Incentivizing the Owner: Why Family Firms offer Pay-for-performance Contracts to their CEOs *

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Preliminary version

Abstract

We study the managers' compensation schemes adopted by publicly listed family firms by means of a theoretical model and an empirical analysis. Existing empirical literature finds puzzling evidence about the structure of CEOs' pay, some of which showing that family CEOs have lower expected pay but higher pay-for-performance sensitivity than external managers, despite their large inside ownership. This is in contrast with the fundamental tenets of principal-agent theory under moral hazard. In a theoretical model, we show that the outcome-related compensation structure of family CEOs may emerge in industries where it is easier to divert value from minority shareholders. In these industries, a pay-for-performance compensation ensures that the family CEO will not expropriate minority shareholders. We test the main hypotheses on a panel of Italian listed family firms (2000-2016), finding evidence in line with the model's predictions.

Keywords: CEO compensation, diversion, shareholder protection, family firms, Family CEO, pay-performance sensitivity, asset tangibility.

JEL codes: J33, G34, M52, D22, L20

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1 Introduction

One of the fundamental tenets of principal-agent theory is that managers need to be provided with incentives to exert effort, owing to the imperfect monitoring by shareholders. Naturally, family CEOs should be immune to these problems thanks to their large ownership stake, which aligns their incentives as managers with those of owners. In fact, when firms are owned and managed by their founders, or by their heirs, the agency problem is mitigated and a milder use of incentive pay in managerial compensations is to be expected. Or maybe not. Quite surprisingly, recent evidence on CEOs' compensations in family firms suggests that also family firms offer incentive contracts to their CEOs, even (and especially) when they belong to the family (Schulze et al., 2001; Michiels et al., 2012; Mazur and Wu, 2016; Graziano and Rondi, 2018).

This evidence arises some important questions. The first one is why family firms adopt a pay-for-performance compensation scheme for their inside managers, given that they obviously do not suffer from the problem of managerial slack. A clue towards an answer is provided by the literature on concentrated ownership (see, for example, Huddart, 1993; Pagano and Roell, 1998; Durnev and Kim, 2005, although an early discussion is already present in Jensen and Meckling, 1976), which highlights that also insider dominated firms –such as family firms– are susceptible to some kind of agency problem, though the latter may differ in nature from those of firms with dispersed ownership. This specific agency problem has often been associated to the divergence of objectives that exists between insiders and minority shareholders (Jensen and Meckling, 1976). Large shareholders may influence decisions that foster their personal profit or utility but neglect or even harm minority shareholders. Then, the question is: can pay-for-performance contracts be used to mitigate the agency problem between shareholders?

A second question concerns the design of these contracts. What are the features of the incentive contracts mitigating the agency problem between shareholders? Do they differ from incentive contracts implemented to prevent managerial slack by external managers? It is a well established fact that traditional principal-agent problems can be solved by providing -typically costly- incentives, which ultimately determine the level of the CEO's pay. However,

in the case of agency problems between shareholders, different dynamics might be at play. In fact, despite their high pay-performance sensitivity, which seems to suggest a severe agency problem, the family CEOs' pay is usually low in expected terms. This lends support to the conclusion that incentives paid to family CEOs are not related to informational rents, as is instead the case of external CEOs.

From a theoretical point of view, managerial incentives in family businesses and their effects on family CEOs' compensations are still an open issue, despite its practical relevance. In Italy, the prevailing control model continues to be the family one even among listed firms. According to the Italian Stock Exchange Authority (CONSOB, 2018), in 2017 the main shareholder owns more than half of the ordinary shares in 52% of listed firms. Overall, the average share held by the main shareholder is 47.7%, and the aggregate share of the other "relevant" shareholders (i.e. those with an interest of at least 2% in the company, including institutional investors) is about 12%, thus excluding the formation of blockholders large enough to play a relevant role in monitoring the administration of the firm.

In this paper we study the impact of the diversion problem on managerial compensations in family businesses by means of a theoretical model that we test on a dataset of Italian listed family firms over the period 2000-2016. The model describes how firms can design the compensation of a family CEO with a controlling share (e.g., a family shareholder) so as to prevent his expropriation of rents from minority shareholders.

The idea that managerial compensations are an endogenous response to the contracting environment faced by the firm has been posited both in the theoretical and empirical literature (Palia, 2001; Holmstrom, 1979; Grossman and Hart, 1983; Holmstrom and Milgrom, 1991; Murphy, 1985; and Jensen and Murphy, 1990). However, these models typically hinge on the conflict between a manager and shareholders concerning the exertion of an effort, neglecting to consider the conflict between shareholders. On the contrary, the literature on diversion studies the conflict between majority and minority shareholders concerning the extraction of rents, but it explicitly assumes that the compensation structure is exogenous, rather focusing on the role of ownership, arguing that the presence of blockholders has been optimized as a response to the contracting environment. This literature implicitly assumes that the CEO and the main shareholder are two different individuals, hence it neglects the

role of the manager's compensation as a potential instrument to align shareholders' objectives. This gap is quite relevant in practice. In family firms, the main shareholder and the CEO are frequently the same person, as the founder -or the heir- is a natural candidate for the position of CEO. In this situation, the compensation that the family CEO receives, as a manager, could serve to mitigate the conflict that he has, as shareholder, with minority shareholders. The agency problem between shareholders could be resolved via the channel of the CEO's compensation.

We explore this idea by examining the pay-for-performance sensitivity at the CEO level in a context of conflict of interest between shareholders. We thus bridge the gap between two strands of literature: the one studying pay-for-performance compensations to align the conflicting interests between owners and managers, and the one on managerial discretion studying the conflicting interests between owners. By taking the ownership structure as exogenous, we provide insights that complement the second strand of literature, by suggesting an alternative instrument to ownership concentration that could help to solve the diversion problem.

We consider a standard moral hazard setup, in which managerial effort allows to increase the expected level of profits, and we also assume that a family CEO can divert value from minority shareholders. This framework is very close to that considered by Huddart (1993), from which, however, we depart as we take the ownership structure as given, and instead focus on the optimal CEO's compensation to align shareholders' interests.

We obtain three main results. The first one is about the structure of family CEO's compensations. The model predicts that the pay-performance sensitivity (PPS) of the family-CEO's compensation is higher in sectors where it is easier to divert funds. Intuitively, the family CEO has an incentive to understate the firm's actual profits to minority shareholders, so as to steal the difference between actual and reported profits. By a pay-for-performance contract, the family CEO is rewarded in function of the profit that he communicates to shareholders, hence his incentive to understate the actual profit decreases.

Quite interestingly, we also find that the pay-for-performance contracts of family CEOs -designed to prevent diversion- present very different features from the pay-for-performance contracts of external CEOs -designed to prevent the shirking of effort. In particular, family

CEOs require an incentive rent that is larger, the larger the profits (as the prize of diversion is greater). As a consequence, their wage must increase linearly with profits: their PPS is a constant share of them. Conversely, external CEOs receive an informational rent that does not depend on profits, but just on the cost of their effort and on the probabilities of its outcomes. Hence, the PPS of external CEOs is lower in industries where profits are higher: in fact, when profits are high, a lower share of them is sufficient to incentivize effort of external CEOs.

These features have important implications when the CEO choice is the result of an equilibrium argument. In fact, the choice of CEO is endogenous: the family firm may be run by the controlling shareholder himself, who is thus the family CEO, or by an external CEO. This choice reflects a trade-off. On the one hand, with a family CEO, minority shareholders need to be secured against the risk of expropriation; on the other hand, an external CEO requires costly incentives to be induced to exert effort. When we account for the equilibrium choice of the type of CEO, we find our second result: in the presence of diversion problem, family CEOs' contracts display a higher PPS than external CEOs' contracts. In fact, industries with higher profits have a more severe diversion problem and thus an external CEO represents the least costly solution. When profits are high, the PPS of external CEOs is low. Family CEOs emerge in equilibrium only when profits are low, hence family CEOs have a higher PPS than external ones.

This result is directly connected to the third one: in the presence of diversion problems, family-CEOs must receive a lower expected pay than external ones. In fact, in equilibrium family CEOs emerge only if profits (and thus compensations) are sufficiently low.

We test these results on a large panel of non-financial family firms listed on the Italian stock exchange and tracked over the period 2000-2016. We define "family" firms as those where the largest individual shareholder and his relatives have more than 50% of the equity. We collected data about the CEO's identity and pay from the companies' annual reports. Our theoretical predictions match the evidence emerging from the dataset about the role of diversion on CEOs' pay. Industries characterized by large intangible assets (such as advertising and R&D expenditures), where diversion is easier, have either family- or non-family CEOs with a pay-for-performance compensation scheme. In contrast, industries with low

R&D and advertising intensity, where diversion is more difficult, have family (and external) CEOs with a fixed compensation scheme. Moreover, in high-diversion industries the compensation of family CEOs has a lower expected value, but higher pay-for-performance sensitivity than the compensation of non-family CEOs.

Our contribution to the literature is threefold. First, we provide a theory that explains the observed provision of incentives to family CEOs in public family companies. Second, we provide empirical support to the argument that asset intangibility increases the efficiency and the potential of diversion, hence of minority shareholders' expropriation. Third, we propose pay-for-performance contracts as a complementary incentive device to ownership structure when the formation and the activism of blockholders is unlikely or ineffective.

In the following, Section 2 derives the theoretical model and the testable hypothesis, Section 3 presents the data and the empirical analysis and Section 4 concludes.

2 The theoretical framework

We consider an environment similar to that examined by Durnev and Kim (2005), in which the controlling shareholder can divert corporate resources for private gains by means of some value-decreasing managerial practices. These are broadly defined and range from managerial perks, excessive shirking, unprofitable "pet" projects, nepotistic appointments, to outright stealing of corporate resources (Jensen and Meckling, 1976; Pagano and Roell, 1998). Diversion is costly to the controlling shareholder. As Durnev and Kim (2005, p. 1463) put it, "The most obvious costs are fines, jail terms, and loss of reputation associated with illegal diversion. Another cost is bribery of employees, regulators, and politicians to facilitate and hide diversion. A third cost is the difference between the controlling shareholder's private value of corporate perks or of diverted resources and their fair replacement value.". These direct costs depend on the regulatory environment of each country, and specifically on the legal protection accorded to minority shareholders, but -within a country- they also depend on a number of firm characteristics, such as the intangibility of the firm's assets. Indeed, diversion is generally easier when a project is at the early stages than after the project becomes tangible assets, because it is more difficult to identify and exercise property rights

for a business idea than for tangible assets (Durnev and Kim, 2005). The idea that fixed assets (i.e. machinery and equipment) are easier to monitor and harder to divert or steal than "soft capital" (intangibles, R&D capital, human capital) is shared by a large amount of literature (see, e.g., Klapper and Love, 2002; Himmelberg, Hubbard and Love, 2002; Himmelberg, Hubbard and Palia, 1999), and Grinblatt and Titman also suggest that "Perhaps, management ownership is related to market-to-book ratios because there are more benefits associated with controlling companies with more intangible assets" (1997, p. 612).

Typically, however, the literature on diversion focuses on the case in which the ownership structure emerges endogenously as a consequence of the diversion problem, as it works as a pre-commitment device to mitigate agency costs (Pagano and Roell, 1998; Huddart, 1993). We complement this strand of literature by investigating the effects of diversion on the managers' compensation schemes. To this aim, we assume that the family owner wants to keep a controlling majority stake in the firm, therefore the ownership structure is given.

2.1 The model

An entrepreneur is the single owner of an all-equity business (a family firm), in which he has invested all his wealth. Suppose that a new investment opportunity arises, which requires two complementary inputs: capital and managerial effort. The venture is risky, and the managerial effort affects the probability that the venture succeeds, while the capital affects the profit in case it succeeds.

The effort defines a standard moral hazard problem, as in Huddart (1993). In particular, the effort is provided by the CEO of the firm at personal cost $\psi = \{0, c\}$, where $\psi = 0$ is the cost if no effort is exerted, while $\psi = c$ is the cost in case the effort is exerted on the venture. If the effort is exerted, the venture succeeds with probability p, and fails with probability $1 - p$. Conversely, in the case of no effort, the venture always fails. In order to ensure that the effort satisfies the usual hypothesis of decreasing marginal returns, we assume that $c > p$. The effort exerted is private information of the CEO.

The profit of the venture is Π. If the venture fails, Π is normalized to zero. Conversely, if it succeeds, the profit Π depends on the amount $k \geq 0$ of capital invested, according to

the function $\sqrt{k}$ (i.e., capital has decreasing marginal returns). Hence, $\Pi = \{0, \sqrt{k}\}$. As the entrepreneur is wealth constrained, in order to obtain the capital k, he needs to raise an amount of external finance, that is assumed to take the form of straight equity (as in Pagano and Roell, 1998). In exchange of the capital k, he cedes a share $1 - \alpha$ of the business's ownership, dividing it equally among a large number of small shareholders, while he retains a large fraction $\alpha \in [0, 1]$ of the stock.[1]

The shareholders (i.e. the entrepreneur and the minority shareholders) split the profit, net of the manager's compensation, in proportion to their ownership.

There are two possible types of manager m. The entrepreneur ($m = F$) can manage the firm by himself (and be the family-CEO), or he can appoint an external CEO ($m = O$).

We now lay out the main features of the model.

Diversion. When profits $\sqrt{k}$ are achieved, the manager can divert them for private gains. The diverted amount $\sqrt{k}$ yields to the manager a private benefit equal to $b\sqrt{k}$, where $b \leq 1$ is the constant rate of diversion (Pagano and Roell, 1998). The constant b can be interpreted as the value that the entrepreneur places on each dollar diverted from the company. The share $1-b$ can be though of as the inefficiency of diversion, i.e. the loss that the firm incurs for each unit diverted (Durnev and Kim, 2005; Johnson et al., 2000; Lombardo and Pagano, 2002; and Shleifer and Wolfenzon, 2002; Pagano and Roell, 1998; Jensen and Meckling, 1976). We denote with $\hat{\Pi} = \{\sqrt{k}, 0\}$ the after-diversion profits observed by minority shareholders: $\hat{\Pi} = \sqrt{k}$ if actual profits are $\sqrt{k}$ and no diversion occurred, while $\hat{\Pi} = 0$ in all other cases (i.e., actual profits Π are zero, or actual profits are $\Pi = \sqrt{k}$ but diversion occurred). This setting implies that minority shareholders cannot tell whether they observe profit $\hat{\Pi} = 0$ because the venture failed ($\Pi = 0$) or rather because the venture succeeded but the manager diverted the profits.

Observing diversion. Diversion can be prevented by monitoring activities implemented by shareholders; however, the effectiveness of this monitoring depends on the ownership stake (Pagano and Roell, 1989; Burkart et al., 1997; Shleifer and Vishny, 1986; Maug, 2002). In fact, shareholders with a large stake in the company are better equipped to exert monitoring,

[1] For our purposes, the value of α does not need further constraints, as long as it makes the entrepreneur the major shareholder, leaving room for potential diversion activities.

possibly because monitoring activities entail a cost that only large shareholders are willing to pay, while small shareholders tend to free-ride. In line with this literature, we assume that diversion can be perfectly observed by the entrepreneur, while minority shareholders can only observe the after-diversion profit $\hat{\Pi}$ communicated by the entrepreneur. As a consequence, diversion can only arise with a family CEO, but not with an external CEO. In fact, when the entrepreneur hires an external manager, eventual diversion activities carried out by the external manager are prevented by the major shareholder by virtue of his large ownership stake. Conversely, when the entrepreneur is also the manager (family CEO), the major shareholder is the one who carries out diversion, and minority shareholders are unable to detect it.

Manager's compensation. The CEO's compensation depends on the profit $\hat{\Pi}$ observed by minority shareholders. In particular, the compensation scheme defines a fixed wage T_m plus a share t_m of profits $\hat{\Pi}$, so that t_m represents the pay-for-performance (PPS) coefficient of the CEO's wage. Hence, the CEO's compensation is given by $W_m(\hat{\Pi}) = T_m + t_m\hat{\Pi}$, with $T_m \geq 0$ and $0 \leq t_m \leq 1$.

The value of the venture is equal to the oberved profit, net of the manager's compensation:

$$S_m(\hat{\Pi}) = \hat{\Pi} - W_m(\hat{\Pi}). \tag{1}$$

Utility functions. In our setup, there are three different players: the external CEO, minority shareholders, and the entrepreneur. The latter in turn can be either a family CEO (i.e., manager and major shareholder at the same time) or, if an external CEO is hired, just the major shareholder.

The external CEO is risk averse, with preferences represented by the Von Neumann-Morgenstern utility function $R(W_O)$ which is concave with respect to the wage and linear with respect to the cost of effort: $R(W_O) = \sqrt{W_O} - \psi$. The external CEO's expected utility when contract W_O is implemented, given that effort is exerted, can therefore be written as

$$ER(W_O) = p\sqrt{T_O + t_O\sqrt{k}} + (1-p)\sqrt{T_O} - c. \tag{2}$$

We normalize his outside option to zero. Hence, the external CEO's participation constraint is $ER(W_O) \geq 0$.

Following Pagano and Roell (1998), we assume that both the entrepreneur and minority shareholders are risk neutral. The utility $V_m(\cdot)$ of minority shareholders is given by the value of the venture, in proportion to their ownership, net of the capital invested:

$$V_m(\hat{\Pi}) = (1-\alpha)\left(\hat{\Pi} - W_m(\hat{\Pi})\right) - k, \text{ for } m = F, O. \tag{3}$$

Minority shareholders choose their investment k so as to maximize the value $V_m(\hat{\Pi})$ of their portfolio (Durnev and Kim, 2005). The value of their outside option is zero.

The utility $U_m(\cdot)$ of the entrepreneur depends on whether he is also CEO or not. The entrepreneur's utility when chooses an external CEO is his share α of the value of the venture:

$$U_O(\Pi) = \alpha\left(\Pi - W_O(\Pi)\right),$$

which is a function of Π as no diversion arises with external CEOs.

In the family CEO case, the entrepreneur-manager's utility $U_F(\cdot)$ is given by his share of the value of the venture, plus the income as CEO, net of the effort cost, plus any rents he derives from eventual diversion activities. Then, the entrepreneur's utility when he is also family CEO, given the effort cost ψ, is

$$U_F(\hat{\Pi}, \Pi) = \alpha\left(\hat{\Pi} - W_F(\hat{\Pi})\right) + W_F(\hat{\Pi}) + b(\Pi - \hat{\Pi}) - \psi. \tag{4}$$

The wage W_F needs to at least compensate the entrepreneur-manager (who is not diverting rents) for his cost of effort. Hence, we assume

$$T_F + t_F p\sqrt{k} \geq c. \tag{5}$$

Condition (5) represents the family CEO's participation constraint, and it allows to rule out unappealing situations, such as those in which the family CEO waives any compensation or even "pays" to work in the family firm (i.e. $T_F + t_F p\sqrt{k} < c$), given that he already receives

the profit as shareholder.[2]

Before proceeding with the analysis, it is important to define the role played by the wage in this setup. Note that the CEO's wage reduces the minority shareholders' utility (3), but increases the family CEO's one (4). This generates a conflict of interest between the family CEO and minority shareholders with regard to the wage, in addition to the conflict that leads to the diversion problem. In other words, the family CEO could exploit his dominant position and extract surplus to minority shareholders via the channel of the wage (by fixing the wage as high as possible, conditional on the shareholders' participation constraint), or via the diversion channel. Clearly, if the entrepreneur could subtract rents openly through the wage, the diversion problem becomes meaningless. There is, however, a fundamental difference between these two channels of surplus extraction: the wage is observable, as it is public information, while the diversion is not. This means also that the conflict of interest related to the wage can easily be solved, for example by delegating the choice of CEO and his compensation to an external figure. Indeed, at large public companies, boards of directors are usually in charge of how and what to pay their CEOs. Indeed, when venture capital is raised, "almost invariably, the investor will insist on the right to appoint a nonexecutive director," especially if the investment is large or particularly risky (Sharp 1991, p. 160). In line with this, we assume that the choice about the type of CEO and his compensation is decided by, say, the board of directors, in such a way to maximize the venture's value. This allows us to focus on the diversion channel as a means of rent extraction.

Timing. The timing of the problem is as follows:

(i) the board of directors chooses the type of manager $m = \{F, O\}$ (i.e., the major shareholder or an external CEO), and commits to offer to the manager the compensation contract (T_m, t_m);

(ii) minority shareholders choose the level of their investment k, such that $k \geq 0$;

(iii) the manager exerts the effort, the outcome Π is realized; the manager carries out

[2]From a modeling perspective, this condition is also attractive because it allows to put the external CEO and the family CEO on the same footing, as they both need to be compensated for their effort. Then, the choice between the family CEO and the external CEO only depends on the different informational problems affecting the two types: the diversion of profits in the case of family CEO, and the shirking of effort in the case of external CEO.

eventual diversion activities; finally, the after-diversion profit $\tilde{\Pi}$ is observed by minority shareholders and payoffs are received.

In our setup, two information problems arise. The first is the moral hazard problem owing to the fact that exerting effort has a private cost for the CEO, but a public benefit as it raises the probability of obtaining a positive profit. In order to provide our insights in the most straightforward way, we will focus on the situation in which this moral hazard problem arises only with external CEOs, while family CEO are intrinsically motivated to exert effort thanks to their large ownership stake.

The second information problem is the possibility of the family-CEO to divert profits. As we already pointed out, this problem arises exclusively with family-CEOs, because external CEOs are subject to a tighter monitoring owing of the concentrated ownership. As is well known in the literature (Pagano and Roell, 1998), the incentive to divert depends on the relationship between the ownership share α and the efficiency of diversion b. In fact, from (4), the family CEO's utility can also be expressed as:

$$U_F(\hat{\Pi}, \Pi) = (1-\alpha)(T_F + t_F\hat{\Pi}) + b\Pi + (\alpha - b)\hat{\Pi} - \psi. \tag{6}$$

Expression (6) highlights that the utility of the family CEO is increasing in $\hat{\Pi}$ when $b \leq \alpha$. Then, if $b \leq \alpha$, the family CEO has a strict incentive to refrain from diversion ($\hat{\Pi} = \Pi$), regardless of the compensation contract (T_F, t_F). Conversely, when $b > \alpha$, the diversion problem might emerge for some values of t_F. Hence, when $b > \alpha$, the value of t_F must be appropriately chosen so as to eliminate the CEO's incentive to rent expropriation.

Note also that, due to the linearity of the diversion technology, the family CEO's strategy is simple: either he extracts as many private benefits as he can ($\hat{\Pi} = 0$), or he extracts none ($\hat{\Pi} = \Pi$)[3].

In the next Section, we examine as a benchmark the equilibrium in the case the diversion problem cannot arise, i.e. $b \leq \alpha$. In Section 2.3, we will instead analyze the equilibrium when $b > \alpha$.

[3]This is the same approach adopted by Pagano and Roell (1998).

2.2 The benchmark: no diversion

Let us consider, as a benchmark, the case of no diversion, i.e. $b \leq \alpha$.

If effort is not exerted in stage 2 (regardless of whether the manager is a family CEO or an external CEO), the value of the venture is always $\Pi = 0$. As a consequence, the manager's compensation is zero, and the value of the venture is zero as well.

Let us now consider the case in which effort is exerted in stage 2. We proceed backwards, and study the investors' choice in stage 1. If the manager exerts effort in stage 2, shareholders in stage 1 invest k^* such that:

$$k^* = \arg\max_k (1-\alpha)\left(p\sqrt{k} - T_m - t_m p\sqrt{k}\right) - k,$$

for $m = F, O$, i.e.

$$k^*(t_m) = \left(\frac{(1-\alpha)(1-t_m)p}{2}\right)^2. \tag{7}$$

Note that the investment k^* is decreasing in t_m (as t_m is defined in the interval $t_m \in [0,1]$), because a pay-for-performance contract reduces the marginal return of the investment.

In stage 0, the board chooses the contract (T_m, t_m) and the type m of CEO. Let us find the optimal contract in the two different scenarios (family and external CEO). This will allow us to determine the equilibrium type of CEO in the benchmark case of no diversion.

2.2.1 The external CEO 's compensation

As is well known in the case of moral hazard problems, the external CEO is not intrinsically motivated to exert effort, and a fixed contract does not provide the incentives for it. Thus, a pay-performance contract is necessary.[4] In particular, the external CEO is subject to the incentive compatibility constraint

$$p\sqrt{T_O + t_O\sqrt{k^*(t_O)}} + (1-p)\sqrt{T_O} - c \geq \sqrt{T_O}, \tag{8}$$

[4]In fact, the external CEO's utility with a fixed contract in the case effort is exerted, $\sqrt{T_O} - c$, is always lower than his utility in case of no effort, $\sqrt{T_O}$.

where $k^*(t_O)$ is given by (7).

In stage 0, the board maximizes the venture's value subject to the minority shareholders' participation constraint and the manager's incentive compatibility constraints[5]:

$$\begin{aligned} \tilde{t}_O, \tilde{T}_O = \arg\max_{t_O, T_O} \quad & p\sqrt{k^*(t_O)} - T_O - t_O p\sqrt{k^*(t_O)} \\ s.t. \quad & (1-\alpha)\left(p\sqrt{k^*(t_O)} - T_O - t_O p\sqrt{k^*(t_O)}\right) - k^*(t_O) \geq 0. \\ & p\sqrt{T_O + t_O\sqrt{k^*(t_O)}} + (1-p)\sqrt{T_O} - c \geq \sqrt{T_O} \end{aligned} \tag{9}$$

We thus obtain the following result:

Lemma 1 *The solution of Problem (9) is* $\tilde{t}_O = \frac{1-\sqrt{1-\frac{8c^2}{p^3(1-\alpha)}}}{2}$, $\tilde{T}_O = 0$.

Proof. See the Appendix. ■

As is typical of principal-agent problems with moral hazard, the external CEO must receive a pay-for-performance contract, in order to have sufficient incentives to exert effort.

Note that the solution of Lemma 1 exists only if $\frac{(1-\alpha)p^3}{8} - c^2 \geq 0$ (i.e., the radicand of $\tilde{t}_O$ is positive). If this condition is not met, it is not possible to satisfy the manager's IC constraint, hence the board prefers that the external CEO exerts no effort. While this is the standard trade-off between the costs and benefits of incentives in principal-agent models with moral hazard, the choice between inducing effort or not is the object of a large amount of literature and it is not the aim of the present study. Our focus is rather on the choice between external and family CEO and the latter's compensation schemes. We thus assume that inducing effort by the external manager is always preferred over the option of no effort. This allows us to consider the external CEO as an outside option. Then, we make the following assumption:

Assumption 1 *The value of the venture is higher when the external CEO exerts effort, relative to no effort, i.e.* $\frac{(1-\alpha)p^3}{8} - c^2 > 0$.

[5]We omit the manager's participation constraint, $p\sqrt{T_O + t_O\sqrt{k^*(t_O)}} + (1-p)\sqrt{T_O} - c \geq 0$, as it is not binding.

Assumption 1 allows us to restrict the attention to the case in which inducing the external CEO to exert effort is worthwhile: investors strictly prefer that the external CEO exerts effort.

The fact that the external CEO must receive a pay-for-performance compensation is not the only salient feature of the contract that emerges from Lemma 1. In fact, it is worth noting, from the manager's binding IC constraint in (9), that $\tilde{t}^O = \frac{c^2}{p^2\sqrt{k^*(\tilde{t}_O)}}$: the PPS of the external CEO's compensation is negatively correlated with the profit of the venture. In fact, an external CEO's informative rent does not depend on profits, but only on the marginal cost and benefit of effort (c and p). Thus, given that the CEO's expected wage $\tilde{t}^O p\sqrt{k^*(\tilde{t}_O)}$ is constant and equal to c^2/p, an increase in profits is compensated by a decrease in his PPS. This feature has important implications, that we will explore later on.

The value of the venture with an external CEO is

$$\tilde{S}_O = p\sqrt{k^*(\tilde{t}_O)} - \frac{c^2}{p}. \tag{10}$$

Note that this specific pay-for-performance contract is costly and it decreases the value of the venture for two reasons. First, it reduces the minority shareholders' investment. Second, it implies an inefficient allocation of risk, as it forces a risk averse agent to undertake some risk, hence the manager must be compensated with an expected wage (c^2/p) that is higher than his effort cost (c).

2.2.2 The family CEO 's compensation

Let us now consider the case of family CEO, in which the CEO is the entrepreneur's himself in the benchmark situation of no diversion ($b \leq \alpha$).

Given the investment (7), in stage 0 the board determines the optimal contract (that we denote with (t_F^*, T_F^*) to indicate the absence of information asymmetries in terms of diversion) by maximizing the venture's value subject to the manager's participation constraint (i.e., the

expected wage must at the least compensate him for his effort):

$$(t_F^*, T_F^*) = \arg\max_{t_F, T_F} \quad p\sqrt{k^*(t_F)} - T_F - t_F p\sqrt{k^*(t_F)} \qquad (11)$$
$$s.t. \quad T_F + t_F p\sqrt{k^*(t_F)} - c \geq 0,$$

whose solution is straightforward and it is expressed by the following Lemma:

Lemma 2 *The solution of Problem (11) is* $t_F^* = 0$, $T_F^* = c$.

Proof. See the Appendix. ■

A pay-for-performance compensation would reduce the marginal return of the investment for minority shareholders, thus curbing their investment. As a consequence, a fixed compensation scheme is strictly preferred.

From (7), we also obtain $k^* = \left(\frac{(1-\alpha)p}{2}\right)^2$. Then, the family CEO's utility is:

$$U_F^* = \alpha\left(p\sqrt{k^*(t_F^*)} - c\right) = \alpha\left(\frac{(1-\alpha)p^2}{2} - c\right). \qquad (12)$$

From Assumption 1, $\frac{(1-\alpha)p^2}{2} - c > 0$, implying that exerting effort is worthwhile for the family CEO[6].

The value of the venture is:

$$S_F^* = p\sqrt{k^*(t_F^*)} - c = \frac{(1-\alpha)p^2}{2} - c. \qquad (13)$$

By comparing the venture's value in the case of external CEO in (10), and in the case of family CEO in (13), we easily obtain $S_F^* > \tilde{S}_O$: in our simplified setup, and in the absence of diversion problems, the value is higher when the CEO is the entrepreneur himself rather than an external CEO manager. In fact, the family CEO is intrinsically motivated to exert effort, and he does not need a costly pay-for-performance contract. By accepting a fix wage, that just covers his effort costs, he is able to induce the optimal investment by investors. On the contrary, an external CEO must be provided with the incentive to exert effort by a pay-

[6]In fact, Assumption 1 implies $\frac{(1-\alpha)p^3}{2} - c^2 > 0$. Then, $\frac{(1-\alpha)p}{2} > \left(\frac{c}{p}\right)^2 > \frac{c}{p}$.

for-performance contract. Such a contract reduces the investment by minority stockholders. As a consequence, in the absence of diversion problems, the family CEO emerges as the dominant solution[7].

2.3 Diversion

We now study how the implications of the diversion problem on the equilibrium compensation contract and on the choice of CEO. Accordingly, in this Section we assume that $b > \alpha$. Given that the compensation of the external CEO is not affected by the diversion problem, in what follows we focus on the family CEO's contract.

2.3.1 The family CEO's compensation

As a first step, we show that the first best fixed contract (t_F^*, T_F^*) induces diversion, and it cannot be an equilibrium. In stage 2, given the first best investment $k^*(t_F^*)$, and the fixed first best contract, the expected utility for the family CEO is expressed by (12) in the absence of diversion. Conversely, if he diverts value, he obtains

$$U_F = \alpha\left(-T_F^*\right) + T_F^* + bp\sqrt{k^*(t_F^*)} - c = bp\sqrt{k^*(t_F^*)} - \alpha c > U_F^*. \tag{14}$$

Hence, when $b > \alpha$, a fixed contract provides him with a strict incentive to steal in stage 2, and this stops minority shareholders from investing in stage 1. Naturally, in the absence of investment, the value of the firm is zero. Therefore, the family CEO must be provided with the incentives not to expropriate minority shareholders after their investment. This is ensured by the following IC constraint:

$$\alpha\left(\Pi - T_F - t_F\Pi\right) + T_F + t_F\Pi - \psi \geq \alpha\left(-T_F\right) + T_F + b\Pi - \psi$$

[7]Naturally, in reality other dimensions may affect this result. For example, family CEOs and external CEOs can differ in their ability, or being the CEO of the family firm can give an additional utility to the entrepreneur. A full-fledged analysis is however beyond the scope of the present work, and we focus here on the trade-offs originated exclusively from the diversion problem.

i.e.

$$t_F \geq \frac{b-\alpha}{1-\alpha}. \tag{15}$$

We can thus state our first result, which summarizes the findings about the optimal contract paid to family CEOs for all levels of b.

Proposition 1 *When the efficiency of diversion is low ($b \leq \alpha$), the PPS of the family-CEO's compensation is $t_F^* = 0$. When the efficiency of diversion is high ($b > \alpha$), the PPS of the family-CEO's compensation is $\tilde{t}_F = \frac{b-\alpha}{1-\alpha}$.*

Although Proposition 1 does not make an equilibrium argument, as it considers only subgames in which the manager is the family CEO, still it allows to highlight that a pay-for-performance contract can be employed to ensure that the family CEO will not expropriate minority shareholders. Thus, the compensation structure acts as a device to limit agency costs. The intuition is very simple. The family CEO has an incentive to understate the firm's actual profits to minority shareholders, so as to steal the difference between actual and reported profits. By rewarding the family CEO in function of the profit that he communicates to shareholders, his incentive to understate the actual profit decreases. This result complements the findings obtained by Pagano and Roell (1998), who study the incentives against diversion by focusing instead on the ownership structure.

When $b > \alpha$, the shareholders' investment is $k^*(\tilde{t}_F) = \left(\frac{(1-b)p}{2}\right)^2$. Moreover, when $b > \alpha$, the family CEO's wage is such that $\tilde{T}_F + \tilde{t}_F p\sqrt{k^*(\tilde{t}_F)} \geq c$, i.e.

$$\tilde{T}_F + \frac{b-\alpha}{1-\alpha}\frac{(1-b)p^2}{2} \geq c \tag{16}$$

If $\frac{b-\alpha}{1-\alpha}\frac{(1-b)p^2}{2} \leq c$, the variable part of the contract is not sufficient to compensate the CEO for the effort. Then, it is necessary to integrate it with the fixed part $\tilde{T}_F = c - \frac{b-\alpha}{1-\alpha}\frac{(1-b)p^2}{2}$. The total expected wage is $\tilde{T}_F + \tilde{t}_F p\sqrt{k^*(\tilde{t}_F)} = c$.

If instead $\frac{b-\alpha}{1-\alpha}\frac{(1-b)p^2}{2} > c$, then $\tilde{T}_F = 0$. In this case, the total expected wage is $\frac{b-\alpha}{1-\alpha}\frac{(1-b)p^2}{2}$.

We can thus express the value of the venture when $b > \alpha$:

$$\tilde{S}_F = \begin{cases} \tilde{S}'_F = p\sqrt{k^*(\tilde{t}_F)} - c \text{ if } \frac{b-\alpha}{1-\alpha}\frac{(1-b)p^2}{2} \leq c \\ \tilde{S}''_F = (1-\tilde{t}_F)p\sqrt{k^*(\tilde{t}_F)} \text{ if } \frac{b-\alpha}{1-\alpha}\frac{(1-b)p^2}{2} > c, \end{cases} \tag{17}$$

with $\tilde{S}'_F \geq \tilde{S}''_F$.

2.3.2 The equilibrium choice of CEO

In this section we study the entrepreneur's choice of the type of CEO in stage 0.

The board chooses an external CEO iff $\tilde{S}_O > \tilde{S}_F$. To this aim, recall that $\tilde{S}'_F \geq \tilde{S}''_F$. Then, a necessary (but not sufficient) condition for external CEOs to emerge in equilibrium is $\tilde{S}_O > \tilde{S}''_F$, i.e.:

$$(1-\tilde{t}_O)p\sqrt{k^*(\tilde{t}_O)} > (1-\tilde{t}_F)p\sqrt{k^*(\tilde{t}_F)}, \tag{18}$$

which implies $\tilde{t}_O < \tilde{t}_F$. We can thus establish our second result.

Proposition 2 *In sectors where the efficiency of diversion is high ($b > \alpha$), the PPS of the family-CEO's compensation (i.e., $\tilde{t}_F$) in equilibrium is higher than the PPS of external CEOs (i.e., $\tilde{t}_O$).*

Proof. See the Appendix. ■

When $b > \alpha$, the family and external CEO's compensations must both be pay-for-performance. However, they are deeply different under other respects. The PPS of the family-CEO , $\tilde{t}_F = \frac{b-\alpha}{1-\alpha}$, only depends on b and α, but it is constant with respect to the profits $\sqrt{k^*(\tilde{t}_F)}$. Conversely, the PPS of external CEOs, $\tilde{t}^O = \frac{c^2}{p^2\sqrt{k^*(\tilde{t}_O)}}$, is negatively correlated to profits. Given that offering pay-for-performance contracts is costly, external CEOs become optimal when profits are sufficiently high, i.e. their PPS becomes low. Then, given that they are hired only when profits are sufficiently high, their PPS in equilibrium is lower than the PPS of family CEOs.

The fact that the PPS of family CEOs is constant, whereas the PPS of external CEOs is negatively correlated to profits, has important implications also on the level of the expected

wage. The expected wage of a family CEO is equal to $\tilde{T}_F + \tilde{t}_F p\sqrt{k^*(\tilde{t}_F)}$; as $\tilde{t}_F$ is constant, then the expected wage of a family CEO increases linearly with the profit level $\sqrt{k^*(\tilde{t}_F)}$. On the contrary, the expected wage of an external CEO is constant and equal to c^2/p, because an increase in profit is compensated by a decrease of the PPS of the external CEO's contract. As the expected wage of the external CEO is constant, it provides a sort of ceiling to the cost of the venture. A family CEO emerges only when his wage is lower than this "ceiling", c^2/p. We can thus establish our third result.

Proposition 3 *In sectors where the efficiency of diversion is high ($b > \alpha$), the expected compensation of the family-CEO is lower than that of external CEOs.*

Proof. See the Appendix. ■

In family firms with a family CEO, the problem of diversion is more severe, the higher the profits. As a consequence, industries with higher profits are more likely to hire external CEOs. Therefore, family CEOs emerge only if profits (and thus compensations) are sufficiently low.

3 Empirical Design and Data

In the theoretical analysis, the compensation policy (e.g. the provision of managerial incentives) ultimately depends on the efficiency of diversion and on the ownership share of the controlling shareholder. Empirically, a measure of diversion or stealing is not easy to find. However, the scope and potential of diversion increases when the firm's activity requires large and sunk investment in intangible assets, human capital, technology and market that are more difficult to observe, evaluate and monitor (Klapper and Love, 2002; Himmelberg, Hubbard and Palia, 1999). This is typical of industries where R&D and advertising expenditures allow firms to differentiate their product and sustain their competitive advantage or to enhance their production efficiency to escape price competition. In these industries, high rates of return typically compensate the escalation of sunk intangible investments. To implement the efficiency of diversion in the empirical analysis, we rely on a typology that classifies industries into two groups, one including homogeneous product industries with low

R&D and advertising intensity (Type 1, i.e. low diversion) and one including differentiated product industries with high R&D and advertising (Type 2, i.e. high diversion), based on UK sectoral data. We derive our classification from industry data to avoid that using firm-level data might raise endogeneity concerns.[8] Furthermore, we opt for a classification that employs UK sectoral data to avoid reverse causality concerns that might arise if we use Italian data, on the grounds that cross-industry differences are highly correlated in industrialized countries. Firms in our dataset are then assigned to Type 1 or Type 2 groups according to their primary industry at the beginning of the period, which is assumed not to change over the sample period.

Theoretical hypotheses are tested on a panel of Italian publicly listed family firms. There are several reasons why we employ firms from within a single country instead of conducting a cross-country analysis. First, by focusing on the ownership and control structures that firms actually have adopted within a given legal regime (i.e. a French Civil law system), we do not have to control for the potential that country-specific laws, financial institutions and cultures allow to owners for expropriation of non-controlling shareholders. Country specific factors indeed influence to a great extent both the choice of the family to retain the controlling stake, the size of this stake, and the decision to appoint a family CEO as well as the compensation policy (La Porta, et al., 1999). All firms in our sample face exactly the same investor protection laws and the same institutional and cultural environment, but have nonetheless chosen to adopt very different compensation structures. Second, Italy is an excellent research case because family firms with controlling shareholders are very common, long-lasting, even among publicly listed firms, and are often run by the founder or by a descendant (Morck, Wolfenzon and Yeung, 2005). Firm ownership is still highly concentrated in Italy, among quoted firms. As reported by CONSOB (2018), the share of the largest shareholder was 47.7% in 2017, and the aggregate share of the other "relevant" shareholders (i.e. those with an interest of at least 2% in the company, including institutional investors) is about 12%. Interestingly, such ownership structure does not favor the formation of block-holders large

[8]Because cross-industry differences are highly correlated in industrialized countries, we opt for a classification that employs UK sectoral data to avoid reverse causality concerns that might arise if we use Italian data

enough to threaten the controlling shareholder or to play a relevant role in monitoring the administration of the firm.

3.1 The Data

We construct our dataset starting from the original population of non-financial firms quoted in the "Industrial Companies" segment of Italian stock exchange as of 2012, and we tracked company data back to 2000[9]. We exclude firms with less than four continuous years of CEO compensation data, outliers, and companies object of large merger or divestiture operations that break up the time series [10]. Our final dataset is an unbalanced panel of 150 non-financial publicly listed firms from 2000-2016. To identify "family" ownership we used information by CONSOB about the identity of all investors with more than 2% of the voting shares, on the largest individual shareholder and on the components of board of directors and we collected information about the investors' parental ties with the largest shareholder. A "*family firm*" is one where either the largest individual shareholder (direct "ultimate owner" of the ownership stake, according to CONSOB's definition) or a group of individual shareholders belonging to the same family have more than 50% of the equity shares. We used 50% as the cut-off value to define a "family" owned firm because ownership is highly concentrated and stable in Italy (see Section 3). To complement information on firm ownership structure, we include the *Controlling share* of the largest shareholder and *Institutional Investor*, a dummy denoting the presence of mutual or investment funds with more than 2% of the shares, as the corporate governance literature suggests they play a disciplining role on compensation policy (Croci, et al. 2012, Fernando et al. 2013). Additional control variables to proxy for the internal corporate governance of the firms are: *Dual*, a dummy equal to 1 when the firm has a dual-class security structure and *STAR*, a binary variable to denote whether the firm is listed

[9]The starting date is 2000 because information on CEO compensations only became publicly available since that year, as a result of CONSOB's Regulation n. 11971 (May 14, 1999).

[10]The final database contains extensive information on non-financial publicly listed Italian firms obtained from multiple sources. Balance sheet, dividends and stock exchange data are collected from three annual directories, *Le Principali Società, Indici e Dati* and *Il Calepino dell'Azionista*, all published by Mediobanca, a large Italian investment bank (www.mbres.it). Information about firms' ultimate ownership, corporate governance, family ties of the CEO group affiliation, location, age, business activity and primary industry at 3-digit NACE classification was obtained from annual reports, DUN's and Bradstreet, company websites, CONSOB, the Italian Exchange (Borsa Italiana) website and other directories.

in the special Stock Exchange segment that has more stringent requirements on corporate governance, transparency and information disclosure.

We collected data about the CEO identity and pay from company annual reports and we use *Total Compensation* in the regressions because several companies only report the *total* pay and many others do not report the individual items consistently across firms and over time[11]. Starting from the CEO identity, we tracked whether the CEO is also the largest shareholder or a member of the controlling family group (based on the CEO's surname or on direct or indirect parental ties as obtained from the press or the news on the web/internet) and we defined accordingly the *Family CEO*. Other variables cover CEO specific characteristics. CEO Tenure, the number of years the CEO has been in charge, controls for CEO experience, but also for potential managerial entrenchment, since a longer tenure may ensure internal power (Bebchuk and Fried, 2004). CEO_Age is a dummy equal to 1 when the CEO is more than 62 years old (the 75th percentile in our dataset), and proxies the CEO's experience and expertise. *CEO Turnover*, a dummy equal to 1 when there is a change in the CEO, an event that generates a discontinuity in the time-series of the pay variable.

We use the *EBITDA* (Earnings Before Interests, Taxes, Depreciation and Amortization), the Return on Assets (*ROA*, the ratio between EBITDA and total assets) or the Market-to-Book ratio ((total asset -equity + market capitalization)/total assets) to measure firm performance (*Performance*). While the ROA is a measure of how efficiently the CEO uses the assets, regardless of the capital structure, the value of EBITDA allows us to control for the incremental profit, in line with the theoretical model and Figure 1. *MTB* allows for a market-based measure of firm performance and of CEO contribution. We include the log of real total sales to measure *Firm Size*, since past research has established that total compensations tend to increase with firm size (Murphy, 1985) and size is likely correlated with ownership, as family-owned firms tend to be small, especially those are still run by a family CEO. In addition, we calculate the firm level asset *Tangibility* ratio as the ratio

[11]We are aware that a comprehensive measure of CEO pay should also cover the values of the CEO's stock and option holdings, disclosure of stock options data became compulsory only in 2012 and the required information was unavailable in the previous years. Instead, we collected information on the presence of stock option plans.

between fixed assets (property, plant, and equipment) and total assets. Finally, *Firm Age* is the number of years since its foundation, because older firms may be more inclined to revert to a professional CEO, if none of the firm's founder descendants is available to run the family business.

The industry typology we use to distinguish industries according to the scope and potential of diversion was originally constructed by Davies et al. (1996, see Table A2.1, pp. 258-260) following Sutton (1991). The typology classifies 3-digit NACE industries based on UK industry data on R&D and advertising to sales ratios. *Type 1* industries report no or low R&D and Advertising intensity, typical of homogeneous product markets where price competition dominates. *Type 2* industries are characterized by high R&D and/or advertising expenditures, i.e. the sunk intangible investments that firm use to differentiate their product in markets where non-price competition strategies dominate.

3.2 Empirical models

To test the model's predictions we estimate the sensitivity of CEO pay to firm performance (Jensen and Murphy, 1990) using the following fixed-effects specification:

$$LogCEO\_Pay_{it} = \alpha + \beta_1 PERF_{it} + \beta_2 FamCEO_{it} + \beta_3 PERF * FamCEO_{it} + \sum \beta_j \bar{X}_{it} + \mu_i + \lambda_t + \varepsilon_{it}, \tag{19}$$

Where the β_1 coefficient allows us to test whether the CEO pay is significantly related to the firm's performance, β_2 indicates if the family CEO's pay is statistically different for a family CEO, while the coefficient β_3 on the interaction $PERF * FamCEO$ tests the difference in pay sensitivity to performance between family- and non-family CEOs. $\boldsymbol{X}$ is a vector of control variables described in Section 3.1, μ_i are the firm fixed effects that control for time invariant firm and sectoral unobservable characteristics, and λ_t are year dummies, which account for time-specific common factors, like the business cycle, changes in corporate governance best-practices, CONSOB's requirements about disclosure of sensitive information

about third-parties relations and compensation policy etc. Finally, ε_{it} is the error term. Standard errors are robust to heteroscedasticity and clustered at the firm level.

We then consider the self-selection based endogeneity problem that may affect the choice of the CEO between a family member and an outside manager. Self-selection may bias the fixed-effects results (Lee, 1979, 1982) due to the non-random assignment of the family CEO (i.e. the "treatment") and, indeed, the same factors that influence the choice of the CEO, such as expected profitability and the scope for diversion, may also affect the choice of the compensation policy. To deal with the self-selection bias, or endogenous treatment, we adopt a latent variable approach[12] similar to the Heckman (1976, 1978) two-step procedure for the sample selection problem. Specifically, we first consider the potentially endogenous "treatment", i.e. the decision to hire a family or an external CEO (the selection equation, where the *FamCEO* is the binary dependent variable) and then we model the "outcome" equation for *CEO pay*, after having controlled for the selection. We thus estimate, via maximum likelihood, the following linear regression with endogenous treatment, where the variables $\boldsymbol{X}$ are used to model the outcome - the pay equation - and the covariates $\boldsymbol{W}$ are used to model the treatment assignment -the CEO choice -, respectively.

$$CEOpay_{ijt} = \boldsymbol{X}_{ijt}\delta + \delta FamCEO_{ijt}\varepsilon_{ijt}$$

$$FamCEO_{ijt} = \begin{cases} 1, \text{ if } \boldsymbol{W}_{ijt}\gamma + u_{ijt} > 0 \\ 0, \text{ otherwise} \end{cases} \tag{20}$$

We further consider that the relationship between CEO pay and performance may vary by treatment level, i.e. with the family ties of the CEO. In other words, the treatment has not merely an intercept effect on the outcome, but also an effect on the coefficient estimates. We thus estimate an endogenous- switching model that allows interactions between treatment

[12]See Clougherty and Duso (2015) for a comprehensive review and an empirical survey of the methodological problems that derive from sample- and self-selection endogeneity. Maddala (1983) has derived the maximum likelihood estimators of the model. See also Wooldridge (2010).

and outcome covariates, in our case the firm's performance, which is what we need when we want to test whether the pay-performance sensitivity of family CEOs differs from that of external CEOs.

3.3 Descriptive evidence

Table 1 panel A presents summary statistics for the total sample as well as for the Family CEOs, non-family CEOs, Low Diversion (Type 1) and High Diversion (Type 2) sub-samples.

INSERT TABLE 1 HERE

Observations distribute quite evenly across family- and non-family CEOs and across Type 1 and Type 2 industries, a convenient feature of the data, for the econometric analysis.

Firms run by family CEOs cover 57.8% of the sample, tend to be smaller, slightly less prof-itable (on average 1 percentage point of ROA) and less valued (1.313 vs. 1.475 in terms of Market to book) and they are more likely to operate in differentiated industries (high R&D and Advertising-intensity) where asset tangibility is lower. Moreover firms run by family CEOs are controlled with a slightly lower stake (59% vs. 62%), show a lower presence of institutional investors (31% vs. 46.6%), have more likely dual-class shares (40.3% vs. 18.1%), and are less likely traded in the STAR segment ((38.7% vs. 46.6%). Family CEOs are less paid, tend to be older than outside managers, have longer tenure and exhibit a lower turnover rate.

Compared to firms in Type 1 (i.e. in which the efficiency of diversion is expected to be lower) industries, Type 2 firms are smaller, more profitable (10% vs. 7.3% ROA), more valued by the stock market (1.48 vs. 1.20 MTB ratio), and exhibit lower asset tangibility (19.9% vs. 27.2%), more institutional investors, less dual-class security structure, higher participation in the STAR segment. They are more likely run by family CEOs (60% vs. 54%) and are controlled with a slightly higher stake (61.2% vs. 59%). Moreover, CEO turnover is slightly higher than in Type 1 industries.

In Table 2, we report the results of mean comparisons that inform us about the differ-ences be-tween Type 1 and Type 2 industries and family and non-family CEOs. Testing

these differences is relevant to understand whether the initial conditions are consistent with assumptions at the basis of the theoretical propositions.

INSERT TABLE 2 HERE

In Panel A, we note that the share of family CEOs does not significantly differs across Type 1 and Type 2 industries, and that the average pay of CEOs in Type 2 industries is higher than the pay of their counterparts in Type 1 industries, but the difference is not statistically significant.

In Panel B we look at differences between family and external CEOs' pay. We find that family CEOs have significantly lower compensations than non-family CEOs. We also note that this finding is driven by the pay difference in Type 2 industries, in line with Proposition 3, because the pay difference in Type 1 industries is not insignificant.

Finally, we examine how family CEOs distribute according to firm profitability within high diversion (Type 2) industries. Figure 1 reports the shares of family CEOs at increasing levels of profitability, i.e. at the 25th, 50th, 75th, and 90th percentiles of the average firm's ROA. Indeed, we find that the percentage of family CEOs declines as the firm's mean ROA increases, in line with the idea that external CEOs are hired when profits are sufficiently high. More precisely, bearing in mind that the average share of Family CEOs in family firms is 60%, family CEOs cover 66.8% of the observations in the first quartile of the ROA distribution; 56.3% from the 25th to the 50th percentile; 63.9 from the 50th to the 75% percentile. The share of family CEOs then decreases to 55.7% (lower than the mean) between the 75% and the 90% percentile and drops even further to 47.5% in the last decile of the distribution.

INSERT FIGURE 1 HERE

3.4 Regression results

In this section, we report the results of the regression analyses that estimate the pay-performance sensitivity parameter t^F of family CEOs in industries with low (Type 1) and high (Type 2) potential for diversion and then the difference in pay performance sensitivity between family CEOs (t^F) and external CEO (t^O).

The PPS equations estimated in Tables 3, 4 and 5 all use the logarithm of total pay as dependent variables and EBITDA, ROA and MTB as measures of performance.. The binary variable FamCEO tests whether the level of the pay of family and non-family CEOs is significantly different. The coefficient on the interaction between FamCEO and Performance allows us to test whether the pay-performance sensitivity of family CEOs significantly differs from the PPS of external CEOs. We include several firm- and CEO-level variables as well as firm and time fixed effects to account for observable and not observable heterogeneity of firm and industry cha-racteristics (see Section 3).

We start with Proposition 1, which predicts that the sensitivity to performance of family CEOs' pay is higher where the potential for diversion is higher (Type 2 industries) and lower or null where the efficiency of diversion is low (Type 1 industries). Our specification controls for differences across Type 1 and Type 2 industries in the PPS as well as in the control variables. Results are in Table 3.

INSERT TABLE 3 HERE

In all Columns, we find that the pay-performance sensitivity of family CEOs operating in Type 2 industries is high and significant for all measures of performance. In contrast, the coefficient of the interaction between performance Type 1 industries is negative, significantly so for the EBITDA. When we test the significance of the PPS of family CEOs in Type 1 industries, i.e. the sum $t^F + t^F * Type1$, the test cannot reject that the sum of the coefficients is null for both ROA and MTB. The remaining test indicates that the pay sensitivity to Ebitda in Type 1 industries is not null, but significantly lower than the PPS in Type 2 industries. The evidence in Table 3 is therefore in line with Proposition 1.

Looking at the control variables, we observe that many enter with opposite signs in Type 1 and Type 2 industries, suggesting that different effects are at work in the compensation policy of managers in the two types of industries. CEO pay is always positively correlated with firm size, but younger CEOs are paid more where R&D and advertising intensity is high and less in Type 1-low diversion industries. The opposite is true for CEO tenure and for the presence of dual-class voting structure (vis-à-vis one share-one vote), which proxies for ownership-control separation, whereas the size of the controlling stake is unrelated to

pay in both Type 1 and Type 2 industries. Finally, tangibility enters with a negative and significant sign only in Type 1 industries, suggesting that higher asset tangibility (hence, lower efficiency of diversion) implies inherently less risk of expropriations, hence less need to offer higher compensations. We now turn to Table 4, which estimates the differences in pay level and performance sensitivity between Family and External CEOs, i.e. the core theoretical Hypotheses 2 and 3. We start with fixed effect results and then we turn to the endogenous treatment regressions.

Panel A of Table 4 focuses on Type 2 industries in which high R&D and advertising intensity makes the efficiency of profit diversion higher and rent extraction of minority shareholders more likely than in Type 1 industries. Estimated results are consistent with the theory and similar for all three measures of firm performance. First, results show that in Type 2 industries the pay of family CEOs is significantly more related to firm performance than the pay of non-family CEOs, in line with Proposition 2. Second, they show that the pay level of family CEOs is significantly lower than the pay of external CEOs, which is consistent with Proposition 3 in Section 2.

INSERT TABLE 4a HERE

When we look at Panel B , the benchmark Type 1 industries where the scope and potential for diversion is lower, we find that neither the level nor the performance sensitivity of Family CEOs differs from those of outside CEOs. Overall, sensitivity of pay to performance appears null or weak.

INSERT TABLE 4b HERE

3.5 Endogeneizing the choice of the CEO

We now account for the problem of self-selection based endogeneity driven by the possibility that the same factors that influence the choice of the compensation policy affect the choice of the CEO (see the discussion in Section 3.2). We deal with the potential self-selection bias, or endogenous treatment, by estimating a structural two-step model where we first estimate the probability to hire a family or an external CEO (the treatment, or selection,

equation, where $FamCEO$ is the binary dependent variable) and then we estimate the outcome equation for CEO pay in the second step. For the purpose of identification, in the selection equation we add the following variables to help explaining the decision to hire a family CEO: firm profitability (the firm's ROA), firm age (as the probability of hiring an external CEO may increase after the founder's death) and the CEO age (a continuous variable instead of a dummy). Moreover, to control for potential pressure from corporate governance best-practices we include a binary variable equal to one when institutional investors' shareholding is viewed as "relevant" by CONSOB (i.e. more than 2%) and a binary variable that denotes if the firm's shares trade in the exchange segment that requires high transparency and disclosure standards (STAR). At the bottom of the table, we report the Wald tests of the null hypothesis of no correlation between the treatment assignment (FamCEO) errors and the outcome (CEO Pay) errors. We estimate separately Type 2 and Type 1 industries in Tables 5 and 6 respectively and report, for each endogenous switching model, the results for the linear outcome regression (where the dependent variable is CEO pay) and the first stage results, i.e. the maximum likelihood estimates of the treatment, which account for the determinants of the choice of hiring a family CEO. Notably, our model allows that the treatment (i.e. the family CEO) has both the intercept effect on the pay level and the slope effect on the firm performance's coefficient estimate (the PPS).

Panels A and B of Table 5 report the results for Type 2 – High diversion industries, which is the object of interest of Hypotheses 2 and 3. Focusing on the variables that help explaining the decision to hire a family CEO (the first stage regressions in Panel B), we find that family CEOs are more likely to run smaller companies, firms with dual-class shares and with a lower participation by institutional investors. Turning to the outcome equation, i.e. CEO pay, in Panel A, we find that the pay-performance sensitivity of family CEOs (as estimated by the coefficient on the interacted variable) is statistically higher than the sensitivity of external CEOs, in line with Proposition 2. Moreover, the level of family CEOs' pay is statistically lower than the level of outside CEOs' pay in line with Proposition 3. The results are very similar to the fixed effect estimates in Panel A of Table 4 and hold for all three measures of firm performance (EBITDA, ROA and MTB).

INSERT TABLES 5a and 5b HERE

In Panels A and B of Table 6, we estimate the same model, focusing on Type 1 industries. The results are similar across the measures of performance. The probability of choosing or keeping a family CEO (Panel B) is higher the larger the firm size and the older the CEO. In line with our expectations, the presence of institutional investors and trading in the STAR segment lower the probability of having a family CEOs,. Moreover, in Column (6), where MTB measures firm performance, we find that a *dual-class* shares voting structure (hence wider separation between cash-flow and control rights) increases the probability of having a family CEO. Having controlled for the potentially endogenous choice of the CEO, we turn to the outcome CEO pay equation (Panel A). The results are very similar to those in Table 4, Panel B. Within Type 1- low diversion industries, neither the pay levels nor the PPS of family and outside CEOs statistically differ. This result also holds in Column (5) where we find that CEO pay is significantly related to the firm's MTB ratio, though not differently for family and non-family CEOs (as the interaction term is insignificant). The evidence in Tables 5 and 6 marks the difference between Type 1 and Type 2 industries, as only in the latter, where the efficiency of diversion is higher, family CEOs are provided with incentive contracts that emerge endogenously as a precommitment device to mitigate agency costs.

INSERT TABLES 6a and 6b HERE

4 Conclusions

In this paper, we use a theoretical model and an empirical analysis to study CEOs' compensation contracts in family firms. Family firms may suffer from a form of agency problem, consisting in the misalignment of objectives between the controlling shareholder -typically belonging to the family- and minority shareholders. When the stake of the controlling (family) shareholder is so high that the presence of a blockholder large enough to exert effective monitoring is extremely unlikely, we show that the structure of the family CEO's compensation contract may realign the divergent objectives between shareholders. In particular, through a theoretical model, we show that the outcome-related compensation structure of

family CEOs may emerge in industries where the relative importance of sunk intangible assets – such as R&D and advertising investments, make it easier to divert value from minority shareholders. In these industries, incentive contracts act as an instrument to ensure to minority shareholders that the family CEO will not divert value from the firm. We are motivated by findings in the recent empirical literature whereby, in contrast with the fundamental tenets of principal-agent theory under moral hazard, family CEO, despite their inside ownership, reveal higher pay-for-performance sensitivity than external managers.

We test our model against a dataset of publicly listed family firms in Italy from 2000 to 2016. We define "family" firms as those where the largest individual shareholder and his relatives have more than 50% of the equity and we use high (low) R&D and advertising intensity in the industry to proxy for high (low) potential of diversion (our Type 2 and Type 1 industries, respectively). The evidence we find from descriptive statistics, regression analysis and endogenous treatment regression models, where the choice of the CEO is endogenized, matches our theoretical predictions about the role of asset tangibility and efficiency of diversion on CEOs' pay. First, we find that the sensitivity to performance of family CEOs' pay is higher in Type 2 industries and lower or null in Type 1 industries. Second, the pay-performance sensitivity of family CEOs is statistically significant and higher than the PPS of external CEOs in Type 2 industries, but not in Type 1 where the difference is insignificant. Third, in Type 2 –but not in Type 1– industries family CEOs receive significantly lower compensations than outside CEOs.

Our paper makes three contributions to the literature. First, we provide an explanation to the provision of incentives to family CEOs in public family companies. Second, we contribute theoretical and empirical support to the argument that asset intangibility increases the efficiency and the potential of diversion, hence of minority shareholders' expropriation. Third, we propose incentive contracts as a precommittment device alternative to ownership structure when the formation and the activism of blockholders is unlikely to be effective.

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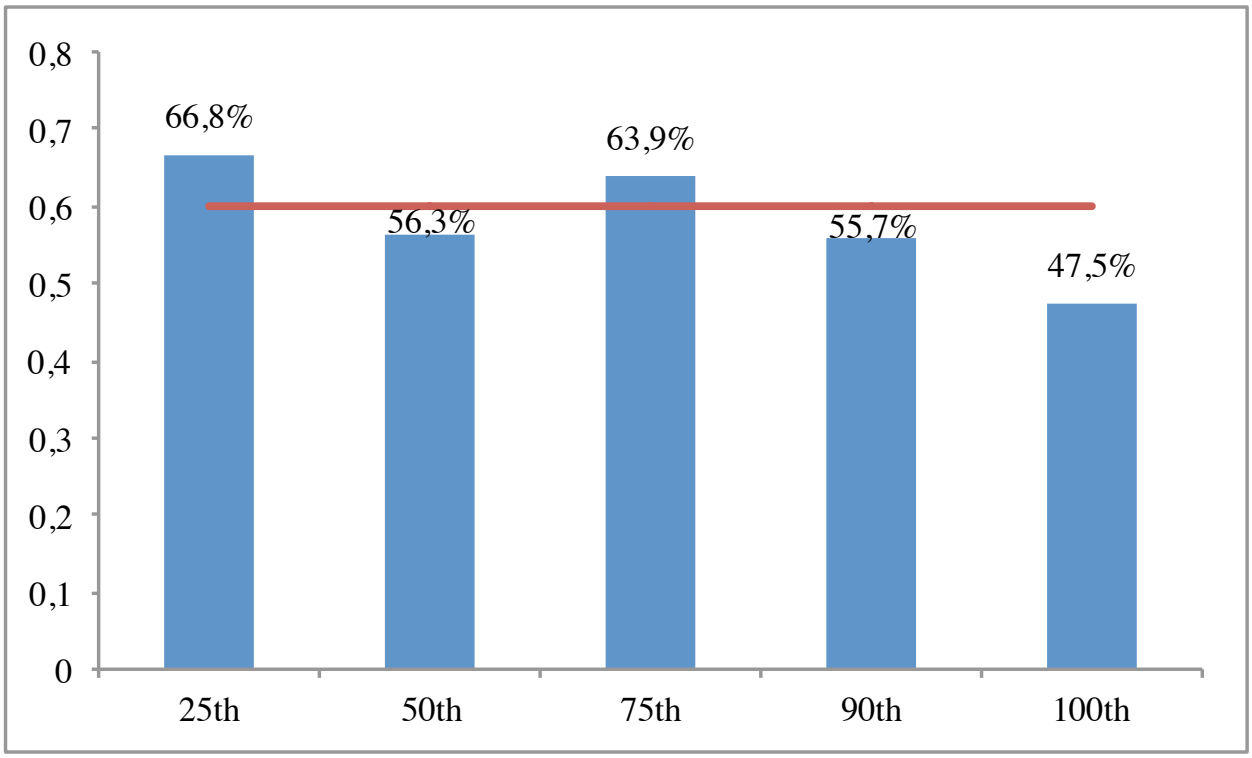

Figure 1: Share of Family CEOs by Firm average ROA in Differentiated (Type 2) industries (average = 60% in red).

Table 1: Summary Statistics

Panel A - Full Sample

	Mean	**Std. Dev.**	**Min**	**Max**	**N Obs.**
CEO pay	809.229	989.934	61.39	17191.66	1120
EBITDA	106793.145	223848.498	-290268.81	2078177.00	1071
Return on Asset	0.090	0.071	-0.26	0.38	1071
Market-to-Book	1.379	0.840	0.37	8.84	1084
Firm size (rsales)	837176.807	1478723.817	16307.56	11200000.00	1116
Asset tangibility	0.225	0.147	0.00	0.92	1101
Firm age	49.757	34.409	0.00	271.00	1172
Controlling share	60.420	9.840	18.92	94.75	1172
famceo	0.578	0.494	0.00	1.00	1171
Dual class shares	0.310	0.463	0.00	1.00	1168
Institutional Investors	0.399	0.490	0.00	1.00	1172
STAR segment	0.420	0.494	0.00	1.00	1168
CEO age	55.609	9.647	35.00	86.00	1170
CEO dumage62	0.283	0.451	0.00	1.00	1172
CEO tenure	8.846	7.528	1.00	40.00	1170
CEO turnover	0.102	0.303	0.00	1.00	1172
Type 2	0.630	0.483	0.00	1.00	1172

Panel B - Family CEOs

	Mean	**Std. Dev.**	**Min**	**Max**	**N Obs.**
CEO pay	703.331	781.522	86.00	8295.99	645
EBITDA	90982.802	201157.657	-290268.81	1521098.00	633
Return on Asset	0.086	0.069	-0.13	0.32	633
Market-to-Book	1.313	0.650	0.37	6.33	637
Firm size (rsales)	810895.734	1606391.774	16307.56	11200000.00	650
Asset tangibility	0.218	0.130	0.00	0.59	642
Firm age	49.464	34.557	1.00	269.00	677
Controlling share	59.223	10.002	18.92	93.78	677
Dual class shares	0.403	0.491	0.00	1.00	677
Institut. Investors	0.313	0.464	0.00	1.00	677
STAR segment	0.387	0.487	0.00	1.00	677
CEO age	57.245	10.834	36.00	86.00	677
CEO dumage62	0.372	0.484	0.00	1.00	677
CEO tenure	10.730	7.857	1.00	40.00	677
CEO turnover	0.055	0.227	0.00	1.00	677
Type 2	0.654	0.476	0.00	1.00	677

Panel C - Non-Family CEOs

	Mean	Std. Dev.	Min	Max	N Obs.
CEO pay	953.028	1203.187	61.39	17191.66	475
EBITDA	129642.340	251564.055	-60761.91	2078177.00	438
Return on Asset	0.096	0.073	-0.26	0.38	438
Market-to-Book	1.475	1.047	0.59	8.84	447
Firm size (rsales)	873834.955	1280347.549	33184.36	8491315.00	466
Asset tangibility	0.236	0.168	0.01	0.92	459
Firm age	50.101	34.249	0.00	271.00	494
Controlling share	62.066	9.386	23.63	94.75	494
Dual class shares	0.181	0.386	0.00	1.00	491
Institutional Investors	0.518	0.500	0.00	1.00	494
STAR segment	0.466	0.499	0.00	1.00	491
CEO age	53.363	7.149	35.00	70.00	493
CEO dumage62	0.160	0.367	0.00	1.00	494
CEO tenure	6.260	6.186	1.00	36.00	493
CEO turnover	0.166	0.372	0.00	1.00	494
Type 2	0.597	0.491	0.00	1.00	494

Panel D - Type 2

	Mean	Std. Dev.	Min	Max	N Obs.
CEO pay	824.266	800.496	61.39	8863.89	709
EBITDA	69084.998	102866.861	-290268.81	869155.69	684
Return on Asset	0.100	0.073	-0.26	0.38	684
Market-to-Book	1.479	0.812	0.41	7.66	693
Firm size (rsales)	644913.900	999172.476	38269.25	8491315.00	714
Asset tangibility	0.199	0.113	0.01	0.55	708
Firm age	48.668	29.847	0.00	154.00	738
Controllingshare	61.219	9.599	18.92	94.75	738
Famceo	0.600	0.490	0.00	1.00	738
Dual class shares	0.243	0.429	0.00	1.00	737
Institut. Investors	0.415	0.493	0.00	1.00	738
STAR segment	0.504	0.500	0.00	1.00	738
CEO age	55.221	9.952	35.00	83.00	737
CEO dumage62	0.270	0.444	0.00	1.00	738
CEO tenure	7.924	6.394	1.00	40.00	737
CEO turnover	0.112	0.316	0.00	1.00	738
Type 2	1.000	0.000	1.00	1.00	738

Panel E - Type 1

	Mean	Std. Dev.	Min	Max	N Obs.
CEO pay	783.289	1251.795	65.42	17191.66	411
EBITDA	173440.103	336458.729	-221098.00	2078177.00	387
Return on Asset	0.073	0.064	-0.14	0.27	387
Market-to-Book	1.203	0.861	0.37	8.84	391
Firm size (rsales)	1178658.685	2030315.912	16307.56	11200000.00	402
Asset tangibility	0.272	0.185	0.00	0.92	393
Firm age	51.608	40.991	1.00	271.00	434
Controllingshare	59.061	10.103	23.63	89.76	434
Famceo	0.540	0.499	0.00	1.00	433
Dual class shares	0.425	0.495	0.00	1.00	431
Institut. Investors	0.373	0.484	0.00	1.00	434
STAR segment	0.277	0.448	0.00	1.00	430
CEO age	56.270	9.077	37.00	86.00	433
CEO dumage62	0.306	0.462	0.00	1.00	434
CEO tenure	10.416	8.933	1.00	37.00	433
CEO turnover	0.085	0.280	0.00	1.00	434
Type 2	0.000	0.000	0.00	0.00	434

Note. CEO pay and Firm Sales are in Thousands of 2000 constant Euro.

Table 2: Mean differences in share of Family CEO, CEO pay and Industry Types

Panel A - CEO Pay and share (%) of Family CEOs by Industry Types

	High diversion (Type 2)	**Low diversion (Type 1)**	**Difference (p-value)**
CEO Pay	824	783	-41
	(800)	(1252)	(0.55)
% of Family CEO	59.0%	56.3%	-2.7
	(49.2)	(46.7)	(0.38)

Panel B - CEO pay by CEO Family ties and Industry types

	Family CEOs	**External CEOs**	**Difference (p-value)**
CEO Pay	703	973	249***
	(781)	(1203)	(0.000)
CEO Pay in Type 2	681	1033	824***
	(603)	(988)	(0.000)
CEO Pay in Type 1	744	830	85
	(1038)	(1467)	(0.49)
Difference	-62.4	204.1*	
(p-value)	(0.335)	(0.071)	

Note: Standard deviations and p-values in parentheses. CEO pay is in Thousands of 2000 constant Euro. $***$, $**$, $*$ denote significance of the mean differences at 1%, 5% and 10%.

Table 3: Pay-performance sensitivity of Family CEOs in High and Low diversion industries

Dep. Var.: Log(Pay)	(1)	(2)	(3)
Performance is:	EBITDA	ROA	MTB
Performance (t^F)	4.96e-06 ***	1.362**	0.157***
	(1.20e-06)	(0.542)	(0.052)
Performance*Type 1 ($t^F * Type1$)	-4.56e-06 ***	-0.759	-0.122
	(1.20e-06)	(0.672)	(0.127)
H0: $t^F + t^F * Type1 = 0$			
F-test (p-value)	4.89 (0.031)	1.53 (0.220)	0.08 (0.780)
	Control variables		
Firm Size	0.220	0.447***	0.496***
	(0.163)	(0.157)	(0.158)
Firm Size_ Type 1	0.281	0.092	0.054
	(0.204)	(0.192)	(0.197)
CEO age > 62	-0.135	-0.192**	-0.167*
	(0.095)	(0.095)	(0.095)
CEO age > 62_ Type 1	0.167	0.245**	0.226**
	(0.114)	(0.118)	(0.110)
CEO Tenure	0.029**	0.036***	0.038***
	(0.013)	(0.013)	(0.012)
CEO Tenure _ Type 1	-0.033**	-0.040***	-0.040***
	(0.013)	(0.014)	(0.012)
CEO Turnover	-0.044	-0.076	-0.053
	(0.070)	(0.076)	(0.076)
CEO Turnover_ Type 1	0.201	0.252	0.219
	(0.167)	(0.164)	(0.164)
Dual-class shares	0.123	0.190*	0.198*
	(0.103)	(0.106)	(0.107)
Dual-class shares _ Type 1	-0.512***	-0.530***	-0.553***
	(0.139)	(0.140)	(0.149)
Tangibility	0.507	0.511	0.494
	(0.380)	(0.416)	(0.449)
Tangibility_ Type 1	-1.299**	-1.242**	-1.241**
	(0.513)	(0.527)	(0.525)
Controlling share (%)	0.003	0.001	0.002
	(0.004)	(0.005)	(0.005)
Controlling share _ Type 1	0.006	0.008	0.006
	(0.007)	(0.008)	(0.008)
Firm and Year FE	Yes	Yes	Yes
F test All (p-value)	0.000	0.000	0.000
R-squared	0.403	0.367	0.366
N firms (N obs.)	66 (599)	66 (599)	65 (603)

Notes. Fixed effects estimations of the Pay-performance sensitivity of Family CEOs. Dependent variable is the logarithm of CEO pay. Robust standard errors clustered by firm in parentheses. $***$, $**$, $*$ denote significance of the mean differences at 1%, 5% and 10%.

Table 4: Pay level and performance sensitivity (Fixed effects estimates)

Panel A - Type 2						
Performance is:	EBITDA		ROA		MTB	
Dep.Var.: Log(Pay)	(1)	(2)	(3)	(4)	(5)	(6)
Performance (t^O)	1.42e-06	1.01e-07	0.917	-0.273	0.011	-0.051
	(1.09e-06)	(9.11e-07)	(0.681)	(0.992)	(0.080)	(0.065)
Famceo ($W^F - W^O$)	-0.326**	-0.491***	-0.337**	-0.481***	-0.334**	-0.553***
	(0.132)	(0.141)	(0.133)	(0.154)	(0.137)	(0.155)
Famceo*performance		3.10e-06***		1.816*		0.175*
($t^F - t^O$)		(7.14e-07)		(1.089)		(0.088)
Control Variables						
Firm Size	0.172	0.177*	0.202*	0.220**	0.243**	0.228**
	(0.104)	(0.094)	(0.105)	(0.100)	(0.108)	(0.102)
CEO age > 62	-0.215**	-0.204**	-0.211**	-0.218**	-0.203*	-0.194*
	(0.100)	(0.099)	(0.103)	(0.104)	(0.106)	(0.111)
CEO tenure	-0.088*	-0.099**	-0.093*	-0.098*	-0.132**	-0.130**
	(0.051)	(0.049)	(0.051)	(0.049)	(0.060)	(0.059)
CEO turnover	0.025*	0.021	0.024*	0.023*	0.018	0.016
	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)	(0.015)
Dual class shares	0.061	0.068	0.047	0.047	0.117	0.113
	(0.087)	(0.088)	(0.091)	(0.093)	(0.098)	(0.100)
Tangibility	0.185	0.158	0.174	0.185	0.260	0.171
	(0.457)	(0.420)	(0.458)	(0.429)	(0.488)	(0.499)
Controlling share %	-0.001	-0.002	-0.001	-0.002	-0.000	-0.000
	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Firm and Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F(All) p-value	0.000	0.000	0.000	0.000	0.000	0.000
R-squared	0.266	0.304	0.265	0.279	0.257	0.269
Number of nfirm	62	62	62	62	62	62
Observations	658	658	658	658	666	666

Notes. Fixed effects estimations. Dependent variable is the logarithm of CEO pay. Robust standard errors clustered by firm in parentheses. $***$, $**$, $*$ denote significance of the mean differences at 1%, 5% and 10%.

Panel B - Type 1						
Performance is:	EBITDA		ROA		MTB	
Dep.Var.: Log(Pay)	(1)	(2)	(3)	(4)	(5)	(6)
Performance (t^O)	5.68e-07**	1.53e-06	0.793	0.548	0.041	0.049*
	(2.38e-07)	(1.07e-06)	(0.817)	(1.796)	(0.027)	(0.027)
Famceo ($W^F - W^O$)	0.119	0.204	0.099	0.080	0.121	0.189
	(0.255)	(0.227)	(0.258)	(0.238)	(0.255)	(0.300)
Famceo*performance		-1.19e-06		0.368		-0.070
($t^F - t^O$)		(1.16e-06)		(1.754)		(0.127)
Control Variables						
Firm Size	0.395***	0.343**	0.444***	0.446***	0.485***	0.488***
	(0.136)	(0.163)	(0.145)	(0.152)	(0.126)	(0.126)
CEO age > 62	0.006	-0.012	0.024	0.020	0.042	0.041
	(0.094)	(0.088)	(0.093)	(0.099)	(0.094)	(0.092)
CEO tenure	-0.048	-0.016	-0.035	-0.040	-0.056	-0.059
	(0.079)	(0.081)	(0.083)	(0.082)	(0.080)	(0.082)
CEO turnover	0.001	0.002	0.001	0.001	0.002	0.001
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Dual class shares	-0.219***	-0.291***	-0.205**	-0.200**	-0.189**	-0.183**
	(0.074)	(0.090)	(0.080)	(0.079)	(0.081)	(0.084)
Tangibility	-0.677**	-0.695**	-0.678**	-0.688**	-0.639**	-0.622**
	(0.309)	(0.335)	(0.303)	(0.290)	(0.293)	(0.285)
Controlling share %	0.013**	0.014**	0.013**	0.013**	0.014**	0.014**
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Firm and Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F(All) p-value	0.000	0.000	0.000	0.000	0.000	0.000
R-squared	0.220	0.238	0.208	0.208	0.210	0.211
Number of firms	38	38	38	38	38	38
Observations	366	366	366	366	370	370

Notes. Fixed effects estimations. Dependent variable is the logarithm of CEO pay. Robust standard errors clustered by firm in parentheses. $***$, $**$, $*$ denote significance of the mean differences at 1%, 5% and 10%.

Table 5: Endogeneous treatment regression model - High diversion industries (Type 2)

Panel A - Pay level and performance sensitivity in high diversion industries			
Performance is:	EBITDA	ROA	MTB
Dep.Var.: Log(Pay)	(1)	(2)	(3)
Performance (t^O)	6.74e-08	-0.303	-0.050
	(9.10e-07)	(0.986)	(0.072)
Famceo ($W^F - W^O$)	-0.609***	-0.634***	-0.728***
	(0.200)	(0.213)	(0.212)
Famceo*performance ($t^F - t^O$)	3.08e-06***	1.822*	0.162*
	(6.97e-07)	(1.066)	(0.091)
Control variables			
Firm Size	0.166*	0.204**	0.194**
	(0.091)	(0.096)	(0.097)
CEO age> 62	-0.201**	-0.213**	-0.211**
	(0.094)	(0.098)	(0.097)
CEO tenure	0.021*	0.024*	0.024*
	(0.013)	(0.013)	(0.013)
CEO turnover	-0.098**	-0.097**	-0.091*
	(0.048)	(0.048)	(0.049)
Dual class shares	0.100	0.090	0.099
	(0.087)	(0.090)	(0.092)
Tangibility	0.109	0.120	0.053
	(0.428)	(0.436)	(0.492)
Controlling share %	-0.003	-0.004	-0.002
	(0.005)	(0.005)	(0.006)
Firm and Year FE	Yes	Yes	Yes
Wald test (all variables)	0.000	0.000	0.000
p-value			
Wald test of no corr. between			
outcome and treatment: ρ	0.221	0.280	0.331
χ^2 (p-value)	1.24 (0.266)	2.16 (0.142)	2.37 (0.123)
Observations	658	658	654

Notes. Outcome equations. Dependent variable is the logarithm of CEO pay. Column (1) to (3) report estimates from a linear regression model with endogenous treatment effects (outcome equation), accounting for the endogeneity of Family CEO. Family CEO is instrumented using Firm size, Dual class voting shares, Asset tangibility, Size of the controlling share of the equity, Asset profitability, CEO age, Firm age, quotation in the STAR segment of the Exchange, the presence of Institutional investors with a share of at least 2%. (first stage estimates are reported in the next Table). Robust standard errors in parentheses are clustered by firm. *** p¡0.01, ** p¡0.05, * p¡0.10.

Panel B - First stage estimates on Family CEO in high diversion (Type 2) industries			
Performance in the Outcome equation is:	EBITDA	ROA	MTB
Dep.Var. is Family CEO	(1)	(2)	(3)
Firm Size	-0.335*	-0.337*	-0.340*
	(0.177)	(0.177)	(0.181)
Dual class shares	1.114***	1.120***	1.113***
	(0.416)	(0.416)	(0.413)
Tangibility	-1.148	-1.162	-0.957
	(1.264)	(1.263)	(1.246)
Controlling share %	-0.021	-0.021	-0.023*
	(0.013)	(0.013)	(0.013)
ROA	-0.453	-0.443	-1.038
	(1.501)	(1.487)	(1.560)
CEO age	0.012	0.012	0.012
	(0.014)	(0.014)	(0.014)
Firm age	0.002	0.002	0.002
	(0.005)	(0.005)	(0.005)
STAR	0.056	0.057	0.028
	(0.313)	(0.310)	(0.304)
Institutional Investor	-0.459*	-0.462*	-0.464*
	(0.270)	(0.268)	(0.265)
Observations	658	658	654

Notes. Treatment equation. Column (1) to (3) report the first stage estimates from regressions of the previous Table. Dependent variable is Family CEO. Robust standard errors in parentheses are clustered by firm. *** p¡0.01, ** p¡0.05, * p¡0.10.

Table 6: Endogeneous treatment regression model - Low diversion industries (Type 1)

Panel A - Pay level and performance sensitivity in low diversion industries			
Performance is:	EBITDA	ROA	MTB
Dep.Var.: Log(Pay)	(1)	(2)	(3)
Performance (t^O)	1.53e-06	0.536	0.054**
	(1.01e-06)	(1.657)	(0.024)
Famceo ($W^F - W^O$)	0.193	0.091	0.281
	(0.254)	(0.250)	(0.308)
Famceo*performance ($t^F - t^O$)	-1.20e-06	0.375	-0.111
	(1.09e-06)	(1.655)	(0.133)
Control variables			
Firm Size	0.343**	0.446***	0.500***
	(0.159)	(0.148)	(0.128)
CEO age ¿ 62	-0.011	0.019	0.037
	(0.081)	(0.088)	(0.085)
CEO tenure	0.002	0.001	-0.000
	(0.017)	(0.016)	(0.017)
CEO turnover	-0.017	-0.040	-0.062
	(0.080)	(0.080)	(0.080)
Dual class shares	-0.288***	-0.203**	-0.211**
	(0.100)	(0.082)	(0.088)
Tangibility	-0.700**	-0.682**	-0.594**
	(0.326)	(0.297)	(0.289)
Controlling share %	0.014**	0.013**	0.014***
	(0.005)	(0.005)	(0.005)
Firm and Year FE	Yes	Yes	Yes
Wald test (all variables)	0.000	0.000	0.000
p-value			
Wald test of no corr. between			
outcome and treatment: ρ	0.017	-0.016	-0.104
χ^2 (p-value)	0.01 (0.930)	0.01(0.927)	0.20 (0.658)
Observations	366	366	365

Notes. Outcome equations. Dependent variable is the logarithm of CEO pay. Column (1) to (3) report estimates from a linear regression model with endogenous treatment effects (outcome equation), accounting for the endogeneity of Family CEO. Family CEO is instrumented using Firm size, Dual class voting shares, Asset tangibility, Size of the controlling share of the equity, Asset profita-bility, CEO age, Firm age, quotation in the STAR segment of the Exchange, the presence of Institutional investors with a share of at least 2%. (first stage estimates are reported in the next Table). Robust standard errors in parentheses are clustered by firm. *** p¡0.01, ** p¡0.05, * p¡0.10.

Panel B - First stage estimates on Family CEO in low diversion (Type 1) industries			
Performance in the Outcome equation is:	EBITDA	ROA	MTB
Dep.Var. is Family CEO	(1)	(2)	(3)
Firm Size	0.303**	0.305**	0.309**
	(0.131)	(0.132)	(0.132)
Dual class shares	0.647	0.648	0.651*
	(0.395)	(0.395)	(0.393)
Tangibility	-1.442	-1.450	-1.468
	(0.968)	(0.964)	(0.968)
Controlling share %	-0.010	-0.010	-0.010
	(0.015)	(0.015)	(0.015)
ROA	2.417	2.438	2.521
	(2.700)	(2.675)	(2.805)
CEO age	0.048***	0.048***	0.048***
	(0.017)	(0.017)	(0.017)
Firm age	0.005	0.005	0.005
	(0.004)	(0.004)	(0.004)
STAR	-1.013**	-1.011**	-1.008**
	(0.412)	(0.413)	(0.413)
Institutional Investor	-1.509***	-1.514***	-1.522***
	(0.358)	(0.359)	(0.360)
Observations	366	366	365

Notes. Treatment equation. Column (1) to (3) report the first stage estimates from regressions of the previous Table. Dependent variable is Family CEO. Robust standard errors in parentheses are clustered by firm. *** p¡0.01, ** p¡0.05, * p¡0.10.

Appendix: Proofs

Proof of Lemma 1. Observing problem (9), it is possible to note that the CEO's wage reduces the entrepreneur's utility U_O. Then, the optimal wage is the lowest possible, i.e. at least one of the two constraints must be binding. Note also that, because of $T_O \geq 0$, the CEO's participation constraint is not binding. We can then focus just on the CEO's IC constraint. After simplifying the term $\sqrt{T_O}$ on the r.h.s. and l.h.s. of the IC constraint of problem (9), the (binding) IC constraint can be rewritten as

$$t_O\sqrt{k^*(t_O)} = \frac{c^2}{p^2} + 2\frac{c}{p}\sqrt{T_O} \tag{21}$$

By substituting (21) in the objective function of Problem (9), the latter becomes:

$$U_O = \alpha\left[p\sqrt{k^*(t_O)} - T_O - p\left(\frac{c^2}{p^2} + 2\frac{c}{p}\sqrt{T_O}\right)\right],$$

which, using (7), becomes:

$$U_O = \alpha\left[p\frac{(1-\alpha)(1-t_O)p}{2} - T_O - p\left(\frac{c^2}{p^2} + 2\frac{c}{p}\sqrt{T_O}\right)\right], \tag{22}$$

In (22), both t_O and T_O enter with the negative sign. Hence, the optimal contract has the lowest possible t_O and T_O. From (21), $\tilde{T}_O = 0$ and $t_O\sqrt{k^*(t_O)} = \frac{c^2}{p^2}$. By (7), the latter can be rewritten as

$$t_O(1-t_O)\frac{(1-\alpha)p}{2} = \frac{c^2}{p^2} \tag{23}$$

This second degree equation has two solutions: $t_O = \frac{1\pm\sqrt{1-\frac{8}{p(1-\alpha)}\left(\frac{c^2}{p^2}+2\frac{c}{p}\sqrt{T_O}\right)}}{2}$. However, only one of them (namely, the one with the minus sign) solves problem (9), as it is the lowest. Then, $t_O = \frac{1-\sqrt{1-\frac{8c}{p^2(1-\alpha)}}}{2}$.

We now just need to verify that the minority shareholders' participation is satisfied, i.e.

$$(1-\alpha)\left(p\sqrt{k^*(\tilde{t}_O)}-\tilde{T}_O-\tilde{t}_O p\sqrt{k^*(\tilde{t}_O)}\right)-k^*(\tilde{t}_O)\geq 0.$$

By substituting (7) and $\tilde{T}_O=0$, the previous condition becomes

$$(1-\alpha)\left(p\frac{c^2}{p^2\tilde{t}_O}-p\frac{c^2}{p^2}\right)-(1-\tilde{t}_O)^2\frac{(1-\alpha)^2p^2}{4}\geq 0.$$

After some straightforward simplifications, it can be rewritten as

$$\tilde{t}_O(1-\tilde{t}_O)\leq\frac{4c^2}{p^3(1-\alpha)},$$

which is verified as, from (23), $\tilde{t}_O(1-\tilde{t}_O)=\frac{2c^2}{p^3(1-\alpha)}$. ■

Proof of Lemma 2. In the optimum, the constraint is binding:

$$T_F+t_F p\sqrt{k^*(t_F)}=c. \tag{24}$$

By substituting (24) into the objective function, the latter becomes:

$$\max_{t_F}(1-\alpha)\left(p\sqrt{k^*(t_F)}-c\right)-k^*(t_F)$$

i.e.

$$\max_{t_F}\frac{(1-\alpha)^2(1-t_F)p^2}{2}-(1-\alpha)c-\left(\frac{(1-\alpha)(1-t_F)p}{2}\right)^2 \tag{25}$$

From the FOC of (25) w.r.t. t_F, we obtain $t_F^*=0$. From the manager's participation constraint (24), it must be $T_F^*=c$. ■

Proof of Proposition 2. In the case of external CEO, the value of the venture is $\tilde{S}_O=p\sqrt{k^*(\tilde{t}_O)}-\frac{c^2}{p}$. In the case of family CEO, the entrepreneur's utility is given by (**??**). We distinguish between two cases.

i) $\frac{b-\alpha}{1-\alpha}\frac{(1-b)p^2}{2}\leq c$ (i.e., $\tilde{s}_F=\tilde{S}'_F$). In this case, external CEOs emerge in equilibrium only

if $\tilde{S}_O > \tilde{S}'_F$:

$$p\sqrt{k^*(\tilde{t}_O)} - \frac{c^2}{p} > p\sqrt{k^*(\tilde{t}_F)} - c, \tag{26}$$

i.e.

$$p\sqrt{k^*(\tilde{t}_O)} - p\sqrt{k^*(\tilde{t}_F)} > c\left(\frac{c}{p} - 1\right). \tag{27}$$

Given that $c > p$, then $c\left(\frac{c}{p} - 1\right) > 0$. This implies that $p\sqrt{k^*(\tilde{t}_O)} - p\sqrt{k^*(\tilde{t}_F)} > 0$, i.e. $k^*(\tilde{t}_O) > k^*(\tilde{t}_F)$. Therefore, $\tilde{t}_O < \tilde{t}_F$.

ii) $\frac{b-\alpha}{1-\alpha}\frac{(1-b)p^2}{2} > c$ (i.e., $\tilde{S}_F = \tilde{S}''_F$). In this case, external CEOs emerge in equilibrium only if $\tilde{S}_O > \tilde{S}''_F$:

$$(1-\tilde{t}_O)p\sqrt{k^*(\tilde{t}_O)} > (1-\tilde{t}_F)p\sqrt{k^*(\tilde{t}_F)}, \tag{28}$$

i.e.

$$(1-\tilde{t}_O)\frac{(1-\alpha)(1-\tilde{t}_O)p}{2} > (1-\tilde{t}_F)\frac{(1-\alpha)(1-\tilde{t}_F)p}{2}. \tag{29}$$

After straightforward simplifications, it can be rewritten as

$$(1-\tilde{t}_O)^2 > (1-\tilde{t}_F)^2, \tag{30}$$

i.e $\tilde{t}_O < \tilde{t}_F$. ■

Proof of Proposition 3.

We distinguish between two cases.

i) $\frac{b-\alpha}{1-\alpha}\frac{(1-b)p^2}{2} \leq c$ (i.e., $\tilde{S}_F = \tilde{S}'_F$). The expected wage of family CEOs is equal to c. The expected wage of external CEOs is equal to $\tilde{t}_O p\sqrt{k^*(\tilde{t}_O)} = \frac{c^2}{p}$. As $c > p$, $c < \frac{c^2}{p}$.

ii) $\frac{b-\alpha}{1-\alpha}\frac{(1-b)p^2}{2} > c$ (i.e., $\tilde{S}_F = \tilde{S}''_F$).

In this case, family CEOs emerge in equilibrium only if $\tilde{S}''_F > \tilde{S}_O$:

$$(1-\tilde{t}_F)p\sqrt{k^*(\tilde{t}_F)} > (1-\tilde{t}_O)p\sqrt{k^*(\tilde{t}_O)},$$

i.e.

$$\tilde{t}_O p\sqrt{k^*(\tilde{t}_O)} - \tilde{t}_F p\sqrt{k^*(\tilde{t}_F)} > \frac{(1-\alpha)p^2}{2}\left(\tilde{t}_F - \tilde{t}_O\right) \tag{31}$$

Given that, from Proposition 2, in equilibrium $\tilde{t}_F > \tilde{t}_O$, then the r.h.s of (31) is positive. Hence, condition (31) implies $\tilde{t}_O p\sqrt{k^*(\tilde{t}_O)} - \tilde{t}_F p\sqrt{k^*(\tilde{t}_F)} > 0$: the expected wage of external CEOs in equilibrium is higher than that of family CEOs. ■