ with respect to their risk attitude towards economic and non-economic goals.

Second, we consider only one family firm owner as the principal. Family firms, however, often have several family or non-family shareholders who impose different weights on the firm's

[24] Related to this, notice that allowing θ_F to exceed 0.5 in our model already shows that family managers can find it optimal to invest into the firm; compare the explanation in Footnote 9.

economic and the family's non-economic goals (compare Footnote 4). For instance, non-family shareholders do not regard the family's non-economic goals as being as important as family shareholders do. Therefore, their preference for particular managers is hardly affected by family bonds or family succession considerations. This potential conflict between family and non-family shareholders may make it more difficult to hire family managers and will complicate the selection problem in general. Third, we have analyzed a one-shot model. In a dynamic model, further characteristics could potentially be considered. For example, non-family managers are likely to be dismissed more easily than family managers if not complying with the firm's goals. This may intensify non-family managers' work incentives in general and their attention to non-economic goals in particular. If, moreover, non-economic goals can be measured better in the long than the short run, the use of suitable long-term measures in incentive contracts would lower the effort distortion and hence improve both manager types' incentives regarding non-economic tasks. Notably, even if no objective measures exist for non-economic goals, self-enforcing (implicit) contracts could provide appropriate incentives in a repeated game if the parties observe some (non-verifiable) outcome for these goals. The efficiency of such contracts then depends on the value and length of the employment relationship, the parties' patience and outside opportunities. Obviously, the two manager types may also differ regarding the aforementioned criteria. Finally, as indicated by the last case presented in Section 4.2.3, our model more generally allows comparisons between managers of the same type. For instance, the family firm founder may have the option to choose among several interested children to become his or her successor. Family managers can be differentiated by their abilities of pursuing the family's goals and their commitment to the family firm. Similarly, our model can be applied in analyzing hiring situations with two non-family candidates. In these scenarios, our model still applies by interpreting the non-economic goals more generally as values that cannot be readily measured such as, for example, corporate social responsibility, work environment, and firm reputation.

Our study has practical implications for family firm owners. In particular, it may foster their understanding of selecting suitable family or non-family managers and designing efficient incentive contracts. Moreover, our study provides business-owning families with economic reasoning as to why and when it can be optimal to hire managers from their own families, thereby equipping them better to defend wrongful accusations of nepotism often brought forward by other share- and stakeholders.

Appendix

This Appendix contains all proofs, solutions, and derivations as well as additional findings that are helpful for deriving and understanding the main results. It is structured in accordance with the main text.

A1. Optimal Incentive Contracts (Section 3)

Manager $i \in \{F, N\}$ chooses efforts $e_{i,1}, e_{i,2}$ to maximize his expected utility in function (5). The first-order conditions are given by:

$$\gamma_i - a_{i,1}e_{i,1} - se_{i,2} + \theta_i(1-\gamma_i) = 0, \tag{8}$$

$$\gamma_i\alpha - a_{i,2}e_{i,2} - se_{i,1} + \theta_i(1-\alpha\gamma_i) = 0. \tag{9}$$

From equations (8) and (9), we solve for the manager's effort levels as functions of $a_{i,1}$, $a_{i,2}, s, \theta_i$, and γ_i. By the above conditions, the fixed wage does not affect the manager's effort choice. Since it however negatively affects the firm owner's objective function in (3), at the optimum she sets $w_i^* = 0$, as stated in (6). Substituting the manager's efforts obtained from equations (8) and (9) into the firm owner's objective function in (3) and calculating the respective first-order condition, yields the optimal bonus γ_i^* presented in (7). Substituting γ_i^* into equations (8) and (9), we solve for the manager's optimal effort in task 1 and task 2, respectively:

$$e_{i,1}^*(\cdot,\alpha) = \gamma_i^*(1-\theta_i)\frac{(a_{i,2}-\alpha s)}{a_{i,1}a_{i,2}-s^2} + \theta_i\frac{(a_{i,2}-s)}{a_{i,1}a_{i,2}-s^2}, \tag{10}$$

$$e_{i,2}^*(\cdot,\alpha) = \gamma_i^*(1-\theta_i)\frac{(a_{i,1}\alpha - s)}{a_{i,1}a_{i,2}-s^2} + \theta_i\frac{(a_{i,1}-s)}{a_{i,1}a_{i,2}-s^2}. \tag{11}$$

Given the optimal incentive contract $\langle\gamma_i^*, w_i^*\rangle$ and the optimal effort levels $e_{i,1}^*(\cdot,\alpha)$ and $e_{i,2}^*(\cdot,\alpha)$, the following result verifies that the manager always obtains a positive expected utility and hence earns a rent:

$$\begin{aligned} U_i^*(\cdot,\alpha) = \quad & \frac{\left[(a_{i,2}-s)+\alpha\left(a_{i,1}-s\right)\right]^2}{8\left(a_{i,1}a_{i,2}-s^2\right)\left[(a_{i,2}-\alpha s)+\alpha\left(a_{i,1}\alpha - s\right)\right]} + \\ & \frac{\theta_i^2}{2}\frac{(1-\alpha)^2}{\left[(a_{i,2}-\alpha s)+\alpha\left(a_{i,1}\alpha - s\right)\right]} \end{aligned} \tag{12}$$

Observe that the summand in the second line of equation (12) is zero for the non-family manager and hence, ceteris paribus, constitutes the 'additional' rent which the family manager obtains due to his intrinsic valuation of the owner's utility.[25]

Substituting w_i^*, γ_i^*, and $e_{i,1}^*(\cdot,\alpha)$ and $e_{i,2}^*(\cdot,\alpha)$ from equations (10) and (11) into the firm owner's objective function in (3), the firm owner's value function under the optimal contract, $\pi_i^* = \pi_i\left(w_i^*, \gamma_i^*, e_{i,1}^*, e_{i,2}^*; \alpha\right)$, is obtained:

$$\pi_i^*(\cdot,\alpha) = \frac{4\theta_i(1-\theta_i)(1-\alpha)^2\left(a_{i,1}a_{i,2}-s^2\right) + \left[(a_{i,2}-s)+\alpha\left(a_{i,1}-s\right)\right]^2}{4(1-\theta_i)\left(a_{i,1}a_{i,2}-s^2\right)\left[(a_{i,2}-\alpha s)+\alpha\left(a_{i,1}\alpha-s\right)\right]}. \tag{13}$$

As is stated in the main text, we focus on positive effort levels throughout, i.e., $e_{i,1}^*, e_{i,2}^* > 0$. To ensure an interior solution, we parametrize s such that $s^2 < a_{i,1}a_{i,2}$ so that the manager's

[25] Under the optimal contract $\langle\gamma_i^*, w_i^*\rangle$, either manager's rent may be larger. For instance, it can be shown that if the managers are symmetric and $\theta_F = 0$, the non-family manager obtains a higher rent, i.e., $U_N^*(\cdot,\alpha) > U_F^*(\cdot,\alpha)$; if however, $\theta_F \in (0, \frac{1}{2}]$, it holds that $U_N^*(\cdot,\alpha) < U_F^*(\cdot,\alpha)$ if θ_F is sufficiently large.

effort-cost function is convex everywhere. Because, by Assumption 1, we have $a_{N,1} < a_{N,2}$ and $a_{F,2} < a_{F,1}$, it follows that $s < a_{N,2}$ and $s < a_{F,1}$. It is obvious that then it also holds that $a_{N,2} > \alpha s$ for any given $\alpha \in (0, 1]$. For the non-family manager, it holds that $\theta_N = 0$. Hence, from equation (10), effort $e^*_{N,1}(\cdot, \alpha)$ is strictly positive because $a_{N,2} > \alpha s$ and $s^2 < a_{N,1}a_{N,2}$. From equation (11), effort $e^*_{N,2}(\cdot, \alpha) > 0$ if $s < a_{N,1}\alpha < a_{N,1}$. Altogether, to allow for comparisons between the solutions for all performance measures (i.e. for all $\alpha \in (0, 1]$), we implement the strongest assumptions guaranteeing positive efforts and hence assume throughout this paper:

$$a_{i,1}\alpha > s \text{ and } a_{i,2} > s \tag{14}$$

A1.1 Incentive Contracts Based on a Perfect Performance Measure (Section 3.1)

Set $\theta_i = 0$. Substituting $\alpha = 1$ into equations (7), (10) and (11) and (13) yields:

$$\gamma^*_i(\cdot, \alpha = 1) = \frac{1}{2}, \tag{15}$$

$$e^*_{i,1}(\cdot, \alpha = 1) = \frac{a_{i,2} - s}{2(a_{i,1}a_{i,2} - s^2)}, \tag{16}$$

$$e^*_{i,2}(\cdot, \alpha = 1) = \frac{a_{i,1} - s}{2(a_{i,1}a_{i,2} - s^2)}, \tag{17}$$

$$\pi^*_i(\cdot, \alpha = 1) = \frac{(a_{i,2} - s) + (a_{i,1} - s)}{4\,(a_{i,1}a_{i,2} - s^2)} \tag{18}$$

The following lemma establishes our findings regarding the impact of managerial ability on the managers' optimal effort levels.

Lemma 2 *Under a perfect performance measure, for manager $i \in \{F, N\}$, the following holds:*

i) The optimal effort level $e^*_{i,1}$ in task 1 is (a) decreasing in $a_{i,1}$ for all s, (b) decreasing in $a_{i,2}$ for $s < 0$, and (c) increasing in $a_{i,2}$ for $s > 0$.

ii) The optimal effort level $e^*_{i,2}$ in task 2 is (a) decreasing in $a_{i,2}$ for all s, (b) decreasing in $a_{i,1}$ for $s < 0$, and (c) increasing in $a_{i,1}$ for $s > 0$.

Proof of Lemma 2. Differentiating equations (16) and (17) w.r.t. abilities $a_{i,1}$ and $a_{i,2}$ yields:

$$\frac{\partial e^*_{i,1}(\cdot, \alpha = 1)}{\partial a_{i,1}} = -\frac{a_{i,2}(a_{i,2} - s)}{2(a_{i,1}a_{i,2} - s^2)^2} < 0, \tag{19}$$

$$\frac{\partial e^*_{i,1}(\cdot, \alpha = 1)}{\partial a_{i,2}} = \frac{s(a_{i,1} - s)}{2(a_{i,1}a_{i,2} - s^2)^2} \begin{cases} < 0 & \text{if } s < 0 \\ > 0 & \text{if } s > 0 \end{cases}, \tag{20}$$

$$\frac{\partial e^*_{i,2}(\cdot, \alpha = 1)}{\partial a_{i,1}} = \frac{s(a_{i,2} - s)}{2(a_{i,1}a_{i,2} - s^2)^2} \begin{cases} < 0 & \text{if } s < 0 \\ > 0 & \text{if } s > 0 \end{cases}, \tag{21}$$

$$\frac{\partial e^*_{i,2}(\cdot, \alpha = 1)}{\partial a_{i,2}} = -\frac{a_{i,1}(a_{i,1} - s)}{2(a_{i,1}a_{i,2} - s^2)^2} < 0. \tag{22}$$

The signs follow from the assumptions in (14) by which it holds that $a_{i,1} > s$ and $a_{i,2} > s$. ∎

By equations (16) and (17), the manager's optimal effort levels under a perfect performance measure depend also on the degree of task interdependence s and the manager's type. The following lemma reports the associated comparative-statics results.

Lemma 3

i) For the family manager ($i = F$):

a) the optimal effort level $e^*_{F,1}(\cdot, \alpha = 1)$ in task 1 is decreasing in s for all s, and

b) the optimal effort level $e^*_{F,2}(\cdot, \alpha = 1)$ in task 2 is decreasing in s if $s < \tilde{s}$ with $\tilde{s} > 0$ and increasing in s otherwise.

ii) For the non-family manager ($i = N$):

a) the optimal effort level $e^*_{N,1}(\cdot, \alpha = 1)$ in task 1 is decreasing in s if $s < \hat{s}$ with $\hat{s} > 0$ and increasing in s otherwise, and

b) the optimal effort level $e^*_{N,2}(\cdot, \alpha = 1)$ in task 2 is decreasing in s for all s.

Proof of Lemma 3. Here we only report the proof for 3i)a) and ii)a), i.e., for the manager's respective effort levels in task 1. The proof for task 2 proceeds analogously. The derivative of $e^*_{i,1}(\cdot, \alpha = 1)$ w.r.t. s is:

$$\frac{\partial e^*_{i,1}(\cdot, \alpha = 1)}{\partial s} = \frac{a_{i,2}(2s - a_{i,1}) - s^2}{2(a_{i,1}a_{i,2} - s^2)^2}. \tag{23}$$

For $s < 0$, it is straightforward that $\dfrac{\partial e^*_{i,1}}{\partial s} < 0$ for both managers.
For $s > 0$, we obtain for the family manager:

$$\frac{\partial e^*_{F,1}(\cdot, \alpha = 1)}{\partial s} = \frac{a_{F,2}(2s - a_{F,1}) - s^2}{2(a_{F,1}a_{F,2} - s^2)^2} < -\frac{(a_{F,2} - s)^2}{2(a_{F,1}a_{F,2} - s^2)^2} < 0, \tag{24}$$

where the first inequality follows from $a_{F,2} < a_{F,1}$.
For the non-family manager, the sign of equation (23) is determined by the sign of its numerator. Note that this numerator is a parabola that is concave in s whose global maximizer and maximum are given by $a_{N,2}$ and $a_{N,2}\left(a_{N,2} - a_{N,1}\right)$. Given that $a_{N,1} < a_{N,2}$, the numerator in equation (23) is monotonically increasing in $s \in (0, a_{N,1})$. At the lower bound of $s = 0$, the numerator in equation (23) is equal to $-\left(a_{N,2}a_{N,1}\right)$ and hence negative. At the upper bound of $s = a_{N,1}$, the numerator in equation (23) is equal to $a_{N,1}(a_{N,2} - a_{N,1})$, which is strictly positive given that $a_{N,1} < a_{N,2}$. This proves that the numerator in equation (23) changes sign in $s \in (0, a_{N,1})$. We define this turning point as $\tilde{s}$. ∎

As to the foregoing lemma, note that whether a manager lowers or raises effort in his more productive task depends on the overall impact of an increase in s on his marginal effort costs in that task. Raising s can in- or decrease these marginal costs. For instance, the family manager's marginal cost of doing task 2 is given by $a_{F,2}e_{F,2} + se_{F,1}$. The impact of s on that term is positive if s is large enough compared to $e_{F,1}$. From Lemma 3i)a), we know that equilibrium effort $e^*_{F,1}(\cdot, \alpha = 1)$ is however decreasing in s. For $\tilde{s}$, that effort eventually becomes so small that the effect of an increase in s is overcompensated, thereby causing a decrease in the marginal cost of task 2 and hence an increase in the optimal effort $e^*_{F,2}(\cdot, \alpha = 1)$. For the non-family manager, analogous reasoning applies with respect to task 1.

Proof of Proposition 1. Setting $\alpha = 1$ and differentiating equation (13) w.r.t. $a_{i,1}$ and $a_{i,2}$ yields:

$$\frac{\partial \pi^*_i(\cdot, \alpha = 1)}{\partial a_{i,1}} = -\frac{(a_{i,2} - s)^2}{4(a_{i,1}a_{i,2} - s^2)^2(1 - \theta_i)} < 0, \tag{25}$$

$$\frac{\partial \pi^*_i(\cdot, \alpha = 1)}{\partial a_{i,2}} = -\frac{(a_{i,1} - s)^2}{4(a_{i,1}a_{i,2} - s^2)^2(1 - \theta_i)} < 0. \tag{26}$$

Differentiating equation (18) w.r.t. s yields:

$$\frac{\partial \pi_i^*(\cdot, \alpha = 1)}{\partial s} = \frac{(a_{i,2} - s)(a_{i,1} - s)}{2(a_{i,1}a_{i,2} - s^2)^2(\theta_i - 1)} < 0, \tag{27}$$

where the last sign follows from $a_{i,1} > s$ and $a_{i,2} > s$ by condition (14).

As stated in the main text, the last part of the proposition also holds for $\alpha < 1$. Hence, we provide the following proof for any given $\alpha \in (0, 1]$. The firm owner's expected utility at the optimum can be written as:

$$\begin{aligned} \pi_F^*(\cdot, \alpha) = \; & e_{F,1}^*(\cdot, \alpha) + e_{F,2}^*(\cdot, \alpha) \\ & - \gamma_F^*(\cdot, \alpha)[e_{F,1}^*(\cdot, \alpha) + \alpha e_{F,2}^*(\cdot, \alpha)]. \end{aligned} \tag{28}$$

Differentiating the previous expression w.r.t. θ_F yields:

$$\begin{aligned} \frac{\partial \pi_F^*(\cdot, \alpha)}{\partial \theta_F} &= \frac{\partial [e_{F,1}^*(\cdot, \alpha) + e_{F,2}^*(\cdot, \alpha)]}{\partial \theta_F} - \frac{\partial \{\gamma_F^*(\cdot, \alpha)[e_{F,1}^*(\cdot, \alpha) + \alpha e_{F,2}^*(\cdot, \alpha)]\}}{\partial \theta_F} \\ &= \frac{(1-\alpha)^2}{[(a_{F,2} - \alpha s) + \alpha(a_{F,1}\alpha - s)]} + \\ & \quad \frac{[(a_{F,2} - \alpha s) + (a_{F,1}\alpha - s)]^2}{4\,(a_{F,1}a_{F,2} - s^2)\,(1-\theta_F)^2\,[(a_{F,2} - \alpha s) + \alpha(a_{F,1}\alpha - s)]} > 0. \end{aligned} \tag{29}$$

The sign follows from condition (14) by which $a_{F,2} > \alpha s$ and $a_{F,1}\alpha > s$ as well as from the condition $a_{F,1}a_{F,2} - s^2 > 0$. ■

Proof of Corollary 1. We provide only the proof for the family manager. The proof for the non-family manager is analogous. Comparing equations (16) and (17) shows that, for the family manager, it holds that $e_{F,1}^*(\cdot, \alpha = 1) < e_{F,2}^*(\cdot, \alpha = 1)$, given that $a_{F,2} < a_{F,1}$. The difference between the family manager's effort exerted in task 2 and task 1 is given by:

$$\Psi \equiv e_{F,2}^*(\cdot, \alpha = 1) - e_{F,1}^*(\cdot, \alpha = 1) = \frac{a_{F,1} - a_{F,2}}{2(a_{F,1}a_{F,2} - s^2)}. \tag{30}$$

Differentiating equation (30) twice w.r.t. s yields:

$$\frac{\partial^2 \Psi}{\partial s^2} = \frac{(a_{F,1} - a_{F,2})(a_{F,1}a_{F,2} + 3s^2)}{(a_{F,1}a_{F,2} - s^2)^3} > 0, \tag{31}$$

which proves that Ψ is a strictly convex function in s. It is straightforward that Ψ reaches the minimum for $s = 0$. ■

A1.2 Incentive Contracts Based on an Imperfect Performance Measure (Section 3.2)

By equations (10) and (11), the manager's optimal effort levels under an imperfect performance measure depend on the degree of task interdependence s, the alignment of the performance measure as reflected by α, managerial abilities, and the manager's type. The following lemma reports the impact of task interdependence s on the managers' optimal effort levels of both tasks, respectively.

Lemma 4

i) For the family manager ($i = F$):

a) *The optimal effort* $e^*_{F,1}(\cdot, \alpha < 1)$ *in task* 1 *is decreasing in* s *unless the following conditions hold;* $s > 0$, $\hat{\alpha} > \alpha > \frac{1}{2}$ *and* $a_{F,2}$ *relatively large. Then* $e^*_{F,1}(\cdot, \alpha < 1)$ *is a U-shaped function of* s.

b) *The optimal effort* $e^*_{F,2}(\cdot, \alpha < 1)$ *in task* 2 *is decreasing in* s *unless the following conditions hold;* $s > 0$, $\alpha > \hat{\alpha}$ *and* $a_{F,1}$ *relatively large. Then* $e^*_{F,2}(\cdot, \alpha < 1)$ *is a U-shaped function of* s.

ii) *For the non-family manager* ($i = N$)*:*

a) *The optimal effort* $e^*_{N,1}(\cdot, \alpha < 1)$ *in task* 1 *is decreasing in* s *unless the following conditions hold;* $s > 0$, $\alpha > \frac{1}{2}$ *and* $a_{N,2}$ *relatively large. Then* $e^*_{N,1}(\cdot, \alpha < 1)$ *is a U-shaped function of* s.

b) *The optimal effort* $e^*_{N,2}(\cdot, \alpha < 1)$ *in task* 2 *is decreasing in* s.

Proof of Lemma 4. Due to its length, the proof is excluded from the paper and available from the authors upon request. ■

Proof of Corollary 2. Set $\theta_i = 0$. The difference in managers i' optimal efforts in both tasks with $\alpha < 1$ compared to $\alpha = 1$ are given by:

$$e^*_{i,1}(\cdot, \alpha < 1) - e^*_{i,1}(\cdot, \alpha = 1) = -\frac{(\alpha - 1)\alpha}{2[\alpha(a_{i,1}\alpha - s) + (a_{i,2} - \alpha s)]} > 0, \tag{32}$$

$$e^*_{i,2}(\cdot, \alpha < 1) - e^*_{i,2}(\cdot, \alpha = 1) = \frac{\alpha - 1}{2[\alpha(a_{i,1}\alpha - s) + (a_{i,2} - \alpha s)]} < 0. \tag{33}$$

Differentiating $[e^*_{i,1}(\cdot, \alpha < 1) - e^*_{i,1}(\cdot, \alpha = 1)]$ w.r.t. s yields:

$$\frac{\partial \left(e^*_{i,1}(\cdot, \alpha < 1) - e^*_{i,1}(\cdot, \alpha = 1)\right)}{\partial s} = -\frac{(\alpha - 1)\,\alpha^2}{[\alpha(a_{i,1}\alpha - s) + (a_{i,2} - \alpha s)]^2} > 0 \tag{34}$$

Differentiating $[e^*_{i,2}(\cdot, \alpha = 1) - e^*_{i,2}(\cdot, \alpha < 1)]$ w.r.t. s yields:

$$\frac{\partial \left(e^*_{i,2}(\cdot, \alpha < 1) - e^*_{i,2}(\cdot, \alpha = 1)\right)}{\partial s} = -\frac{(\alpha - 1)\,\alpha}{[\alpha(a_{i,1}\alpha - s) + (a_{i,2} - \alpha s)]^2} > 0 \tag{35}$$

■

Proof of Corollary 3. Set $\theta_i = 0$. Using equations (10) and (11), we calculate the difference between the manager i's efforts exerted in task 1 and task 2:

$$e^*_{i,1}(\cdot, \alpha) - e^*_{i,2}(\cdot, \alpha) = \frac{[(a_{i,2} - \alpha s) + (a_{i,1}\alpha - s)][(a_{i,2} - \alpha s) - (a_{i,1}\alpha - s)]}{2[(a_{i,2} - \alpha s) + \alpha(a_{i,1}\alpha - s)](a_{i,1}a_{i,2} - s^2)}. \tag{36}$$

i) For both managers $i \in \{F, N\}$, differentiating equation (36) w.r.t. α, yields:[26]

$$\frac{\partial(e^*_{i,1}(\cdot, \alpha) - e^*_{i,2}(\cdot, \alpha))}{\partial \alpha} = \frac{-(a_{i,1}\alpha - s) - \alpha(a_{i,2} - \alpha s)}{[(a_{i,2} - \alpha s) + \alpha(a_{i,1}\alpha - s)]^2} < 0, \tag{37}$$

given that $a_{i,2} - \alpha s > 0$ and $a_{i,1}\alpha - s > 0$ by condition (14).

[26] To avoid lengthy calculations by hand, we use Mathematica 11 to compute the derivative of equation (36) with respect to α. Mathematica code: `D[e1-e2,α]`.

To prove results ii) and iii), observe that, given that $a_{i,2} - \alpha s > 0$ and $a_{i,1}\alpha - s > 0$ as stated in condition (14), and $a_{i,1}a_{i,2} - s^2 > 0$, the sign of equation (36) depends on the expression $[(a_{i,2} - \alpha s) - (a_{i,1}\alpha - s)]$ in the numerator.

ii) For the non-family manager, by Assumption 1(i), it holds that $(a_{N,2} - \alpha s) - (a_{N,1}\alpha - s) > (a_{N,2} + s)(1 - \alpha) > 0$. Hence, it follows that $e^*_{N,1}(\cdot, \alpha) - e^*_{N,2}(\cdot, \alpha) > 0$.

iii) For the family manager, we first consider the case $e^*_{F,1}(\cdot, \alpha) - e^*_{F,2}(\cdot, \alpha) > 0$ in (36) and solve that inequality for α. Rearranging $(a_{F,2} - \alpha s) - (a_{F,1}\alpha - s) > 0$, we have $(a_{F,1} + s)\alpha < a_{F,2} + s$. Note that $a_{F,1} + s > 0$ for the family manager, since $s^2 < a_{F,1}a_{F,2} < (a_{F,1})^2$. Therefore, $(a_{F,2} - \alpha s) - (a_{F,1}\alpha - s) > 0$ is true for $a_{F,2} + s > 0$ and $\alpha < \dfrac{a_{F,2} + s}{a_{F,1} + s}$. As for the opposite case, by the foregoing, for $e^*_{F,1}(\cdot, \alpha) - e^*_{F,2}(\cdot, \alpha) < 0$, we must have $(a_{F,1} + s)\alpha > a_{F,2} + s$. It is obvious that, if $a_{F,2} + s < 0$, the inequality holds for any given α. If $a_{F,2} + s > 0$, it holds for $\alpha > \dfrac{a_{F,2} + s}{a_{F,1} + s}$.

iv) Remember that, by Definition 1, managers are symmetric when $a_{F,1} = a_{N,2}$ and $a_{F,2} = a_{N,1}$. Then, to compare efforts, it suffices to consider $a_{F,1}$ and $a_{F,2}$. Showing that $e_{N,1} > e_{F,1}$ is equivalent to showing that:

$$\frac{\frac{(a_{F,1}-\alpha s)[(a_{F,1}-\alpha s)+(a_{F,2}\alpha - s)]}{(a_{F,1}-\alpha s)+\alpha(a_{F,2}\alpha - s)} - \frac{(a_{F,2}-\alpha s)[(a_{F,2}-\alpha s)+(a_{F,1}\alpha - s)]}{(a_{F,2}-\alpha s)+\alpha(a_{F,1}\alpha - s)}}{2(a_{F,1}a_{F,2} - s^2)} > 0. \tag{38}$$

Provided that $a_{F,1} > a_{F,2}$ by Assumption 1(ii), we have that $[(a_{F,1} - \alpha s) + (a_{F,2}\alpha - s)] > [(a_{F,2} - \alpha s) + (a_{F,1}\alpha - s)]$. Hence, we need to show that:

$$\frac{(a_{F,1} - \alpha s)}{(a_{F,1} - \alpha s) + \alpha(a_{F,2}\alpha - s)} - \frac{(a_{F,2} - \alpha s)}{(a_{F,2} - \alpha s) + \alpha(a_{F,1}\alpha - s)} > 0. \tag{39}$$

Simplifying yields:

$$\frac{(a_{F,1} - a_{F,2})\alpha[(a_{F,2}\alpha - s) + \alpha(a_{F,1} - \alpha s)]}{[(a_{F,1} - \alpha s) + \alpha(a_{F,2}\alpha - s)][(a_{F,2} - \alpha s) + \alpha(a_{F,1}\alpha - s)]} > 0, \tag{40}$$

which is true given that $a_{F,1}\alpha - s > 0$ and $a_{F,2} - \alpha s > 0$ by condition (14) and $a_{F,1} > a_{F,2}$ by Assumption 1(ii).

Showing that $e_{F,2} > e_{N,2}$ is equivalent to showing that:

$$\gamma_F \frac{(a_{F,1}\alpha - s)}{(a_{F,1}a_{F,2} - s^2)} - \gamma_N \frac{(a_{N,1}\alpha - s)}{(a_{N,1}a_{N,2} - s^2)} > 0. \tag{41}$$

We first prove that $\gamma_F > \gamma_N$ by computing the difference:

$$\gamma_F - \gamma_N = \frac{(1 - \alpha)[-(a_{F,1} - a_{N,1})s\alpha^2 + a_{N,2}(a_{F,1}\alpha - s) - a_{F,2}(a_{N,1}\alpha - s)]}{2[(a_{F,2} - \alpha s) + \alpha(a_{F,1}\alpha - s)][(a_{N,2} - \alpha s) + \alpha(a_{N,1}\alpha - s)]} > 0. \tag{42}$$

For $s \leq 0$, inequality (42) is clearly satisfied by condition (14) and Assumption 1(iii),(iv), implying that $a_{i,2} - \alpha s > 0$, $a_{i,1}\alpha - s > 0$, $a_{F,1} - a_{N,1} > 0$, and $a_{N,2} - a_{F,2} > 0$. To see that it holds also for $s > 0$, consider only the square bracket of the numerator in the right-hand side of equation (42). Since efforts are positive, we must have $a_{N,2} > \alpha s$ and therefore:

$$\begin{aligned} & -(a_{F,1} - a_{N,1})s\alpha^2 + a_{N,2}(a_{F,1}\alpha - s) - a_{F,2}(a_{N,1}\alpha - s) \\ > \; & -(a_{F,1} - a_{N,1})a_{N,2}\alpha + a_{N,2}(a_{F,1}\alpha - s) - a_{F,2}(a_{N,1}\alpha - s) \\ = \; & (a_{N,2} - a_{F,2})(a_{N,1}\alpha - s) > 0, \end{aligned} \tag{43}$$

where the last inequality is true because, by condition (14) and Assumption 1(iii), it holds that $a_{N,1}\alpha - s > 0$ and $a_{N,2} - a_{F,2} > 0$. This proves that $\gamma_F > \gamma_N$ for any given s. Given that $\gamma_F > \gamma_N$, provided that $a_{F,1} > a_{N,1}$ by Assumption 1(iv), and symmetric abilities, the inequality (41) always holds.

Moreover, given the previous result, to prove that $e_{N,1} - e_{N,2}$ is always greater than $|e_{F,1} - e_{F,2}|$ for symmetric managers, we only need to show that $e_{N,1} - e_{N,2} > e_{F,2} - e_{F,1} > 0$. Rearranging and using symmetry as before, we have:

$$e_{N,1} - e_{N,2} > e_{F,2} - e_{F,1} \tag{44}$$

$$\iff \frac{(1-\alpha^2)[(a_{F,2} - \alpha s) + (a_{F,1} - \alpha s) + \alpha(a_{F,2}\alpha - s) + \alpha(a_{F,1}\alpha - s)]}{2[(a_{F,1} - \alpha s) + \alpha(a_{F,2}\alpha - s)][(a_{F,2} - \alpha s) + \alpha(a_{F,1}\alpha - s)]} > 0, \tag{45}$$

which is satisfied by condition (14). ■

Proof of Proposition 2.

Suppose that $\theta_i \in [0, \frac{1}{2}]$. Differentiating $\pi_i^*(\cdot, \alpha < 1)$ as given in equation (13) w.r.t. α yields:

$$\frac{\partial \pi_i^*(\cdot, \alpha < 1)}{\partial \alpha} = \frac{(1-\alpha)(1-2\theta_i)^2[(a_{i,2} - s) + \alpha(a_{i,1} - s)]}{2(1-\theta_i)[(a_{i,2} - \alpha s) + \alpha(a_{i,1}\alpha - s)]^2} \geqslant 0, \tag{46}$$

given that $a_{i,2} > s$, $a_{i,1} > s$, $0 \leqslant \theta_i \leqslant \frac{1}{2}$, and $0 < \alpha < 1$.

An important condition arising throughout the remainder of the Appendix concerns the relative size of $a_{i,1}, a_{i,2}$ and α. More specifically, for the family manager, some results depend on whether $a_{F,2} - a_{F,1}\alpha^2 \gtreqless 0$, i.e., whether his ability in task 1 is sufficiently large compared to α and his ability in task 2.[27] For simplicity, for any manager i, we define the threshold value of α for which it holds that $a_{F,2} - a_{F,1}\alpha^2 = 0$ as:

$$\hat{\alpha} = \sqrt{\frac{a_{i,2}}{a_{i,1}}}. \tag{47}$$

To study the effect of an increase in s on the owner's expected utility under the optimal contract, π_i^*, we proceed in two steps. First, we show that, for $\theta = 0$, the function is decreasing in s. In the second step, we rewrite the owner's expected utility for $\theta \neq 0$ as $\pi_i^*(\cdot; \theta \neq 0, \alpha < 1) = \frac{1}{1-\theta}\pi_i^*(\cdot; \theta = 0, \alpha < 1) + R(\cdot; s)$, where the first term is decreasing in s while $R(\cdot; s)$ is increasing in s. Hence, we only have to show that, for s converging to its upper bound, $\frac{\partial \pi_i^*(\cdot; \theta \neq 0, \alpha < 1)}{\partial s}$ is negative.

First step. To show that $\frac{\partial \pi_i^*(\cdot; \theta = 0, \alpha < 1)}{\partial s} < 0$, we check the derivative for $\alpha < \hat{\alpha}$ and $\alpha > \hat{\alpha}$ and show that the claim holds in both cases. For $\alpha < \hat{\alpha}$ and $\theta = 0$, we can write $\pi_i^*(\cdot; \theta = 0, \alpha < 1) = \frac{1}{2}(e_{i,1}^*(\cdot; \theta = 0, \alpha < 1) + e_{i,2}^*(\cdot; \theta = 0, \alpha < 1))$. Hence, the derivative with respect to s can be written as:

$$\frac{\partial \pi_i^*(\cdot; \theta = 0, \alpha < 1)}{\partial s} = \frac{1}{2}\left(\frac{\partial e_{i,1}^*(\cdot; \theta = 0, \alpha < 1)}{\partial s} + \frac{\partial e_{i,2}^*(\cdot; \theta = 0, \alpha < 1)}{\partial s}\right). \tag{48}$$

[27] Notice that, for the non-family manager, it always holds that $a_{N,2} - a_{N,1}\alpha^2 > 0$ because $a_{N,2} > a_{N,1}$ and $\alpha \in (0, 1)$.

To simplify the algebra, we compute:

$$\begin{aligned} & \frac{\partial e^*_{i,1}(\cdot;\theta=0,\alpha<1)}{\partial s}+\alpha\frac{\partial e^*_{i,2}(\cdot;\theta=0,\alpha<1)}{\partial s} \\ = & \frac{-(a_{i,1}\alpha-s)(a_{i,2}-s)-(a_{i,2}-s\alpha)(a_{i,1}-s)}{2(a_{i,1}a_{i,2}-s^2)^2}<0, \end{aligned} \tag{49}$$

given that $a_{i,2}>s$, $a_{i,1}>s$, and $a_{i,1}\alpha>s$ by condition (14). Remember that, by Lemma 4, we have $\frac{\partial e^*_{i,2}(\cdot;\theta=0)}{\partial s}<0$ for the case $\alpha<\hat{\alpha}$; hence, $\frac{\partial e^*_{i,1}(\cdot;\theta=0,\alpha<1)}{\partial s}+\frac{\partial e^*_{i,2}(\cdot;\theta=0,\alpha<1)}{\partial s}<\frac{\partial e^*_{i,1}(\cdot;\theta=0,\alpha<1)}{\partial s}+\alpha\frac{\partial e^*_{i,2}(\cdot;\theta=0,\alpha<1)}{\partial s}$. Therefore, it follows that $\frac{\partial \pi^*_i(\cdot;\theta=0,\alpha<1)}{\partial s}<0$. For $\alpha>\hat{\alpha}$, we have:

$$\begin{aligned} & \frac{\partial \pi^*_i(\cdot;\theta=0,\alpha<1)}{\partial s\partial\alpha} \\ = & \frac{(1-\alpha)\left\{\left(a_{i,1}\alpha^2-a_{i,2}\right)(1-\alpha)+2\alpha\left[(a_{i,2}-s\alpha)+(a_{i,1}\alpha-s)\right]\right\}}{2\left[(a_{i,2}-s\alpha)+\alpha(a_{i,1}\alpha-s)\right]^3}>0. \end{aligned} \tag{50}$$

Then, it is sufficient to show that $\frac{\partial \pi^*_i(\cdot;\theta=0)}{\partial s}<0$ for $\alpha=1$ as:

$$\lim_{\alpha\longrightarrow 1}\frac{\partial \pi^*_i(\cdot;\theta=0)}{\partial s}=-\frac{(a_{i,2}-s)\,(a_{i,1}-s)}{2(a_{i,1}a_{i,2}-s^2)^2}<0. \tag{51}$$

Second step. With some algebraic manipulation, equation (13) can be written as:

$$\pi^*_i(\cdot;\theta\neq 0,\alpha<1)=\frac{1}{1-\theta}\pi^*_i(\cdot;\theta=0,\alpha<1)+R(\cdot;s), \tag{52}$$

where $R(\cdot;s)=\frac{\theta(1-\alpha)^2}{[(a_{i,2}-s\alpha)+\alpha(a_{i,1}\alpha-s)]}$ is an increasing function of s. Observe that given the assumptions $a_{i,1}\alpha>s$ and $a_{i,2}>s$ by condition (14), the upper bound for s is given by $s_{\max}=\{a_{i,1}\alpha,a_{i,2}\}$. Suppose that $s_{\max}=a_{i,1}\alpha$. Then from $a_{i,2}>s$ it follows that $a_{i,2}>a_{i,1}\alpha$. Conversely, suppose that $s_{\max}=a_{i,2}$. Then from $a_{i,1}\alpha>s$ it follows that $a_{i,1}\alpha>a_{i,2}$. Differentiating $\pi^*_i(\cdot;\theta\neq 0,\alpha<1)$ and evaluating it at $s=a_{i,1}\alpha$ yields:

$$\left.\frac{\partial \pi^*_i(\cdot,\theta\neq 0,\alpha<1)}{\partial s}\right|_{s=a_{i,1}\alpha}=\frac{(1-\alpha)\left\{-a_{i,2}+a_{i,1}\alpha[\alpha(1-2\theta)^2+4\theta(1-\theta)]\right\}}{2a_{i,1}(1-\theta_i)(a_{i,2}-a_{i,1}\alpha^2)^2}. \tag{53}$$

Then, it is sufficient to show that $-a_{i,2}+a_{i,1}\alpha[\alpha(1-2\theta)^2+4\theta(1-\theta)]$ is negative or, equivalently, given that $a_{i,2}>a_{i,1}\alpha$, to show that $[\alpha(1-2\theta)^2+4\theta(1-\theta)]\leqslant 1$. In fact, the l.h.s. of the foregoing expression is a concave parabola in θ. Differentiating yields $\frac{\partial[\alpha(1-2\theta)^2+4\theta(1-\theta)]}{\partial\theta}=4(1-\alpha)(1-2\theta)$ which is zero for $\theta=\frac{1}{2}$, indicating the maximum of the function, which is exactly equal to 1. Conversely, suppose that $s_{\max}=a_{i,2}$. Then differentiating $\pi^*_i(\cdot;\theta\neq 0,\alpha<1)$ and evaluating it at $s=a_{i,2}$ yields:

$$\left.\frac{\partial \pi^*_i(\cdot,\theta\neq 0,\alpha<1)}{\partial s}\right|_{s=a_{i,2}}=-\frac{(1-\alpha)^2\,\alpha(1-2\theta)^2}{2(1-\theta)(a_{i,2}-2a_{i,2}\alpha+a_{i,1}\alpha^2)^2}<0. \tag{54}$$

Notice that the last sentence of the proposition regarding the impact of θ_F on the owner's utility holds for any $\alpha \in (0,1]$, and the proof consequently coincides with the one at the end of Proposition 1. ■

A2. The Optimal Hiring Decision (Section 4)

A2.1 Symmetric Abilities (Section 4.1)

Proof of Proposition 3.

i) Suppose that $\alpha = 1$ and initially set $\theta_F = 0$. Then the difference of the firm owner's expected utility between hiring a family and a non-family manager is given by:

$$\pi_F^*(\cdot, \alpha = 1) - \pi_N^*(\cdot, \alpha = 1) = \frac{a_{F,2} + a_{F,1} - 2s}{4(a_{F,1}a_{F,2} - s^2)} - \frac{a_{N,2} + a_{N,1} - 2s}{4(a_{N,1}a_{N,2} - s^2)}. \quad (55)$$

By Definition 1, we have $a_{F,1} = a_{N,2}$ and $a_{F,2} = a_{N,1}$ if the managers are symmetric in terms of ability and, consequently, the equation above equals zero.

If $0 < \theta_F \leq \frac{1}{2}$, we rewrite the firm owner's expected utility when hiring the two managers, respectively, as follows:

$$\pi_F^*(\cdot, \alpha = 1) = \frac{a_{F,2} + a_{F,1} - 2s}{4(a_{F,1}a_{F,2} - s^2)(1 - \theta_F)}, \quad (56)$$

$$\pi_N^*(\cdot, \alpha = 1) = \frac{a_{N,1} + a_{N,2} - 2s}{4(a_{N,1}a_{N,2} - s^2)}. \quad (57)$$

By the conditions $a_{F,1} = a_{N,2}$ and $a_{F,2} = a_{N,1}$ in the symmetric case, it is obvious that $\pi_F^*(\cdot, \alpha = 1) > \pi_N^*(\cdot, \alpha = 1)$ since $0 < \theta_F \leq \frac{1}{2}$.

ii) Suppose that $\alpha < 1$ and initially set $\theta_F = 0$. Given that the two managers are symmetric, i.e., $a_{F,1} = a_{N,2}$ and $a_{F,2} = a_{N,1}$, then the firm owner's expected utility difference when hiring a family or a non-family manager is given by:

$$\begin{aligned} & \pi_F^*(\cdot, \alpha < 1) - \pi_N^*(\cdot, \alpha < 1) \\ = & \frac{[(a_{F,2} - s) + \alpha(a_{F,1} - s)]^2}{4(a_{F,1}a_{F,2} - s^2)[(a_{F,2} - \alpha s) + \alpha(a_{F,1}\alpha - s)]} \\ & - \frac{[(a_{N,2} - s) + \alpha(a_{N,1} - s)]^2}{4(a_{N,1}a_{N,2} - s^2)[(a_{N,2} - \alpha s) + \alpha(a_{N,1}\alpha - s)]} \\ = & -\frac{(\alpha - 1)^3(\alpha + 1)(a_{F,2} - a_{F,1})}{4[(a_{F,2} - \alpha s) + \alpha(a_{F,1}\alpha - s)][\alpha(a_{F,2}\alpha - s) + (a_{F,1} - \alpha s)]} \\ < & \ 0, \end{aligned} \quad (58)$$

given that, by Assumption 1(ii) and condition (14), it holds that $a_{F,2} < a_{F,1}$, $a_{F,2} > \alpha s$, $a_{F,1}\alpha > s$, $a_{F,2}\alpha > s$, and $a_{F,1} > \alpha s$.

If $0 < \theta_F \leq \frac{1}{2}$, we know from the proof of Proposition 1 that $\pi_F^*(\cdot, \alpha)$ is strictly increasing in θ_F. We hence need to prove that there exists a $\theta_F \in \left(0, \frac{1}{2}\right)$ that is sufficiently large for $\pi_F^*(\cdot, \alpha)$ to exceed $\pi_N^*(\cdot, \alpha)$ so that $\pi_F^*(\cdot, \alpha) - \pi_N^*(\cdot, \alpha) > 0$.

We consider the upper bound of θ_F and verify that, for $\theta_F = \frac{1}{2}$, the firm owner's utility difference between hiring a family or a non-family manager is positive. The firm owner's utility when hiring a family manager is given by:

$$\pi_F^*(\cdot, \theta_F = \frac{1}{2}, \alpha < 1) = \frac{1}{2}\left(\frac{a_{F,2} - s}{(a_{F,1}a_{F,2} - s^2)} + \frac{a_{F,1} - s}{(a_{F,1}a_{F,2} - s^2)}\right). \tag{59}$$

The owner's utility when hiring a non-family manager can be written as:

$$\pi_N^*(\cdot, \theta_N = 0, \alpha < 1) = \frac{1}{2}\gamma_N^*\left(\frac{a_{N,2} - \alpha s}{(a_{N,1}a_{N,2} - s^2)} + \frac{a_{N,1}\alpha - s}{(a_{N,1}a_{N,2} - s^2)}\right). \tag{60}$$

Recall that $\gamma_N^* < 1$. Using conditions $a_{F,1} = a_{N,2}$ and $a_{F,2} = a_{N,1}$ in the symmetric case, we only need to compare the terms in the brackets in equations (59) and (60):

$$\begin{aligned} & sign\left[\pi_F^*(\cdot, \theta_F = \frac{1}{2}, \alpha < 1) - \pi_N^*(\cdot, \theta_F = 0, \alpha < 1)\right] \\ = \quad & sign\left[\left(\frac{a_{F,2} - s}{(a_{F,1}a_{F,2} - s^2)} + \frac{a_{F,1} - s}{(a_{F,1}a_{F,2} - s^2)}\right) - \left(\frac{a_{F,1} - \alpha s}{(a_{F,1}a_{F,2} - s^2)} + \frac{a_{F,2}\alpha - s}{(a_{F,1}a_{F,2} - s^2)}\right)\right] \\ = \; & sign\left[a_{F,2} - s + \alpha s - a_{F,2}\alpha\right] = sign\left[(a_{F,2} - s)(1 - \alpha)\right] > 0 \end{aligned} \tag{61}$$

By continuity, it follows that there exists a smaller value of θ_F such that for symmetric managers, $\pi_F^*(\cdot, \alpha < 1) > \pi_N^*(\cdot, \alpha < 1)$ holds for any $\alpha \in (0, 1)$ and s. ■

A2.2 Asymmetric Abilities (Section 4.2)

Proposition 4.

Set $\theta_i = 0$. For $\alpha = 1$, the difference of the firm owner's expected utility between hiring a family and a non-family manager is:

$$\pi_F^*(\cdot, \alpha = 1) - \pi_N^*(\cdot, \alpha = 1) = \frac{a_{F,2} + a_{F,1} - 2s}{4(a_{F,1}a_{F,2} - s^2)} - \frac{a_{N,2} + a_{N,1} - 2s}{4(a_{N,1}a_{N,2} - s^2)}. \tag{62}$$

W.l.o.g., suppose that $i = F$, $j = N$, and $a_{F,2} \leq a_{N,1}$.[28]

i) We aim to show that if $a_{F,1} + a_{F,2} < a_{N,1} + a_{N,2}$, $\pi_F^*(\cdot, \alpha = 1) > \pi_N^*(\cdot, \alpha = 1)$ holds for every s.

According to Assumption 1(iii) and (iv) let:

$$a_{F,1} = a_{N,1} + \sigma; \;\; a_{N,2} = a_{F,2} + \epsilon, \tag{63}$$

where $\sigma, \epsilon > 0$. By equation (63), the inequality $a_{F,1} + a_{F,2} < a_{N,1} + a_{N,2}$ can be written as $a_{N,1} + \sigma + a_{F,2} < a_{N,1} + a_{F,2} + \epsilon$, which yields that $\sigma < \epsilon$.

Substituting equation (63) into equation (62) yields:

$$\pi_F^*(\cdot, \alpha = 1) - \pi_N^*(\cdot, \alpha = 1) = \frac{\epsilon(a_{N,1} - s)^2 - \sigma(a_{F,2} - s)^2 + \sigma\epsilon(a_{N,1} - a_{F,2})}{2[(s^2 - a_{N,1}a_{N,2}][(s^2 - a_{F,2}a_{F,1})]}. \tag{64}$$

The denominator of the above expression is positive given that $s^2 < a_{i,1}a_{i,2}$. The numerator is also positive because $a_{F,2} \leq a_{N,1}$ and $\sigma < \epsilon$. Altogether, this proves that $\pi_F^*(\cdot, \alpha = 1) > \pi_N^*(\cdot, \alpha = 1)$ for every s.

ii) Suppose that instead we have $a_{F,1} + a_{F,2} \geqslant a_{N,1} + a_{N,2}$. W.l.o.g., we want to show that $\pi_F^*(\cdot, \alpha = 1) > \pi_N^*(\cdot, \alpha = 1)$, provided that $a_{F,2}$ is sufficiently small. Then, from equation (62), it follows by the assumption $a_{F,1} + a_{F,2} \geqslant a_{N,1} + a_{N,2}$ that the numerator of $\pi_F^*(\cdot, \alpha = 1)$ is at

[28] Exchanging i and j yields the same result.

least as large as the numerator of $\pi_N^*(\cdot, \alpha = 1)$. When, in addition $a_{F,2}$ is sufficiently small, it follows that $\pi_F^*(\cdot, \alpha = 1) > \pi_N^*(\cdot, \alpha = 1)$ for all s. ■

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