Product Market Competition, Executive Compensation, and CEO Family Ties

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Abstract

This paper analyzes the interaction between product market competition and family ties on the structure of CEO pay, in a panel of publicly listed family firms. To account for the multi-dimensional nature of competition we use a variety of measures. We find that in industries where import penetration is high, products are differentiated or domestic concentration is high, family CEOs' variable pay is lower than is professional CEOs' variable pay; but the former is more closely related to firm performance. This result remains strong when we account for the equity component of compensation and for endogeneity concerns and when we test the hypothesis of family CEOs' "pay for luck". Our findings suggest that: i) competition is likely to *substitute* incentive pay in homogeneous product markets and to *complement* them in differentiated industries and in markets that are open to international trade; and ii) product market characteristics are more important than are family ties in shaping managerial compensation.

Keywords: CEO compensation; product market competition; family firms; import penetration; R&D and advertising intensity; corporate governance; pay-performance sensitivity

JEL classification: L22; D22; G30; J33; M52

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1. Introduction

A powerful force that mitigates managerial slack is the market mechanism (Hart, 1983). On the one hand, product market competition is itself a source of discipline that prompts managers to exert effort. On the other hand, by increasing the value of effort, competition may make it optimal to offer the manager a performance-related payment contract. Whether competition is a substitute or a complement for monetary incentives is still an open question (Raith, 2003; Vives, 2008).

Although a growing empirical literature has examined the relationship between product market competition and various aspects of corporate governance in managerial firms,[1] few articles focus on executive compensation, and even fewer examine this issue within family firms. This is probably due to the view that closely-held firms need not provide incentive contracts to their managers because large inside ownership eliminates the agency costs that arise from separation between ownership and control. Recent corporate governance contributions, however, have suggested that there are agency problems also within family firms (Mazur and Wu, 2016; Burkhart et al., 2003; Schulze et al. 2001). Conflicts typically arise between minority and majority shareholders who pursue non-monetary objectives and let family members run the company even when those family members do not maximize its value.

This paper investigates whether the structure of managerial compensation differs between family and non-family CEOs who operate in markets that are subject to different sources of competitive pressure. To test our conceptual framework, we implement different aspects of competition: foreign, and domestic; and we focus on market characteristics that are related to the intensive use of sunk intangible assets to increase product differentiation. We use a panel dataset of publicly listed family companies

[1] See among others Giroud and Mueller (2010) for the relationship between market competition and firm governance, or Bena and Xu (2017) for the relationship between competition and firm value.

from 2000 to 2017 in Italy: where many quoted firms are owned by an individual or a family, and are run by a member of the controlling family group.

Our findings can be summarized as follows: First, in industries where import penetration is high, products are differentiated, or domestic concentration is high, the variable share of total pay of family CEOs is lower than for external CEOs. Although this result may suggest weaker incentives for family CEOs, we also find that in these industries the variable share of family CEOs' pay is significantly more related to firm performance than is true for professional CEOs. This suggests that family CEOs are provided stronger incentives than are non-family CEOs. Second, where foreign competitive pressure is weak, the product is homogeneous, or domestic concentration is low, the structure of family and non-family CEOs is similar. Third, the above results are robust to endogeneity concerns about the direction of the relationship between CEO pay and performance, and these results hold when we account for the equity-based component (stock distributions and options) of the compensation.

The remainder of the paper is organized as follows: Section 2 illustrates the theoretical framework. Section 3 briefly describes the Italian institutional context. Section 4 presents the empirical model and the dataset. In Section 5, we describe the main results. Section 6 reports the robustness analyses that focus on: "pay for luck"; alternative definitions of family firms; and the reverse causality in the relationship between CEO pay, firm performance, and other potentially endogenous variables. Section 7 concludes.

2. Theoretical framework and hypotheses

The theoretical framework from which we derive our testable hypotheses draws on the literature on the impact of product market competition on managerial incentives and the literature on managerial compensation in family firms.

2.1 Market competition and managerial incentives

Since Hicks' (1935, p. 8) statement that "The best of all monopoly profits is a quiet life", many economists have suggested that in the absence of competitive pressure, cost control may become lax, and firms may not operate on their production-possibility frontier. Leibenstein (1966) argued that when individuals can freely choose actions, they will not choose those necessary to minimize cost. On the contrary, they will instead reduce the stress that is associated with a high level of effort and enjoy a quiet life. As a result, a variety of output results are possible for the same inputs and the same knowledge of production techniques. In a dynamic competitive environment, however, low-cost firms that are lured by the possibility of earning above-normal profits enter the market and put pressure on high-cost incumbent firms to reduce cost or to exit (Nelson and Winter 1982).

The idea that competition acts as an incentive mechanism has been formalized by Hart (1983), under the assumption that managers are extremely risk averse. Despite its intuitive appeal, formalizing the idea that competition reduces managerial slack in more general settings has proven difficult, and the subsequent literature shows that often results are ambiguous because of two opposing effects: the "elasticity" effect; and the "size" effect (see among others, Graziano and Parigi, 1998; Raith, 2003; Vives, 2008). With the "elasticity" effect, competition increases demand elasticity, and lower-cost firms are best equipped to attract rivals' customers. This makes managerial effort more valuable and incentive schemes more appealing. The "size" effect instead prevails when tougher competition shrinks firms' business and market shares. In this case, firms benefit less from managerial effort and therefore offer weaker incentive contracts. However, Schmidt (1997) shows that the ambiguity disappears whenever more intense competition increases the threat of liquidation. When firm survival is endangered, optimal managerial effort increases.

Consistent with this wide range of theoretical predictions, the empirical literature that has tested the relationship between competition and managerial monetary incentives has offered a variety of results. Aggrawal and Samwick (1999) find that the extent of relative performance in managerial compensation is limited by strategic competition. Karuna (2007), who considers a range of determinants of product competition, finds that managerial incentives are positively related to product substitutability and market size, and negatively related to entry costs, which confirms the multi-dimensional nature of the relation between competition and incentives. Beiner et al. (2011) find support for their hypothesis that more intense domestic competition is associated with stronger managerial incentives.

Unambiguously positive effects of competition are obtained by the strand of theoretical literature focusing on the competitive pressure that results from foreign trade and market integration, as suggested by Krugman (1979). Many studies show that foreign trade affects the toughness of competition by: improving firm productivity; reducing firm X-inefficiency (see Tybout, 2002, for a survey); and increasing managerial effort (Martin, 1978; Horn, Lang, and Lundgren 1995).

A few empirical studies support this hypothesis. Cunat and Guadalupe (2005) exploit the appreciation of the pound in 1996 to analyze the resulting effect of the more aggressive foreign competition on managerial pay-performance sensitivity. Cunat and Guadalupe (2009) study how firms changed the structure of executive compensations as a response to changes in foreign competition and find that deeper import penetration increases pay-performance sensitivity while reducing the level of non-performance related pay. Tello-Trillo (2015) shows that the sensitivity of CEO wealth to a firm's performance increases with U.S. trade liberalization. This leads us to formulate the following hypothesis about the structure of the CEO compensation:

HP. 1: *CEO variable pay is more closely related to firm performance in industries that are more exposed to competition.*

A different twist to the relationship between competition and incentives is offered by the new industrial organization literature. This literature has shown that, when industry structure is endogenously determined by firm conduct, firms have a strong incentive to differentiate their products in order to relax price competition and decrease demand elasticity (Tremblay and Polasky, 2002). Incumbent firms, in their effort to retain their market shares, will devote a large amount of resources to deter entry by developing brand loyalty. The inverse relationship between market size and concentration that is generally found in homogeneous product markets, does not hold when products are differentiated (Sutton, 1991).

According to this view, firms' strategic interactions in these markets thus depend on their investment in sunk intangible assets - such as R&D, advertising, and marketing expenditures – that increases product differentiation, consumer-perceived product quality, and willingness to pay. Raith (2003, p. 1429) clarifies this point: "when investments in quality improvements or cost reductions are endogenous (as here), then increases in market size may lead to an escalation of firms' strategic investments that dissipates any profit gains and prevents further entry, and the market may remain concentrated irrespective of market size".

How do the escalation in strategic investment and the threat of entry affect incentive contracts? First, the escalation of R&D and marketing investment implies the need to rely on CEOs with the appropriate skills: "*a higher level of potential competition" requires "a more capable CEO and, therefore, higher and more responsive pay*" (Hubbard and Palia, 1995, p. 108). Second, in such markets, uncertainty about the sustainability of competitive advantage and the rivals' strategies is higher, which thus requires more delegation to managerial initiative. According to Prendergast (2002), more decision mak-

ing is indeed delegated to the agent in more uncertain and riskier environments where the optimal strategy depends on information that the principal does not have. Moreover, investment in intangible assets exacerbates the asymmetry of information, which makes managerial effort difficult to monitor and evaluate, "*which in turn generates incentive pay based on output*" (Prendergast, 2002, p. 1072).

Overall, powerful incentives will be required to prevent managers from opportunistically abusing their wider mandate and to align their interest to those of the shareholders. This leads to the following hypothesis:

HP. 2: *CEO variable pay is more closely related to firm performance in industries that rely on sunk intangible assets to differentiate their product.*

2.2 *Product market competition and the role of family ties on CEO pay*

The above predictions derive from a literature that considers firms where ownership is separated from control and managers and shareholders' interests are not aligned. In many countries, however, closely-held family firms are common, and founders/owners manage their company. These firms are not immune to agency problems; they simply face agency costs that are different from those of widely-held corporations. In this section, having in mind the incentive problem in public companies as a benchmark, we discuss how product market competition may affect managerial-incentive pay in family firms.

Consider first a professional CEO who has no familial relationship to firm owners. In widely-held companies, the cost of monitoring the managers is too high for small, dispersed shareholders, which thus generates a free-rider problem (Fama and Jensen, 1983). Incentive contracts, which relate CEO pay to the firm's performance, are thus viewed as the standard solution to this problem (Jensen and Murphy, 1990). In contrast, when professional managers run closely held family firms, the free-rider problem

does not exist as large shareholders have a clear incentive to monitor them to guarantee the best possible outcome (Burkart, Gromb, and Panunzi, 1997).[2] As a consequence, the need to rely on monetary incentives to align managerial and shareholders objectives is less acute (Block, 2011, Frey and Osterloh, 2005), which leads us to formulate the following hypothesis:

HP. 3: (Non-family CEOs): *We expect the variable pay of professional CEOs in family firms to be weakly or insignificantly related to firm performance irrespective of competitive conditions.*

Let us consider now a CEO who is -- or has familial ties with -- the large shareholder: a "family CEO". By the standard agency theory, the "family CEO", being the residual claimant, has the strongest motivation to maximize the firm's long-term value and has no need for further incentives (Fama and Jensen, 1983). The recent literature, however, suggests that family firms that are run by a family CEO may also face agency costs (Burkhart, Panunzi, and Shleifer, 2003; Mazur and Wu, 2016, Schulze et al. 2001).

After taking the firm public, the owner-manager starts playing the double role of principal and also agent for the outside shareholders, and thus faces the lure of rent extraction and the private benefits of control. Then, family-related agency problems may arise when a plurality of relatives have interests in the firm, with different roles and involvement and different monetary as well as non-monetary objectives.[3] Whenever the objective of the owner-manager is the maximization of the utility of the family rather than the maximization of firm value, expropriation of minority shareholders becomes more likely.

[2] Burkart et al. (2003) even envisage the risk that "over-monitoring" by the large shareholders may undermine the external manager's initiative and effort.

[3] For a thorough analysis of *parental altruism* and its consequences on corporate governance and firm value, see Lubatkin et al. (2005) and Karra et al. (2006).

In such situations, where a large controlling stake makes the promise not to expropriate minority shareholders almost impossible to keep, the owner-manager may then commit to performance-based compensation schemes in order to mitigate the "agency costs of equity" (Jensen and Meckling, 1976) and to reassure the investors and the capital markets.[4]

The incentive contract may thus be viewed as a "signaling device" to capital markets that the family CEO will not destroy value by: shirking on effort; indulging in private benefits from control (Karra et al., 2006, Michiels et al., 2012); or hiring family members with insufficient qualifications (Chrisman et al., 2004). Even non-executive family shareholders may find it convenient to tie the family CEO pay to firm performance, as parental ties make it difficult to take disciplinary actions against an underperforming family CEO. In sum, incentive pay can be a useful mechanism of corporate governance also for family CEOs.

The competitive environment will affect the design of managerial incentives also for family CEOs. As is true for executives in non-family firms, family CEOs need to work harder to sustain and increase the firm's market share in industries that are more exposed to competition or that rely on product differentiation. But, different from professional managers, family CEOs have the implicit task to pass on a profitable firm to the next generation and, in more competitive environments, may have to take painful, but necessary actions that contrast with other family values/familial altruism.

Finally, the signaling effect of incentive pay is even more important in industries that are characterized by tough competitive pressure or by high intangible investments, where asymmetric information makes the actual value difficult to evaluate and allows the CEO more room for maneuver. Overall, the above discussion leads to the following hypothesis:

[4] Although the ownership stake is a large fraction of the family CEO's wealth, the relative illiquidity of his shares makes the cash component of performance-related pay particularly incentivizing (McConaughy, 2000).

HP. 4: (Family CEOs): *We expect the variable pay of family CEOs to be more closely related to firm performance when firms are subject to higher competitive pressure and when they rely on sunk intangible assets to differentiate their product.*

The literature on managerial compensations in family firms typically does not focus on family CEOs. Among the few articles, Gomez-Mejia et al. (2003), McConaughy (2000), and Mazur and Wu (2016) examine U.S. family-controlled firms and find that the pay of family CEOs is sensitive to firm performance, though it is less responsive than is the pay of outside CEOs. Using a large sample of publicly listed firms in Continental Europe, Croci, Gonenc, and Gozkan (2012) find that family CEOs receive lower total and equity-based compensations than do professional CEOs.

In contrast, Cai et al. (2013) show that family managers in private, unlisted family firms in China have higher compensation than do non-family managers, and that a larger portion of their bonuses is not contingent on firm performance.

Finally, Bandiera et al. (2015) investigate compensation in the Italian service industry and show that, compared to widely held firms, family firms offer a lower share of variable pay and are less likely to fire or promote professional managers based on their performance. To the best of our knowledge, this is the only study of the impact of product market competition and product differentiation strategy on CEO compensations in family firms.

In summary, based on the theoretical framework discussed above, we want to test whether product market competition -- in its multi-dimensional forms -- affects the structure of CEO compensation and whether this effect is different for family and professional CEOs. More specifically, we expect the compensation of family CEOs to be more responsive to product market conditions than is the structure of compensation of professional CEOs in family firms.

3. The institutional framework

The corporate governance system in Italy is particularly interesting for the questions that we raise in this paper because several empirical studies have documented that the private benefits of control are large in Italian closely held firms, which suggests that there are severe agency problems between controlling and minority shareholders (Dick and Zingales, 2004).

The Italian corporate sector is characterized by concentrated ownership, family control (also among listed firms), a relatively thin stock market, and a limited role of institutional investors. The fraction of voting shares of the largest individual shareholder in listed firms is quite stable over time: 48.3% in 2000; 46.2% in 2010; and 47.2% in 2017.[5] In 2016 the ultimate shareholder was a family in 66% of listed companies; that percentage increased to 78% for listed companies in the industrial sector. The average stake that was held by institutional investors in 2017 was only 7.5%.

The number of firms that issued dual class shares has been steadily decreasing over time: only 18 at the end of 2016, down from 70 in 1998. In contrast, the number of firms that report "voting pacts" or "coalitions" among shareholders has increased. A voting pact (*patti di sindacato*) is an agreement among shareholders that is aimed to stabilize, secure, and somehow enhance the exercise of control in the firm. The Commissione Nazionale per le Società e la Borsa (CONSOB) -- the Italian authority that supervises capital markets -- mandates the public disclosure of these agreements, whose duration is three years and can be renewed as many times as shareholders wish. According to Bianchi and Bianco (2006), "coalitions" are the alternative mechanism of separation between ownership and control that has gradually substituted "pyramidal groups" in the second half of the 1990s.

[5] CONSOB annual relations various issues (2017, p. 85).

Firms that are listed on the Italian Stock Exchange are invited to adopt the Italian Self-discipline Corporate Governance Code -- or to explain why they do not do so.[6] The objective of the Code -- which was issued for the first time in 1999 and subsequently revised and updated -- is to improve the governance and transparency of listed firms. One of the Code's recommendations is the adoption of a remuneration committee with a majority of independent directors. The Code also suggests that firms should achieve a proper balance between fixed and variable pay and to link variable pay to predetermined and measurable performance targets. The Code, together with the CONSOB's requirement to disclose managerial compensation (as of 2000), have induced firms to rely on variable pay on a regular base.

Stock options and equity-based compensations are not common in Italy and are mentioned only briefly by the Corporate Governance Code. Melis et al. (2012) study non-financial listed firms in Italy and show that in 2004 more than 70% of firms did not have stock option plans for top executives. The limited use of stock options -- this limited use is common among many Continental Europe countries -- is documented in a comparative study on managerial compensation in Europe by Conyon et al. (2013, p. 64), who found that "On average, CEOs in Europe receive 50% of their total pay in the form of base salaries, 20% in bonuses, 3% in stock options (valued at grant-date), and 16% in restricted stock or performance shares."

With respect to these values, the composition of Italian CEO pay in 2008 had a greater weight for the fixed component: 56% base salary; 16% bonuses; 19% other pay; 6% option grant; and 3% stock pay: less than 10% in stocks and options. The smaller equity component in the compensation of Italian CEOs is due to the fact that, traditionally, the Italian stock exchange has been the least developed among the G7.

[6] At the end of 2016, 92% of the firms had adopted the last version of the Code. See, Assonime, "Corporate governance in Italy", Note e Studi 18/2016.

In addition to this, the penalizing and time-inconsistent fiscal regime of stock options in Italy has further discouraged their use (see Zattoni and Minichilli, 2009). CONSOB mandated that listed companies disclose information about stock options, equity holdings, and equity-based component of CEO pay only as of 2012.[7] Before that year, the limited data that were reported in company accounts cannot be used to obtain a time-consistent and reliable measure of the equity component of pay. [8]

Finally, Italy is appropriate for this study because its economic system is open to trade, well integrated in the Single European Market, with a large share of imports and exports (28.2% and 31.2% of GDP in 2017, respectively[9]). Many Italian companies operate either in traditional industries where competitive pressure from countries with low labor cost is severe or in integrated markets where investments in intangible assets drive strategies of product differentiation.

The last two decades have witnessed important changes in international trade, ranging from the admission of China and other emerging countries to the formation of the WTO to the enlargement of the European Union to encompass the formerly socialist countries. Overall, European countries have experienced a reduction in trade barriers. The increase in globalization and in international economic integration has changed the competitive environment of the industries that are more exposed to foreign competition by raising competitive pressure and widening the differences with sectors that are protected from international trade. Empirical evidence shows that Italian firms have reacted to the increased competition by reducing prices and mark-ups (Altomonte, Barattieri, and Rungi, 2014). Thus, Italy provides

[7] CONSOB, Communication of February 24th, 2011.

[8] Even though the application of the IFRS2 for the disclosure of executive stock-based compensation dates back to mid-2000s' in the company reports, it was impossible to find these data consistently over time and across firms. Too many missing data prevented the construction of reliable time series in those years.

[9] As a comparison, in 2017 imports and exports in the United States were 15.0% and 12.1%, respectively. World Bank national account, import and export data are available at https://data.worldbank.org/indicator/ne.imp.gnfs.zs and https://data.worldbank.org/indicator/ne.exp.gnfs.zs

a valuable opportunity to examine how competition and corporate governance interact in determining CEO incentives.

4 Empirical Model and Data description

4.1 The empirical model

To analyze how the structure of CEO pay changes with product market competition and CEO family ties, we focus on the relationship between variable pay and actual firm performance. Indeed, the finance and corporate governance literature (Murphy, 1999; Bebchuk and Fried; 2004, Bertrand and Mullainathan, 2001) has documented that current compensation practices often contrast with the performance-related scheme that is implicit in the optimal contracting models (Holmstom, 1979). Therefore, variable components may result from managerial entrenchment or rent expropriation practices rather than from optimal incentive schemes; consequently, a simple comparison of the ratio between variable and fixed pay might be misleading.

In the regressions that are reported below, we thus use the share of variable pay as the dependent variable, and we perform a battery of robustness check with alternative dependent variables.[10] Moreover, as a robustness test, we investigate whether CEO compensation is structured to reward managerial effort or whether it is used to increase CEO pay with no reference to his/her contribution to the firm: the "pay-for-luck" hypothesis that was proposed by Bertrand and Mullainathan (2001).

[10] We also used the following alternative definitions of the dependent variable: i) the log of total compensation; ii) the ratio of total compensation to total assets; and iii) the log of the ratio of total pay to total assets (regressed on the log of firm performance). All of the regressions provide similar results (which are available on request), in line with those that are obtained when we use the variable share of pay as a dependent variable.

The empirical model tests whether the relationship between the variable share of the CEO pay and firm performance for family and non-family CEOs differs statistically in subsamples that are characterized by diverse types of competition. In reporting the results as well as in the tables, we often refer to the relationship between variable pay and firm performance as "pay-performance sensitivity" (PPS), which is shorter and more effective.[11]

We use dichotomous variables to distinguish industries with high/low foreign competition (high/low import penetration), differentiated/homogeneous product industries (high/low R&D and advertising intensities), and weak/tough domestic competition (high/low 5-firm concentration ratios) as we described in Section 4.2.2.[12] We assign firms to one or the other type based on their primary industry, which is invariant over time. We estimate, for each industry sub-group, an empirical model that relates the variable share of firm *i*'s CEO pay in year *t* to firm performance.

To ensure that the estimation of our models on separate sub-samples is the appropriate level of analysis, we report the Chow-like F-tests of the joint significance of sub-sample's variables in a fully unrestricted model run on the full sample. Separating the sub-samples reduces the number of cross-variable interactions, diminishes the impact of multicollinearity,[13] and makes the results easier to interpret.

[11] Sensitivity is typically used to define the general relationship between managerial compensation and performance (when the relationship is between the log of pay and the log of performance it is called the elasticity). In our case, the relationship is between the variable component of the pay and performance, and we use the PPS expression to highlight the idea that managerial compensation is designed to respond to changes in firm performance.

[12] Ideally, one would like to exploit a natural experiment or a shock to the competitive environment such as a sudden appreciation of the currency or an unexpected reduction in trade barriers (Cunat and Guadalupe, 2005, 2009). Unfortunately, a shock such as this is not available for Italy from 2000 to 2017, because trade liberalization towards China and other Asian countries was a gradual process rather than a foreign trade shock. For this reason, we classify different competitive environments by using one-time, out-of-sample industry level variables (Type1/Type2, High/Low Imp-Pen, etc.). In fact, time-varying variables would raise simultaneity concerns because of the parallel evolution of competitive conditions and compensation policies as changes in import penetration or R&D or advertising intensity in the industry ultimately derive from firm-level decisions, which are, in turn, the firms' and CEOs' responses to continuously changing conditions.

[13] In the Appendix, we report the correlation matrix in Table A4 and the Variance Inflator Factor (specifying individual and average values) in Table A3.

The baseline specification is as follows:

$$Varshapay_{it} = \alpha + \beta_1(ROA_{it-1}) + \beta_2(FAMCEO_{it-1}) + \beta_3(ROA_{it-1})x(FAMCEO_{it-1}) + \Sigma\beta_j \mathbf{X}_{jt-1} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

We use two different pay variables: *Varshapay_cash* accounts for the cash components of variable pay (bonuses and non-monetary benefits); and *Varshapay_eq* includes the fair value of the equity based-compensation in the variable component.[14] ROA_{it-1} -- firm's *i* Return on Assets in year *t-1* -- is the variable that measures firm performance. As an alternative, we also use MTB_{it-1}: the ratio of the market value to the book value of total assets. The time notation clarifies that the payment of bonus and other rewards in year t refers to the performance that was achieved in year t-1. The relationship between CEO pay and firm performance (and possibly, other variables) raises potential endogeneity concerns. We address these concerns in where we report the results of a Granger causality test for firm performance, leverage, and the independence of remuneration committee.

The coefficient β_2 allows us to estimate if the performance-related component of family CEOs' pay is higher or lower relative to non-family CEOs' performance-related component. β_3 measures the difference in the incentive intensity of family CEOs with respect to nonfamily CEOs. Notably, the turnover of family and non-family CEOs is substantial, which thus ensures the within-firm heterogeneity that is necessary for estimating the difference in incentive intensity.

[14] The dependent variable is bounded from 0 to 1. As a robustness check, we performed three different sets of regression for the main specification that investigate the differences between Type1 and Type2, High and Low Import penetration, and high and low domestic) concentration, using econometric methods that take into account the bounded nature of the dependent variable: i) We estimated Tobit regressions; ii) we used the fractional response (probit) regression model (Papke and Wooldridge, 1996), which is especially designed for models where the dependent variable is greater than or equal to 0 and less than or equal to 1, and relies on quasi-likelihood estimators; and iii) we used the transformation log[varshapay_cash/(1-varshapay_cash)] as a dependent variable, adding 0.001 to varshapay_cash when the variable was zero. The results were found to be always in line with those obtained using the fixed effects model: quantitatively and qualitatively. We thank one referee for suggesting these robustness tests.

The vector **X** denotes the set of firm- and CEO-level control variables that were described in Section 4 and in Table 1. Amongst the control variables, we pay special attention to CEOs who also chair the board of directors. We thus include both the dummy *CEO-Chair duality* and its interaction with *ROA,* to account for its relationship with firm performance, as it is possible that the CEO-Chair exploits the excess power to maneuver his/her compensation. Finally, μ_i are firm-specific fixed effects that account for the remaining time invariant unobservable firm and industry characteristics; λ_t are year dummy variables that account for time-specific common factors, such as the business cycle, changes in trade liberalization, etc.; and ε_{it} is the error term.

4.2 Data description

4.2.1 The sample

We construct our dataset by starting with the population of firms that were quoted in the "Industrial Companies" segment of the Italian stock exchange from 2000 to 2017; this includes manufacturing firms and (non-financial) service companies. The starting date is 2000 because in that year CONSOB required listed companies to disclose the information about CEO monetary compensation.[15]

We exclude: firms with less than four continuous years of CEO compensation data; outliers (i.e., firms with few observations or with missing or negative values for total assets, debt, equity, sales, and CEO pay); and companies that were the object of large merger or divestiture operations that break up the time series and make the individual segments less than four-years long. Moreover, we exclude public utilities, since they are not only subject to price regulation, but are also partially controlled by the government; hence there are potential consequences for their performance, compensation policy, and corporate governance (Joskow, Rose, and Shepard, 1993; Cambini, Rondi, and De Masi, 2015).

[15] CONSOB Regulation n. 11971, May 14, 1999.

Our final dataset is an unbalanced panel of 130 non-financial publicly listed firms that are tracked from 2000 to 2017.[16] The following section describes the variables that we use in the empirical analysis, while Table 1 reports the list of the variables, with their sources and a short description. [17]

4.2.2 The Variables

CEO Pay

Data on CEO pay and identity were collected manually from company annual reports. We use the ratio of *(Bonus + Non-monetary Benefits) to Total Compensation* to measure the performance-related component of total pay for the full sample period (*Varshapay_cash*).[18] Non-monetary benefits -- a component of managerial pay that CONSOB requires firms to disclose -- include insurance, accommodation, and supplementary pension plans. CEOs do not pay taxes on these benefits, and therefore they may represent a convenient way to augment monetary pay. The data on non-monetary benefits within firms and for CEOs are highly variable over time. In addition, we use two variables -- which are available only from 2012 -- that include the equity-related component of CEO pay: the fair value of equity-based compensation (stock options and equity owned) in the ratio *Varshapay_eq*; and the logarithmic transformation of the variable component of total pay (cash and equity). In addition, we constructed a dummy variable to denote the presence of stock option plans (*Stock_Option dum*) that is based on information

[16] Note that some firms changed ownership status over the sample period, so they appear both in the family and in the non-family subsamples, pro-rata.

[17] We draw the data from multiple sources: Accounting and financial data are collected from three annual directories -- *Le Principali Società*, *Indici e Dati*, and *Il Calepino dell'Azionista* -- that are published by Mediobanca: a large Italian investment bank (www.mbres.it). Information about firms' ultimate ownership, controlling share, corporate governance, family ties of the CEO, age, business activity and primary industry at the 3-digit NACE classification was obtained from annual reports and company websites, CONSOB and Borsa Italiana (Italian Stock Exchange market)'s websites, and Dun & Bradstreet.

[18] We thank one referee for the suggestion to use the ratio of variable pay to total pay as the dependent variable. Results are also available, on request, for alternative definitions of the pay variables, such as: the log of total compensation; the ratio of total pay to total assets; and the log transformation of that ratio. In the end, we present the results that are based on the ratio of variable pay to total compensation because this variable is more easily interpreted and also because two variants are readily accommodated: one that includes only the cash component: *Varshapay_cash*; the other that adds the equity-based component: *Varshapay_eq*.

that became available only in 2005.[19] Due to data limitation, we assumed that once the plan is announced, the company does not cancel it.

Firm Ownership, Family firms and Family CEOs

To identify "family" ownership, we used data that are published by CONSOB about the identity and equity shares of shareholders with at least 2% of the voting shares. We then collected information about their parental ties (by blood or marriage) with the largest shareholder (the "direct ultimate owner", according to CONSOB's definition). We defined a "family firm" as one where either the largest individual shareholder or a group of individual shareholders who belong to the same family have more than 50% of the equity shares (see Miller et al., 2007, for a comprehensive list of definitions of "family firm"). Correspondingly, a non-family firm is one where a large shareholder or family-related shareholders with a (joint) majority stake could not be traced (after excluding public utilities).

The 50% cut-off value is motivated by the very high concentration of ownership in Italy, but we also consider a lower threshold of 30% for a robustness check. Moreover, following Miller et al. (2007), we also define the "*Lone Founder Firm"*: where the founder is the largest shareholder and none of his/her relatives has more than 2% of the equity.

To identify the "family CEO", we matched firm ownership data with hand-collected information about the CEO's direct or indirect (through marriage) parental ties as obtained from the press or the news on the web/internet. We thus define "*family CEO*" as a CEO who is either the majority shareholder or a member of the controlling "family" that holds the majority of the shares. Correspondingly, a "*non-family*

[19] Data became available in 2005, after the European Commission issued Recommendation 2004/913/CE about executives' role and compensation policy.

CEO" is a professional manager who has no familial ties to the controlling shareholder or family. Finally, the variable *Founder_CEO* identifies situations where, in a *Lone Founder Firm*, the founder is also the CEO.

The following variables account for CEO characteristics: *CEO tenure* controls for pay increases that are due to the number of years that the CEO served in the company, but also for managerial entrenchment, since a longer tenure is often associated with a CEO's internal power (Bebchuk and Fried, 2004). *CEO tenure squared* allows for non-linearity in the relationship, as CEO power may grow more than proportionally with time (Finkelstein and Hambrick, 1989).[20] *CEO age* is a proxy for the CEO's experience and expertise, but also for less-risky and less-profitable investment policies if the CEO becomes more risk-averse when ageing, as suggested by Gomez-Mejia et al. (2003). *CEO turnover* is a dichotomous variable that denotes a change in the CEO, as this event generates a discontinuity in the time-series of the pay variable. Finally, *CEO-Chair duality* is a binary variable that is equal to one when the CEO is also Chair of the Directors' Board. It accounts for managerial entrenchment, concentration of managerial power, and potential minority shareholders' expropriation (see, for example, Adams et al., 2005; Adams et al., 2010).

Corporate Governance variables

Following the corporate governance literature, we include a few firm-specific variables that, if omitted, may bias the relationship between CEO pay and firm performance. These firm characteristics identify control-enhancement mechanisms that potentially enable the controlling shareholder (the family) to separate ownership from control by reducing the amount that family has invested in the firm

[20] For a robustness check, we also use the log of tenure to account for non-linearity.

without losing control of the firm (Morck et al., 2005; Bianchi and Bianco, 2006). This in turn could offer the controlling shareholder the opportunity to extract rents by maneuvering the CEO compensation.

The binary variable *Voting Pact* indicates the presence of a "shareholders' agreement" or a "coalition" (see Section 3). *Dual class share* is equal to 1 when there are stock categories with different voting rights (e.g., voting and non-voting shares). As shown by Grossman and Hart (1988), a dual-class voting structure enables inefficient or rent-extracting owners to keep control by making takeovers more expensive or impossible.

The number of independent directors on the remuneration committee is another mechanism of corporate governance that is relevant for our research question as monitoring by independent directors is expected to limit the discretion of powerful CEOs to set their own compensation (Elhalgrasey et al., 1999; Conyon and Peck, 1998). To construct the ratio of independent to total directors in the compensation committee (*Indep_Rem_committee*) we used the firms' Reports of Corporate Governance.

The presence of institutional investors -- mutual, investment, and pension funds; insurance companies; and investment banking firms (Croci, et al. 2012; Fernando et al., 2013) is another source of monitoring and discipline on compensation policy. Hence, we constructed the variable *Inst_share*: the sum of the equity shares that are held by institutional investors with more than 2% of the shares, as reported by the CONSOB's list of "relevant investors".

Finally, the binary variable "*STAR*" indicates companies that are listed in a special segment of the Italian Stock Exchange (*Segmento Titoli con Alti Requisiti*) where they have to comply with more stringent requirements of corporate governance best-practice, transparency, and information disclosure than applies to firms in the ordinary stock market.

Firm performance and other controls

To measure *Firm Performance*, we use the return on assets, *ROA* (EBITDA/Total assets), and also the firm's market-to-book ratio, *MTB* (the ratio of the market value to the book value of the total assets).[21] We then include the log of real sales as a measure of *Firm Size.* Past research has established that CEO pay tends to increase with firm size (Baker and Hall, 2004; Murphy, 1985). Firm size can influence both the level and the structure of CEO pay since larger firms have more assets, more complex operations, and therefore more potential agency conflicts that may result in more intense use of monetary incentives. Alternatively, larger firms enjoy better visibility on financial markets and receive more coverage by analysts, and this make monitoring easier and thereby reduces the need for incentive compensation. Thus, the expected sign is ambiguous. Moreover, size, ownership, and family involvement are often correlated, as many family firms tend to be small, so omitting the size variable would bias the results.

Financial leverage is the ratio of long- and short-term financial debt to total assets and is included because high debt levels may affect the structure of CEO compensation. In family firms, we may expect incentive pay to be a signal to financial markets and debt-holders that the family CEO will not destroy value by indulging in private benefits.

Finally, *Firm Age* is the number of years since the founding of the firm: As the firm matures, the controlling family may be more inclined to release control over time or to turn to a professional CEO, if none of the firm's founder's descendants is available to run the family business (Miller et al., 2007). Moreover, in mature firms, more generations are involved in firm management, and this may worsen the agency problems among family members, which would increase the need to use performance-based compensation.

[21] There is a large corporate finance literature about how to measure firm performance when estimating pay-performance sensitivity. See among the others: Murphy (1985); Jensen and Murphy (1990); Bertrand and Mullainathan (2001); Cunat and Guadalupe (2009); Croci et al. (2012); and Cai et al. (2013).

Industry-specific variables and controls

In this section, we describe the variables that we use to categorize firms, based on their primary industry: the industry that accounts for the largest share of their output.

To measure the intensity of foreign competition, we calculate the *Import Penetration* ratio of industry imports to apparent consumption in Italy; this is defined as $M_j/(Y_j+M_j-X_j)$, where M_j, Y_j, and X_j are the imports, production, and exports in 3-digit NACE industry j in the year 2000 (OECD STAN-Database for Structural Analysis, ISIC–Rev. 4). We then construct a dummy variable, *High_Imp-Pen*, which is equal to 1 when industry's j import penetration is above the median value for the year 2000: a one-time beginning-of-sample characterization.

To distinguish industries with high versus low sunk intangible asset industries, we use the typology that was constructed by Davies et al. (1996, Table A2.1, pp. 258-260), which classifies 3-digit NACE industries based on UK industry data for R&D and advertising to sales ratios.[22] In *Type 1* industries, where advertising and R&D intensity is low, firms typically produce homogeneous products; in *Type 2* industries, firms produce differentiated products that require high R&D and/or advertising expenditures.

We also consider the intensity of domestic competition by relying on the 5-firm concentration ratios (Elhalgrasey et al. 1999) that are calculated by the Italian National Statistics Institute at the sectoral level for the first time for the year 2008 (ISTAT, *Rapporto sulla competitività dei settori produttivi*). We then construct a binary variable that identifies industries with a 5-firm concentration ratio that is above the 50th or the 75th percentile average (*Cr5_q2* and *Cr5_q3*, respectively*)*.

[22]. We borrow from Rajan and Zingales (1995) the idea to use a classification that employs out-of-sample (or out-of-country) data to proxy for industry characteristics. This strategy is meant to reduce endogeneity concerns because -- although the sectoral R&D and advertising intensities of Italian and UK economies are likely correlated -- it cannot be claimed that the UK intensities are determined or influenced by Italian companies' strategic decisions about R&D and advertising investments. Furthermore, in Italy there are no reliable statistics to measure the R&D and advertising intensity at the industry level.

The use of binary classifications to approximate different competitive environments is partly motivated by the limitations of the information that is available for these variables. The most severe limitations refer to the Type 1/Type 2 industry groups due to unavailable disaggregated data on advertising and R&D intensity at the 3-digit level of NACE classification. As for Import Penetration and Cr5, possible measurement errors in the data -- e.g., unsystematic variations in Cr5 from year to year – and a lack of information for some industries -- e.g., trade data in the service sectors -- persuaded us to use binary classifications to reduce as much as possible the distortions that could arise from using the continuous variable or multiple separating points. Nevertheless, as a sensitivity check, for foreign and domestic competition we exploited the available information to run robustness tests that use the continuous variable or different thresholds on the full sample.

Finally, we include the industry-level ROA profitability ratio (*ROA_industry)*, which is Ebitda/total assets, to provide a benchmark for gauging how much of the measured performance of a firm is due to the firm's – the CEO's -- efforts.

4.3 Descriptive evidence

We present summary statistics in Table 2. The table reports data also for non-family firms to allow the reader to understand better the characteristics that are specific to family firms. The data confirm the main features of the Italian governance system that were discussed in Section 3: a high share of family CEOs; low equity holdings of institutional investors; and a low fraction of firms that use stock-option plans.

Table 3 reports pay-related and firm performance variables by industry types and CEO family ties, with the test of significance of mean differences. We find that both the level of CEO total (cash) pay and

its variable share are similar in Type 1 and Type 2 industries as well as in low and high import competition industries, whereas they are larger within highly concentrated industries. When we include the equity-based component, we find weak evidence that the fraction of variable pay is larger in industries with less foreign competition. However, the propensity to implement stock option plans is significantly higher in industries with differentiated products, that are more exposed to import penetration, and that are more concentrated. With respect to CEO family ties: Both total pay and the variable cash component of family CEOs are significantly lower than for non-family CEOs (in line with Bandiera et al., 2015; and Block, 2011), whereas stock option plans are more frequent for non-family CEOs.

Finally, with respect to firm performance, both the Return to Asset (ROA) and the MTB ratios are significantly higher in industries with differentiated products, tougher foreign competition, and higher concentration. Firm performance is worse, on average, when the company is run by a family CEO (in line with Lins, Volpin, and Wagner, 2013; and Barontini Bozzi, 2011).

5 Results

5.1 The benchmark: CEO pay and market competition in non-family firms

We start by presenting estimates of equation (1) for a sample of (listed) non-family firms to set a benchmark that is consistent with the standard Anglo-Saxon model of corporate governance. For these "non-family" firms, the relationship between managerial incentives and the nature of competition are not confounded by the CEO's parental ties with the family nor by the over-monitoring by the large shareholder (see Section 2.2).[23] The results are in Table 4.

[23] The differences between family and non-family firms extend also to other variables. We verified the significance of these differences with a Chow-like test, which confirmed that the two samples can be separated with a gain of relevant information. The F-statistic for the null of no differences was: F(19,129)=2.47, with a p-value of 0.0015.

We find that the variable share of CEO pay (*Varshapay_cash*) is significantly related to firm performance in industries with differentiated products (Type 2) and where import penetration is high. In contrast, where the product is homogeneous (Type 1), or firms are more protected from foreign competitive pressure, the variable fraction of pay is unrelated to performance.[24] This evidence is consistent with our predictions #1 and #2 in Section 2.1, and provides a benchmark for the subsequent analysis of family-related aspects.

Turning to control variables, we find that *Varshapay_Cash* is higher when: the CEO is younger, which is consistent with the idea that older CEOs are more risk averse (Gomez-Mejia et al., 2003); the firm is larger (Baker and Hall, 2004); the remuneration committee is more independent (Elhalgrasey et al., 1999; Conyon and Peck, 1998); and the industry performance is higher. Surprisingly, the variable share of CEO pay is negatively related to the ownership share of institutional investors, and is lower in firms that are listed in the STAR segment. Both findings are in contrast with the view that institutional investors and more stringent corporate governance rules favor best-practice compensation policy (see Croci et al., 2012, for evidence in Europe). The remaining control variables of the corporate governance literature are either insignificant or weakly significant, after controlling for time invariant firm characteristics.

5.2 CEO pay and market competition in family firms

We now turn to the family firms: the sample of interest in our analysis. The model in Table 5 adds the dummy variable *FamCEO* and its interaction with *ROA* to test if the level of *Varshapay_cash* and its sensitivity to firm performance are statistically different between family and non-family CEOs.

[24] At the bottom of the table, we report the F-tests that verify the separability of the full sample of non-family firms into two sub-samples of Type1/Type2 and high/low import penetration industries. The reported tests ensure that the sample-specific variables in a fully unrestricted model statistically differ, thus supporting the choice of using two sub-samples.

Column (1) shows the estimates for the full sample, when we do not account for competitive conditions. None of the coefficients of interest are significant, which suggests no relationship between CEO pay, firm performance, and CEO familial ties with the controlling family. However, we find that if the CEO chairs the board of directors, the variable share of his pay can increase also when performance deteriorates, which is in line with the idea that CEO-Chair duality reinforces the power to reward the CEO even when he should be either penalized or urged to do better. Turning to control variables, we find that *Varshapay* increases with firm size and firm age and with the CEO's tenure, but at a decreasing rate. Possibly, as the CEO's tenure increases, his effort becomes less effective, and his pay becomes less sensitive to firm performance.[25]

When we investigate how the sensitivity of a CEO's variable pay to firm performance varies with the nature of competition in the industry, the differences between family and non-family CEOs become evident: First, *ROA* is insignificant in all columns: The variable pay of professional CEOs in family firms is not significantly sensitive to the firm's performance. This result is in line with Hypothesis #3. Second, the coefficients on the dummy variable *FamCEO* and on the interaction term *ROA*FamCEO* indicate that both the pay level and its sensitivity to performance differ between family and non-family CEOs, depending on the competitive mechanisms. In particular, in industries with differentiated products (*Type 2*) or with high import penetration (*High-Imp*), the variable share of pay of family CEOs is significantly lower, but more tightly related to the firm's performance. This result is consistent with our Hypothesis #4. In contrast, where the product is homogeneous (*Type 1*) or less affected by foreign competition (*Low-Imp*), we find no evidence of incentive pay for both family and non-family CEOs.

[25] When we include only the linear term, its coefficient is insignificant; this is true also when we use the logarithmic transformation.

Comparing the results of family CEOs (Table 5) to those of professional CEOs in non-family firms (Table 4), we note that they are similar. This suggests that the same competitive mechanisms that motivate incentive contracts in widely-held companies are at work in closely-held family firms that are run by a member of the family. In turn, this indicates that product market characteristics are more important than is firm ownership in shaping managerial compensation.

Examining control variables, we find that, in Columns (3) and (5), *Varshapay_cash* increases with the firm's financial leverage, though at a decreasing rate: Concerns about increasing debt levels may lead to stronger incentives, which is in line with Jensen and Meckling's (1976) idea of a disciplinary role of debt (though decreasing at the margin).[26] In Column (5), *Dual class share* -- a measure of the wedge between control rights and cash-flow rights -- is negative and significant: This voting structure, which is often associated with minority shareholders' expropriation, is more likely associated with lower pay-performance sensitivity when the firm operates in an industry that is protected from foreign competition.[27]

Table 6 extends our analysis to domestic competition, as measured by the 5-firm concentration ratio. We use two dichotomous variables to separate firms in high versus low concentration industries: above and below the 50th and the 75th percentiles, respectively, of the distribution of CR5 that has been constructed by the National Institute of Statistics. The results in Table 6 show that in highly concentrated

[26] We also tested a specification with the log transformation of the ratio of debt to total assets, but we found that the coefficient is insignificant in all columns. The results are available on request.

[27] As anticipated in Section 4, we performed a robustness test of the results on the full sample (as opposed to separate sub-samples) with the use of a semi-continuous variable for import penetration, which is constructed to capture four different thresholds of import penetration intensity. We found that the result on the higher PPS of family CEOs hold in this specification: $Varshapay_{it} = \alpha + \beta_1(ROA_{it-1}) + \beta_2(FAMCEO_{it-1}) + \beta_3(ROA_{it-1})x(IMP\_PEN_{it-1}) + \beta_4(ROA_{it-1})x(FAMCEO_{it-1})x(IMP\_PEN_{it-1}) + \Sigma\beta_j \mathbf{X}_{jt-1} + \mu_i + \lambda_t + \varepsilon_{it}$. The results show that, while the β_1 coefficient is positive but insignificant and the β_3 coefficient is insignificantly negative, the β_4 coefficient is positive and significant: The PPS of Family CEOs in industries with higher import penetration is significantly higher, in line with the evidence from the separate sub-samples in Table 5. The results are available on request. Unfortunately, we could not repeat the full sample analysis with a continuous or semi-continuous version of the R&D and Advertising intensity data, because they are unavailable.

industries -- Columns (1) and (3) -- the variable share of family CEOs' pay is lower, but more related to firm performance than for non-family CEOs. The evidence is thus very similar to what we obtained for differentiated product and high import penetration industries. Conversely, in less concentrated industries variable pay is unrelated to performance, regardless of the family status of the CEO. On the one hand, these findings may result just from the high correlation between industry concentration, R&D, and advertising intensity and import penetration (see the correlation matrix in Appendix Table A4). On the other hand, the results suggest that where concentration is low, competitive pressure appears as a substitute for managerial incentives.[28]

In the Appendix Table A1, we report the estimates of the regression analyses that use the market-to-book ratio as a measure of performance.[29,30]

Finally, we allow for the presence of owned shares and stock options. To this end, we re-estimate the previous models, but include the equity-based part of CEO compensation: -- the fair value of equity compensation -- in the variable share of the CEO pay. We calculate two alternatives for the dependent variable: One is *Varshapay_eq*: the ratio of the sum of cash and equity compensation to total pay (including the equity-based pay). The other is the log of the numerator of the ratio *Varshapay_eq*: the log of the sum of cash bonus, non-monetary benefits and the difference between the fair value of equity compensation in year t and t-1.

[28] The results hold when we estimate a model with the continuous variable -- CR5 -- for the full sample. We find that on average PPS is lower where concentration is higher, but not for family CEOs, as the variable share of family CEOs' pay is higher when the Cr5 is higher. The results are available on request.

[29] The results show that, in line with the previous evidence, the variable share of total pay is significantly related to MTB in Type 2 and high import penetration industries and -- different from Table 5 -- significant in less-concentrated industries. *Varshapay_cash* is lower for family CEOs as well as for CEOs who also hold the Chair position. However, we found no differences between family and non-family CEOs, so we report the results without the interactions. More generally, it is not surprising that, in Italy, CEO pay is more sensitive to an accounting measure of performance than to a market-based one, because the stock market is still thin and relatively underdeveloped.

[30] As we indicated in footnotes 14 and 18, we also performed a battery of robustness checks that use alternative definitions of the dependent variable -- log of total pay; the ratio of total pay to total assets; and its log transformation -- and alternative estimation methods: Tobit regressions; and fractional response probit regression model. Comfortingly, the results confirm the evidence in Tables 5 and 6, regardless of the definitions and the estimation methods.

Table 7 reports the regression results. Although the number of observations available for the test is unavoidably reduced (recall that data on stock options are available from 2012 only), the estimated results confirm the previous findings. In industries with differentiated products or that are subject to foreign competitive pressure, both the log of total (cash and equity) variable pay and its share of total CEO pay (*Varshapay_eq*) are lower for family CEOs, but more sensitive to firm performance than is true for non-family CEOs. The evidence is in line with Hypothesis #4.[31]

6 Robustness

In this section, we present robustness tests that are designed to address concerns about: possible pay manipulation by family CEOs; alternative definitions of family firms; and potential endogeneity of the relationship between CEO pay and firm performance and other control variables.

6.1 Camouflage

We first consider whether the evidence of incentive pay for family CEOs might result from camouflage activities in the shape of "pay for luck" (Bertrand and Mullainathan, 2001). This expression defines a situation in which the variable component does not reward the CEO for his contribution to firm performance, but for his "luck". Under optimal contracting (Holmstrom, 1979; Edmans and Gabaix, 2016), managers should be rewarded only for improvements that result from their effort, not from sheer luck or common external circumstances, since positive industry trends or shocks benefit all firms alike. In these events, the CEO would not deserve any prize for the firm's higher profits.

[31] The results for the homogenous and low import penetration industries were insignificant (as they were in Tables 4, 5, and 6) and are available on request.

To approximate the CEO-specific "real" contribution to firm performance, we subtract the average Return on Assets[32] of industry *j* in year *t* from the ROA of firm *i* that operated in industry *j* in year *t* (see for example Aggarwal and Samwick, 1999). The positive difference between the firm's ROA and *ROA_industry* is meant to capture the CEO's *Merit* beyond the industry trend: if the CEO really "makes a difference" for his firm's performance.

The results are presented in Tables 8 (cash-variable pay) and 9 (both cash and equity-based variable pay). They show that the variable share of family CEO pay is positively and significantly related to *Merit* only in Columns (1) and (3): The competitive mechanisms in product-differentiated markets and in industries that are subject to foreign competition lead to performance-related pay.

6.2 Alternative definitions of "family firm"

Our definition of family firm considers a relatively high threshold of equity ownership: higher than the threshold that is generally used in the literature (often 20% or 30%, but in the US even lower: e.g., 5% in Miller et al., 2007). This choice is motivated by the very high average stake owned by the largest shareholder in Italian firms (47.7% according to CONSOB's annual report in 2017). Nevertheless, as a robustness test, we lowered the threshold to 30%, and thereby included 17 more listed companies in the sample of "family firms". The results in Table 10 are very similar to those in Table 5 and statistically significant. The sensitivity of variable pay to performance of family CEOs is higher in industries where R&D and advertising intensity or import penetration are higher, and the variable share of their pay is lower than that of non-family CEOs', but more related to firm performance.

Next, we turn to the definition of "lone founder firm" by Le Miller et al. (2007): a firm in which the firm's founder still holds the controlling stake, and the other members of the family do not play any

[32] The average industry ROA is obtained by aggregated annual industry data (Mediobanca, *Dati cumulativi delle società italiane* annual report) -- not from the in-sample averages.

role. To this purpose, we first identified the firm's founder in the full sample of firms: both family and non-family; then we checked whether the founder is still alive and running the company as the CEO. Finally, we estimated the base model with a focus on the pay-performance sensitivity of the "founder-CEO".

The results in Table 11, however, are uninformative: Both the dummy variable *Founder-CEO* and its interaction with ROA are insignificant -- possibly due to the relatively small number of founder CEOs who are still operative in the sample of listed private firms (16%). The results show that the share of variable CEO pay is significantly related to firm performance where products are differentiated and import penetration is high, which is in line with the previous findings.

6.3 The direction of the relationship between pay, performance and other variables

The relationship between CEO pay and firm performance raises potential endogeneity concerns. Although the usual modeling of the pay-performance relationship designates the pay as a function of firm performance (Jensen and Murphy, 1990; Murphy, 1985; Edmans and Gabaix, 2016), the extant correlation could also result from a relationship whereby higher CEO pay leads to better firm performance.

This ambiguity calls for a test of the direction of the relationship between the two variables. To this purpose, we perform Granger (1969) causality tests that estimate the following bivariate autoregressive processes, where CEO pay is regressed on once- and twice-lagged performance terms as well as on its own lags, and similarly for firm performance:

$$CEOpay_{it} = \beta_1(CEOpay_{it-1} + \beta_2 CEOpay_{it-2} + \alpha_1 ROA_{it-1} + \alpha_2 ROA_{it-2} + \Sigma\beta_j \mathbf{X}_{jt-1} + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

$$ROA_{it} = \beta_1 CEOpay_{it-1} + \beta_2 CEOpay_{it-2} + \alpha_1 ROA_{it-1} + \alpha_2 ROA_{it-2} + \Sigma\beta_j \mathbf{X}_{jt-1} + \mu_i + \lambda_t + \varepsilon_{it} \quad (3)$$

If *ROA* Granger-causes *CEO pay* but not vice versa, then α_1 and α_2 should be jointly significant in Equation (2), while β_1 and β_2 in Equation (3) are not: do not contribute any explanatory power in the

regression. Therefore, we test the joint significance of both sets of coefficients. In the regressions, we include the full set of control variables while accounting for firm and time fixed effects.

In Table 12, we report the results from fixed-effects estimation and from instrumental-variables estimation, as this is a dynamic model that is estimated on panel data. Therefore, we have to deal with the dynamic panel bias, which stems from the correlation between the lagged dependent variable and the error term (Arellano and Bond, 1991). We thus present the results using the System Generalized Method of Moments estimator that was proposed by Arellano and Bond (1991) and Blundell and Bond (1998). This estimator deals with the dynamic panel bias as well as with the weak instrument problem that arises when the lagged dependent variable is persistent.

The results from fixed effects and GMM estimates in Table 12 lead to similar conclusions: The F- and Wald tests show that the once- and twice-lagged ROA coefficients are jointly significant in the CEO pay regression, while the two CEO pay terms are individually and jointly insignificant in the ROA regression: Firm performance Granger-causes CEO pay -- and not vice-versa.

Other variables could raise similar endogeneity concerns. For example, debt levels could well be a function of CEO payment methods. Indeed, in managerial firms, where shareholders may have an incentive to shift risk to the debtholders in the event of financial distress, there may be a link between the debt ratio and managerial compensation. The agency cost of debt in managerial firms arises from the different attitude toward risk between dispersed shareholders and debtholders, with the former choosing investment opportunities that are riskier than what is desired by the latter. Then, if managerial compensation in a levered firm could act as a commitment device to minimize the agency cost of debt (John and John, 1993), high-levered firms would exhibit lower pay-performance sensitivity of managerial compensation than firms that are equity-financed.

For several reasons, we expect the endogeneity problem of debt that we may encounter in managerial firms to be absent or significantly weak in family firms. Indeed, family firms have fewer agency conflicts between debt and equity holders since the controlling shareholders are undiversified and more risk averse because of the substantial wealth at risk and the desire to pass the firm to the next generation. All of this makes firm survival an important objective in family firms. Empirical evidence confirms that family firms have lower debt levels than do managerial firms (Anderson, Mansi, and Reeb, 2003).

Nevertheless, to check whether this is the case, we performed the same Granger-causality test that we adopted for the ROA/CEO Pay relationship. The results show that "*Financial Leverage*" -- the ratio of financial debt to total assets – significantly contributes to the explanation of CEO Pay -- which confirms previous evidence -- but the reverse is not true: The lagged CEO Pay terms are individually and jointly insignificant in the Financial leverage equation (the results are available on request). The evidence suggests that we can reject the hypothesis that debt is potentially endogenous.

Finally, we have considered the potential endogeneity of the variable "*Independence of Remuneration Committee*": A powerful CEO might influence both the pay and the composition of the remuneration committee, which determines the compensation policy. Hence, to check whether this is the case, we performed the Granger-causality test between CEO pay and the share of independent directors in the remuneration committee. The results of the test (which are available upon request) show that we can reject the hypothesis that the Independence of Remuneration Committee is potentially endogenous.

7 Conclusions

We analyze how the characteristics of product market competition and family ties shape CEO compensations in Italian listed family firms in the period 2000-2017. To the best of our knowledge, we

are the first to study whether and how family and non-family CEOs' pay changes in industries that exhibit different levels of competitive structure.

We find that managerial incentives are stronger in industries with product differentiation, higher import penetration, or higher domestic market concentration. Family CEOs' fraction of variable pay is lower but is more closely related to firm performance than is true for professional CEOs; we interpret this result as a consequence of family-related agency problems. Moreover, family CEOs may choose to commit to incentive pay in order to signal to investors that they will not dissipate the firm's value. Indeed, when we test the hypothesis of "pay for luck", we find that the variable pay of family CEOs remains significantly related to performance even when we control for the industry specific results.

This paper provides three main contributions to the literature: First, we find that the market mechanism is likely to *substitute* incentive contracts in homogeneous product markets and in less concentrated industries, and to *complement* them in differentiated product markets, in markets that are open to international trade, and in more concentrated industries. Second, by exploiting within-firm heterogeneity, we show that family and external CEOs' incentive schemes differ *within* family firms: Analyses that exploiting CEO specific characteristics -- such as familial ties and family direct involvement -- provide sharper insights than do those that rely exclusively on the dichotomy of family/non-family firms. Finally, using non-family firms as a benchmark, we find that the sensitivity of variable pay to firm performance of professional CEOs is significant in the same types of industries as it is for family CEOs: The characteristics of product market competition shape the incentive schemes of both family CEOs and professional CEOs in widely-held firms in a similar way. Conversely, in family firms where the CEO does not belong to the family, the large shareholder's monitoring still substitutes for incentives.

Two limitations of our data are worth highlighting: First, the analysis of managerial variable pay that includes stock plans and stock options covers a relatively short period -- 2012-2017 -- that may have

been affected by the severe financial crisis that hit Italy. It would thus be important to extend the analysis for a longer period to verify the robustness of our findings.

Second, the absence of a relationship between variable pay and firm performance for outside CEOs in family firms suggests that variable pay is used for reasons other than incentives. This issue would deserve closer scrutiny. For instance, Bandiera et al. (2015) found that Italian family firms that operate in the service industries are less likely to offer bonuses as a function of individual or team performance, and that they reward "fidelity" more than talent. Such an investigation, however, would require information on firm internal organization and detailed measures of managerial practices relative to incentives, dismissals, and promotions that we lack (see, for example, Bloom et al., 2019).

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Table 1 – Variable Descriptions

Rtotcomp	CEO's total pay (cash) in '000 of 2000 constant Euros
Varshapay_cash	Share of variable pay to total CEO pay (only cash components)
Varshapay_eq	Share of variable pay to total CEO pay (incl. the fair value of equity-based components) (2012-)
Stockoptiondum	Dummy variable = 1 if the firm has a stock option plan (available from 2005)
ROA	Ratio of Ebitda to total assets (firm's accounting profitability)
Market-To-Book ratio (MTB)	Ratio of firm value (total assets – book value of common equity + market value of common equity) to total assets (financial performance)
FamCEO	Dummy variable = 1 if CEO is a member of the controlling family by blood or marriage ties
CEO_chair	Dummy variable = 1 if the CEO is also Chair of the Directors' Board
CEO tenure	The number of years that the CEO has been in charge in the firm
CEO age	The CEO's age in years
CEO turnover	Dummy variable = 1 if a new CEO is appointed
Firm size	Log of real sales (firm size) in '000 of 2000 constant Euros
Financial leverage	Ratio of financial LT and ST debt to total assets
Inst_share	Total equity share that is held by institutional investors with an equity share>=2% (CONSOB)
Dual class share	Dummy variable = 1 if the firm issues dual-class shares (CONSOB)
Voting pact	Dummy variable = 1 if a few minority shareholders have signed a voting pact/coalition (CONSOB)
Indep Rem Comm	Fraction of independent directors on the Remuneration Committee
STAR	Dummy variable = 1 if the firm is listed in the STAR segment of the stock exchange (high transparency and corporate governance requirements) (Borsa Italiana)
Firm age	Number of years since the firm's founding
ROA_industry	Industry-level ratio of Ebitda to total assets (benchmark for profitability) (Mediobanca)
Type 2	Dummy variable = 1 if the firm's primary activity is in a 3-digit industry with high R&D and advertising to sales ratio (Davies, Lyons et al., 1996, for the methodology and the primary sources).
High Imp_Pen	Dummy variable =1 if the firm's primary activity is in a 3-digit industry with import penetration (year 2000) above the mean (OECD-STAN Database for structural Analysis, ISIC-Rev4)
Cr5_q2	Dummy variable = 1 if the industry CR5 is above the 50th percentile (year 2008) (ISTAT)
Cr5_q3	Dummy variable = 1 if the industry CR5 is above the 75th percentile (year 2008) (ISTAT)
Family	Dummy variable = 1 if the firm is majority (50%) controlled by individuals related by blood or marriage
Family 30	Dummy variable = 1 if the firm is controlled by individuals related by blood or marriage with 30%
Founder_CEO	Dummy variable = 1 if CEO is also the firm's founder

Notes: All variables were constructed by the authors (see Section 4) unless otherwise specified.
Total compensation (Rtotcomp) and Firm size (i.e., a firm's sales) are in thousands of 2000 constant Euros.

Table 2 - Summary Statistics: All Family Firms

	Family Firms							
	mean	sd	min	p25	p50	p75	max	count
Rtotcomp	801.302	969.489	61.39	299.22	499.57	949.10	17191.66	1092
Varshapay_cash	0.120	0.199	0.00	0.00	0.01	0.20	1.00	1092
Varshapay_eq	0.251	0.221	0.001	0.027	0.218	0.431	0.792	187
Stockoptiondum	0.283	0.451	0.00	0.00	0.00	1.00	1.00	1053
ROA	0.093	0.068	-0.14	0.06	0.09	0.13	0.38	1092
MTB	1.399	0.885	0.37	0.96	1.15	1.52	9.06	1090
Merit	0.023	0.068	-0.23	-0.02	0.03	0.06	0.24	1092
FamCEO	0.575	0.495	0.00	0.00	1.00	1.00	1.00	1092
CEO_chair	0.333	0.472	0.00	0.00	0.00	1.00	1.00	1092
CEO tenure	8.739	7.521	1.00	3.00	6.00	12.00	40.00	1092
CEO age	55.895	9.720	35.00	48.00	55.00	63.00	86.00	1092
CEO turnover	0.096	0.295	0.00	0.00	0.00	0.00	1.00	1092
Firm size (real sales)	808504	1392214	16307	144759	277991	855961	11764183	1092
Financial leverage	0.278	0.147	0.00	0.17	0.28	0.37	0.83	1092
Inst_share	3.196	4.661	0.00	0.00	0.00	5.00	26.37	1092
Dual class share	0.337	0.473	0.00	0.00	0.00	1.00	1.00	1092
Voting pact	0.246	0.431	0.00	0.00	0.00	0.00	1.00	1092
Indep.Rem.Comm	0.596	0.374	0.00	0.33	0.67	1.00	1.00	1092
STAR	0.439	0.496	0.00	0.00	0.00	1.00	1.00	1092
Firm age	58.364	39.475	0.00	33.00	49.00	78.00	271.00	1092
ROA_industry	0.070	0.032	-0.01	0.05	0.07	0.09	0.18	1092
Type 2	0.651	0.477	0.00	0.00	1.00	1.00	1.00	1092
High_Imp_Pen	0.647	0.478	0.00	0.00	1.00	1.00	1.00	1092
Cr5mean_q2	0.522	0.500	0.00	0.00	1.00	1.00	1.00	1092
Cr5mean_q3	0.387	0.487	0.00	0.00	0.00	1.00	1.00	1092
Family 30	1	0	0	1.00	1.00	1.00	1.00	1092
Founder_CEO	0.158	0.365	0.00	0.00	0.00	0.00	1.00	1092
	Non-Family Firms							
Rtotcomp	1549.839	3105.463	86.00	410.91	810.10	1535.92	44972.44	373
Varshapay_cash	0.215	0.228	0.00	0.00	0.17	0.39	0.96	373
Varshapay_eq	0.298	0.180	0.010	0.158	0.272	0.405	0.766	82
Stockoptiondum	0.506	0.501	0.00	0.00	1.00	1.00	1.00	354
ROA	0.100	0.126	-0.24	0.06	0.08	0.11	1.57	373
MTB	1.374	0.837	0.44	0.97	1.15	1.41	7.33	373
Merit	0.032	0.132	-0.40	-0.01	0.02	0.06	1.56	373
FamCEO	0.029	0.169	0.00	0.00	0.00	0.00	1.00	373
CEO_chair	0.220	0.415	0.00	0.00	0.00	0.00	1.00	373
CEO tenure	6.532	5.169	1.00	3.00	5.00	9.00	23.00	372
CEO age	59.995	101.950	35.00	49.00	55.00	60.00	2017.00	373
CEO turnover	0.139	0.347	0.00	0.00	0.00	0.00	1.00	373
Firm size (real sales)	5079662	12381148	15026	150094	615753	3465593	81136448	373
Financial leverage	0.527	1.837	0.00	0.16	0.29	0.39	24.07	373
Inst_share	6.887	7.501	0.00	0.00	4.86	11.16	44.45	373
Dual class share	0.349	0.477	0.00	0.00	0.00	1.00	1.00	373
Voting pact	0.563	0.497	0.00	0.00	1.00	1.00	1.00	373
Indep Rem Comm	0.595	0.328	0.00	0.40	0.67	0.75	1.00	373
STAR	0.249	0.433	0.00	0.00	0.00	0.00	1.00	373
Firm age	59.971	44.606	5.00	25.00	45.00	87.00	170.00	373
ROA_industry	0.068	0.035	-0.00	0.04	0.07	0.09	0.18	373
Type 2	0.592	0.492	0.00	0.00	1.00	1.00	1.00	373
High_Imp_Pen	0.466	0.500	0.00	0.00	0.00	1.00	1.00	373
Cr5mean_q2	0.643	0.480	0.00	0.00	1.00	1.00	1.00	373
Cr5mean_q3	0.579	0.494	0.00	0.00	1.00	1.00	1.00	373
Family 30	0.461	0.499	0.00	0.00	0.00	1.00	1.00	373
Founder_CEO	0.161	0.368	0.00	0.00	0.00	0.00	1.00	373

Notes: Total compensation (Rtotcomp) and a firm's sales are in thousands of 2000 constant Euros.

Table 3 - Summary Statistics and t-Tests of Mean Differences

	mean	sd	count	mean	sd	count	Sign.
	High R&D and Advertising (Type 2)			Low R&D and Advertising (Type 1)			
Rtotcomp	828.779	788.408	753	827.144	1317.788	417	-
Varshapay_cash	0.124	0.191	753	0.124	0.228	417	-
Varshapay_eq	0.248	0.213	117	0.298	0.239	41	-
Stockoptiondum	0.356	0.479	472	0.269	0.444	275	**
ROA	0.104	0.069	740	0.076	0.062	395	***
MTB	1.525	0.876	750	1.202	0.858	398	***
	High Import Penetration			Low Import Penetration			
Rtotcomp	830.621	823.008	746	823.930	1272.749	424	-
Varshapay	0.120	0.196	746	0.132	0.220	424	-
Varshapay_eq	0.243	0.218	122	0.322	0.217	36	*
Stockoptiondum	0.374	0.484	487	0.231	0.422	260	***
ROA	0.106	0.071	736	0.072	0.055	399	***
MTB	1.503	0.884	746	1.246	0.857	402	***
	High concentration (CR5_q2)			Low concentration (CR5_q2)			
Rtotcomp	957.414	1149.456	619	683.032	799.280	551	***
Varshapay	0.139	0.223	619	0.107	0.181	551	***
Varshapay_eq	0.269	0.217	84	0.252	0.224	74	-
Stockoptiondum	0.392	0.489	411	0.241	0.428	336	***
ROA	0.106	0.069	600	0.081	0.065	535	***
MTB	1.589	1.069	608	1.214	0.545	540	***
	Family CEO			Non-family CEO			
Rtotcomp	719.728	801.611	666	971.530	1216.470	504	***
Varshapay	0.081	0.170	666	0.182	0.231	504	***
Varshapay_eq	0.239	0.024	80	0.284	0.0249	78	-
Stockoptiondum	0.256	0.437	402	0.403	0.026	345	***
ROA	0.091	0.067	654	0.099	0.069	481	***
MTB	1.359	0.734	658	1.485	1.047	490	***

Note: Total compensations (Rtotcomp) is in thousands of 2000 constant Euros.
***, **, * denote significance of the mean differences at 1%, 5%, and 10%.

Table 4 – Pay-Performance Sensitivity in Non-Family Firms (Benchmark)

Dep. Var. Varshapay_cash	(1) All	(2) Type2	(3) Type1	(4) High-Imp	(5) Low-Imp
ROA	0.531*	0.955**	0.029	0.841***	0.316
	(0.291)	(0.363)	(0.411)	(0.293)	(0.454)
CEO_chair	0.012	0.073	0.096	0.097**	-0.039
	(0.072)	(0.048)	(0.176)	(0.044)	(0.131)
ROA_CEO_chair	-0.094	-0.108	-0.503	-0.259	-0.178
	(0.225)	(0.195)	(1.040)	(0.217)	(0.949)
CEO tenure	0.008	0.003	0.022	0.004	0.008
	(0.011)	(0.011)	(0.015)	(0.010)	(0.017)
CEO tenure^2	-0.000	0.000	-0.001	-0.000	0.000
	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
CEO age	-0.003	-0.009**	0.001	-0.009*	-0.001
	(0.003)	(0.004)	(0.004)	(0.005)	(0.004)
CEO turnover	-0.011	-0.049	0.001	-0.035	-0.015
	(0.040)	(0.051)	(0.070)	(0.064)	(0.062)
Log(Firm size)	0.069*	0.113**	0.043	0.176***	-0.007
	(0.040)	(0.050)	(0.096)	(0.042)	(0.050)
Financial leverage	-0.021	-0.030	-0.224	-0.040*	0.154
	(0.019)	(0.023)	(0.694)	(0.022)	(0.611)
Financial leverage^2	-0.000	-0.000	0.237	0.000	0.050
	(0.001)	(0.001)	(0.860)	(0.001)	(0.754)
Inst_share	-0.002	-0.007*	0.004	-0.007**	0.003
	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)
Dual class share	0.075	0.104	-0.022	-0.024	0.146*
	(0.073)	(0.098)	(0.075)	(0.102)	(0.081)
Voting pact	-0.054	-0.080	0.055	-0.006	-0.118
	(0.056)	(0.063)	(0.071)	(0.027)	(0.094)
Indep. Rem. Committee	0.150**	0.032	0.234**	-0.042	0.216*
	(0.069)	(0.092)	(0.110)	(0.049)	(0.125)
STAR	-0.028	-0.078*	0.120*	-0.024	0.063
	(0.042)	(0.042)	(0.065)	(0.036)	(0.093)
Firm age	0.006	0.009	-0.001	0.024**	-0.004
	(0.006)	(0.009)	(0.012)	(0.008)	(0.007)
ROA_industry	1.923**	1.753	2.215	3.601***	1.321
	(0.840)	(1.415)	(2.436)	(1.254)	(1.411)
Year and Firm FE	Yes	Yes	Yes	Yes	Yes
H_0: Cross-sample differences =0 F-Test (p-value)		5.39 (0.000)		3.79 (0.000)	
Observations	372 [43]	220[23]	152[20]	173[20]	199[23]
R2	0.187	0.356	0.220	0.395	0.241

Notes: Fixed effects estimates. See Table 1 and Section 4 for variable definitions. Robust standard errors in parentheses are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10

Table 5 - Pay-Performance Sensitivity in Family Firms

Dep. Var. Varshapay_Cash	(1) All	(2) Type2	(3) Type1	(4) High-Imp	(5) Low-Imp
ROA	0.102	0.042	0.204	0.069	0.099
	(0.235)	(0.276)	(0.379)	(0.280)	(0.382)
FamCEO	-0.041	-0.103***	0.010	-0.065*	-0.022
	(0.032)	(0.035)	(0.051)	(0.040)	(0.036)
ROA _FamCEO	0.400	0.807**	-0.137	0.706**	0.107
	(0.273)	(0.328)	(0.408)	(0.339)	(0.375)
CEO_chair	-0.008	0.014	0.014	-0.001	-0.002
	(0.022)	(0.032)	(0.047)	(0.026)	(0.041)
ROA _CEO_chair	-0.516**	-0.763***	-0.155	-0.716***	-0.145
	(0.203)	(0.268)	(0.368)	(0.253)	(0.347)
CEO tenure	0.009**	0.010	0.008*	0.009*	0.007
	(0.004)	(0.006)	(0.004)	(0.005)	(0.005)
CEO tenure^2	-0.000***	-0.000*	-0.000*	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO age	-0.002	-0.002	-0.001	-0.001	-0.006*
	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)
CEO turnover	-0.011	-0.021	0.028	-0.008	-0.011
	(0.020)	(0.023)	(0.032)	(0.026)	(0.031)
Log(Firm size)	0.069***	0.080***	0.069**	0.079***	0.095***
	(0.023)	(0.029)	(0.028)	(0.029)	(0.031)
Financial leverage	0.288	0.003	0.753*	0.051	0.674*
	(0.222)	(0.213)	(0.375)	(0.219)	(0.344)
Financial leverage^2	-0.450	0.074	-1.317**	0.036	-1.169**
	(0.384)	(0.308)	(0.591)	(0.320)	(0.478)
Inst_share	-0.002	-0.002	-0.003	-0.003	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Dual class share	-0.033	-0.011	-0.046	-0.002	-0.218**
	(0.037)	(0.039)	(0.092)	(0.037)	(0.088)
Voting pact	0.015	-0.011	0.077*	0.016	0.046
	(0.024)	(0.028)	(0.043)	(0.029)	(0.039)
Indep Rem Committee	-0.044	-0.033	-0.047	-0.026	-0.080
	(0.027)	(0.031)	(0.063)	(0.032)	(0.056)
STAR	0.033	0.021	0.024	-0.010	0.058
	(0.040)	(0.040)	(0.057)	(0.044)	(0.056)
Firm age	0.008***	0.009**	0.000	0.008**	0.005
	(0.003)	(0.003)	(0.005)	(0.003)	(0.005)
ROA _industry	-0.666	-0.212	-1.649*	-0.239	-1.434
	(0.490)	(0.641)	(0.877)	(0.695)	(0.899)
Year and Firm FE	Yes	Yes	Yes	Yes	Yes
H_0: Cross-sample differences =0 F-Test (p-value)		1.83 (0.029)		1.63(0.063)	
Observations[N. Firms]	1,092 [102]	711[63]	381[39]	706[59]	386[43]
R-squared	0.150	0.190	0.194	0.157	0.255

Notes: Fixed effects estimates. See Table 1 and Section 4 for variable definitions. Robust standard errors in parentheses are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10

Table 6 - PPS in Family Firms in High/Low Industry Concentration Industries

Dep. Var.	(1)	(2)	(3)	(4)
Varshapay_Cash	High conc 50th	Low Conc 50th	High Conc 75th	Low Conc 75th
ROA	-0.162	0.447	-0.290	0.176
	(0.259)	(0.379)	(0.428)	(0.333)
FamCEO	-0.088*	-0.008	-0.123**	-0.017
	(0.049)	(0.039)	(0.060)	(0.036)
ROA _FamCEO	0.990***	-0.042	0.981**	0.352
	(0.341)	(0.322)	(0.457)	(0.335)
CEO_chair	0.000	-0.005	0.016	-0.018
	(0.041)	(0.023)	(0.050)	(0.022)
ROA _CEO_chair	-0.975***	-0.375	-0.948**	-0.371
	(0.357)	(0.237)	(0.408)	(0.240)
Control Variables				
Tenure, tenure^2, CEO age, CEO turnover, Firm size, Financial leverage, Fin. Lev^2, Firm age, Institutional investor equity share, Dual-class shares, Voting pact, STAR, Independence of remuneration committee, Industry ROA, Firm and Year FE				
H_0: Cross-sample differences =0 F-Test (p-value)	1.51 (0.098)		1.52 (0.094)	
Observations	570 [55]	522[47]	423[39]	669[63]
R-squared	0.223	0.164	0.279	0.122

Notes: Fixed effects estimates. See Table 1 and Section 4 for variable definitions. Robust standard errors in parentheses are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10

Table 7 - PPS When CEO "Pay" Includes Equity-Based Compensation

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Variables	Log (bonus+non-monetary benefits+ Δfairval)			Varshapay_eq		
	All	Type 2	High_imp	All	Type 2	High_imp
ROA	7.176	9.578	11.898*	0.861	1.663*	1.849**
	(8.084)	(6.141)	(6.062)	(1.191)	(0.953)	(0.878)
FamCEO	-3.153**	-3.367**	-3.663**	-0.310*	-0.306*	-0.352*
	(1.479)	(1.557)	(1.679)	(0.157)	(0.162)	(0.177)
ROA _famCEO (*p-value*)	30.764*	32.208*	35.469*	2.916 *(12%)*	2.643 *(16%)*	3.179 *(12%)*
	(15.650)	(16.315)	(18.058)	(1.834)	(1.843)	(2.003)
CEO_chair	2.692	3.046	3.525	0.268	0.290	0.381
	(2.445)	(2.653)	(2.706)	(0.266)	(0.290)	(0.289)
ROA _CEO_chair	-30.342*	-34.089*	-37.513**	-2.914	-3.283	-3.860*
	(15.955)	(17.037)	(17.823)	(1.836)	(2.027)	(1.973)
Control Variables						
CEO tenure, CEO tenure^2, CEO age, CEO turnover, Firm size, Financial leverage, Fin. Lev^2, Firm age, Institutional investor equity share, Dual-class shares, Voting pact, STAR, Independence of remuneration committee, Industry ROA, Firm and Year FE						
Observations [firms]	157 [49]	117[34]	121[35]	157 [49]	117[34]	121[35]
R2	0.317	0.358	0.412	0.245	0.290	0.307

Notes: Fixed effects estimates. See Table 1 and Section 4 for variable definitions. Robust standard errors in parentheses are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10

Table 8 - Pay for Luck

Dep. Variable: Varshapay	(1) Type 2	(2) Type 1	(3) High Imp	(4) Low Imp
Merit (Firm ROA-Industry ROA)	0.100	0.543	0.177	0.395
	(0.242)	(0.365)	(0.270)	(0.425)
FamCEO	-0.048*	0.008	-0.021	-0.017
	(0.026)	(0.042)	(0.029)	(0.044)
Merit_famCEO	0.803**	-0.258	0.752*	-0.148
	(0.361)	(0.445)	(0.392)	(0.458)
CEO_chair	-0.037	-0.008	-0.043**	-0.036
	(0.024)	(0.041)	(0.021)	(0.052)
Merit_CEO_chair	-0.902***	-0.564	-0.957***	-0.521
	(0.272)	(0.527)	(0.281)	(0.522)
Control Variables				
CEO tenure, CEO tenure^2, CEO age, CEO turnover, Firm size, Financial leverage, Fin. Lev^2, Firm age, Institutional investor equity share, Dual-class shares, Voting pact, STAR, Independence of remuneration committee, Industry ROA, Firm and Year FE				
Observations [Firms]	711[63]	381[39]	706[59]	386[43]
R-squared	0.193	0.184	0.161	0.250

Notes: Fixed effects estimates. See Table 1 and Section 4 for variable definitions. Robust standard errors in parentheses are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10

Table 9 - Pay for Luck When Pay Includes Equity-Based Compensation

lnvarpayeq=log(bonus+bnf_non_mnt+diffairval)

Dep. Variable Log(Var-pay-eq)	(1) Type 2	(2) Type 1	(3) High Imp	(4) Low Imp
Merit (Firm ROA-Industry ROA)	8.094	15.483	9.833*	-44.124
	(5.935)	(24.489)	(5.586)	(37.235)
FamCEO	-1.302**		-1.348**	
	(0.625)		(0.602)	
Merit_famCEO	34.621**	-35.967	36.638**	66.694
	(16.526)	(74.984)	(17.254)	(89.055)
CEO_chair	-0.376		-0.260	
	(1.153)		(1.056)	
Merit_CEO_chair	-34.535**	-0.778	-35.946**	-393.847**
	(16.843)	(75.775)	(16.626)	(136.471)
Control Variables				
CEO tenure, CEO tenure^2, CEO age, CEO turnover, Firm size, Financial leverage, Fin. Lev^2, Firm age, Institutional investor equity share, Dual-class shares, Voting pact, STAR, Independence of remuneration committee, Industry ROA, Firm and Year FE				
Observations [firms]	117[34]	40[15]	121[35]	36[14]
R-squared	0.359	0.661	0.406	0.627

Notes: Fixed effects estimates. See Table 1 and Section 4 for variable definitions. Robust standard errors in parentheses are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10

Table 10 - PPS with Ownership Threshold of 30% to Define the Family Firm

Dep. Var.= Varshapay_Cash	(1) All	(2) Type2	(3) Type1	(4) High-Imp	(5) Low-Imp
ROA	0.229	0.306	0.186	0.248	0.219
	(0.217)	(0.274)	(0.360)	(0.261)	(0.409)
FamCEO30	-0.034	-0.084**	0.026	-0.063	-0.014
	(0.030)	(0.037)	(0.044)	(0.039)	(0.045)
ROA_famCEO30	0.323	0.577*	0.041	0.573*	0.181
	(0.270)	(0.321)	(0.442)	(0.316)	(0.465)
CEO_chair	0.007	0.023	-0.002	0.011	0.014
	(0.023)	(0.029)	(0.043)	(0.026)	(0.041)
ROA_CEO_chair	-0.538***	-0.781***	-0.179	-0.717***	-0.196
	(0.201)	(0.238)	(0.444)	(0.233)	(0.445)
Control Variables					
CEO tenure, CEO tenure^2, CEO age, CEO turnover, Firm size, Financial leverage, Fin. Lev^2, Firm age, Institutional investor equity share, Dual-class shares, Voting pact, STAR, Independence of remuneration committee, Industry ROA, Firm and Year FE					
Observations	1,252 [119]	818[75]	434[44]	785[69]	467[50]
R-squared	0.145	0.201	0.162	0.166	0.181

Notes: Fixed effects estimates. See Table 1 and Section 4 for variable definitions. Robust standard errors in parentheses are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10

Table 11 - PPS for the Founder CEO in a "Lone Founder Firm"

Dep: Varshapay	(1) All	(2) Type2	(3) Type1	(4) High_Imp	(5) Low_Imp
ROA	0.237	0.383*	0.073	0.374*	0.191
	(0.157)	(0.229)	(0.176)	(0.205)	(0.239)
Founder_CEO	-0.027	0.007	-0.049	0.008	-0.122*
	(0.041)	(0.055)	(0.063)	(0.050)	(0.067)
ROA_Founder CEO	0.226	0.101	0.656	0.066	1.159
	(0.263)	(0.310)	(0.524)	(0.287)	(0.766)
CEO_chair	-0.013	-0.022	0.016	-0.012	-0.025
	(0.025)	(0.032)	(0.039)	(0.028)	(0.041)
ROA_CEO_chair	-0.251	-0.226	-0.423	-0.269	-0.217
	(0.169)	(0.198)	(0.364)	(0.185)	(0.429)
Control Variables					
CEO tenure, CEO tenure^2, CEO age, CEO turnover, Firm size, Financial leverage, Fin. Lev^2, Firm age, Institutional investor equity share, Dual-class shares, Voting pact, STAR, Independence of remuneration committee, Industry ROA, Firm and Year FE					
Observations [n. firms]	1,464 [130]	931[81]	533[49]	879[75]	585[55]
R-squared	0.126	0.175	0.123	75	55

Notes: Fixed effects estimates. See Table 1 and Section 4 for variable definitions. Robust standard errors in parentheses are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10

Table 12

Endogeneity: Granger Tests of Weak Causality between CEO Pay and Firm Performance

	(1)	(2)	(3)	(4)
Dep. Variables:	Pay	ROA	Pay	ROA
	Fixed Effects		AB-GMM System	
α_1 L. ROA	0.466	0.500***	0.791*	0.674***
	(0.352)	(0.067)	(0.409)	(0.057)
α_2 L2. ROA	0.629*	-0.039	0.256	0.012
	(0.319)	(0.056)	(0.446)	(0.058)
β_1 L.log(CEO pay)	0.364***	-0.000	0.544***	0.005
	(0.062)	(0.004)	(0.059)	(0.004)
β_2 L2.log(CEO pay)	0.096***	-0.003	0.110***	-0.001
	(0.031)	(0.004)	(0.040)	(0.003)
Control variables	YES	YES	YES	YES
Firm and Year Dummies	YES	YES	YES	YES
F or χ^2 test (P-value) on H_0: $\alpha_1 = \alpha_2 = 0$	4.51 (0.01)		6.45 (0.04)	
F or χ^2 test (P-value) on H_0: $\beta_1 = \beta_2 = 0$		0.34 (0.71)		1.35 (0.51)
Arellano-Bond test for AR(1) *(p-value)*	-	-	*0.000*	*0.000*
Arellano-Bond test for AR(2) *(p-value)*	-	-	*0.344*	*0.427*
Sargan-Hansen test of over identifying restrictions *(p-value)*	-	-	*0.855*	*0.780*
Wald χ^2 (P-value)	-	-	0.000	0.000
R-squared	0.344	0.358	-	-
Number of firms (obs.)	97 (911)	97 (911)	97 (905)	97 (905)

Notes. Fixed effects are in Columns (1) and (2); dynamic panel-data estimation, one-step system GMM estimates are in Columns (3) and (4). Arellano-Bond AR(1) [AR(2)] tests the null hypothesis of no first-order [second-order] correlation in the differenced residuals. The Sargan-Hansen statistic tests the null hypothesis that the over-identifying restrictions are valid. The F-statistics in columns (1) and (2) and the Wald tests in columns (3) and (4) denote the Granger weak-causality tests of the respective null hypotheses that the two coefficients are jointly significant (P-values in parentheses). Robust standard errors in parentheses are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10.

Appendix

Table A1

Pay Performance Sensitivity with MTB (Family Firms)

Dep. Var.	(1)	(2)	(3)	(4)	(5)	(6)
Varshapay_Cash	Type 2	Type 1	High IP	Low IP	High CR5 (50th)	Low CR5 (50th)
MTB_tot	0.030*	-0.001	0.030*	0.002	0.013	0.093***
	(0.016)	(0.008)	(0.015)	(0.009)	(0.009)	(0.034)
FamCEO	-0.046	0.007	-0.021	-0.005	-0.021	0.001
	(0.031)	(0.042)	(0.031)	(0.038)	(0.043)	(0.029)
CEO_chair	-0.053**	0.003	-0.057***	-0.019	-0.075*	-0.023
	(0.025)	(0.044)	(0.021)	(0.046)	(0.038)	(0.019)
Control Variables						
CEO tenure, CEO tenure2, CEO age, CEO turnover, Firm size, Financial leverage, Fin. Lev2, Firm age, Institutional investor equity share, Dual-class shares, Voting pact, STAR, Independence of Remuneration committee, Industry ROA, Firm & Year FE						
Observations	729	388	724	393	588	529
Number of firm	63	39	59	43	55	47
R2	0.181	0.173	0.150	0.246	0.210	0.159

Notes: Fixed effects estimates. See Table 1 and Section 4 for variable definitions. Robust standard errors in parentheses are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10

Appendix Table A2

PPS with Equity Compensation by High/Low Concentration

	(1)	(2)	(3)	(4)
Dep. Variables:	Log(varpay-eq)	Log(varpay-eq)	Varshapay_eq	Varshapay_eq
	Hconc	Lconc	Hconc	Lconc
ROA	-4.796	26.337*	-0.635	1.824
	(15.387)	(15.114)	(2.443)	(1.575)
FamCEO	-2.690	-19.541***	-0.040	-1.596***
	(3.896)	(3.759)	(0.594)	(0.408)
ROA_famCEO	33.530	12.730	1.276	2.992
	(38.859)	(25.693)	(5.663)	(3.121)
CEO_chair	1.339	0.613	-0.113	0.250
	(5.041)	(3.953)	(0.742)	(0.418)
ROA_CEO_chair	6.158	-23.900	4.203	-3.534
	(44.783)	(29.004)	(6.281)	(3.106)
Control Variables				
CEO tenure, CEO tenure^2, CEO age, CEO turnover, Firm size, Financial leverage, Fin. Lev^2, Firm age, Institutional investor equity share, Dual-class shares, Voting pact, STAR, Independence of remuneration committee, Industry ROA, Firm and Year FE				
Number of Obs. [firm]	84[28]	73[21]	84[28]	73[21]
R2	0.444	0.531	0.353	0.437

Notes: Fixed effects estimates. See Table 1 and Section 4 for variable definitions. Robust standard errors in parentheses are clustered by firm. *** p<0.01, ** p<0.05, * p<0.10

Appendix Table A3

Variance Inflation Factors from Table 5

Variable		VIF	1/VIF
ROA		3.06	0.327118
FamCEO		4.14	0.241333
ROA _FamCEO		5.69	0.175808
CEO_chair		3.53	0.283474
ROA_CEO_chair		4.58	0.218511
CEO tenure		12.95	0.077194
CEO tenure^2		11.32	0.088315
CEO age		1.32	0.759345
CEO turnover		1.37	0.731632
Firm size		1.44	0.69645
Financial Lev.		10.99	0.090987
Financial Lev^2		10.56	0.094735
Inst_share		1.22	0.822362
Dual class share		1.21	0.826418
Voting pacts		1.13	0.887155
Indep Rem Comm		1.42	0.706315
STAR		1.3	0.768382
Firm age		1.14	0.879596
ROA_ind		1.26	0.793549
Mean VIF		3.5	-

Appendix Table A4
Correlation Matrix

	ROA	CEO tenure	CEO age	CEO turnover	FamilyCEO	FounderCEO	CEO_chair	Firm size	Financial Leverage	Inst_s~e	Dual class shares	Voting pact	STAR	Indep_ Rem Committee	Firm age	ROA_industry	Type 2	High Imp Pen	Cr5 mea~2	cr5 mea~3
ROA	1																			
CEO tenure	0.0444	1																		
CEO age	-0.0032	0.3612	1																	
CEO turnover	-0.0627	-0.3378	-0.1832	1																
Family CEO	-0.0608	0.3022	0.2091	-0.2098	1															
Founder_CEO	0.0029	0.1897	0.3769	-0.1097	0.3782	1														
CEO_chair	-0.041	0.1736	0.3027	-0.1092	0.4579	0.4464	1													
Firm size	0.2072	-0.0245	-0.1896	0.0266	-0.1495	-0.2537	-0.2097	1												
Financial Leverage	-0.3605	-0.1726	-0.0653	0.0629	-0.1217	-0.1496	-0.0632	0.0415	1											
Iinst_share	0.1699	0.1128	-0.1242	-0.0195	-0.1181	-0.1599	-0.1366	0.1872	0.0649	1										
Dual class share	0.0297	-0.0041	0.0715	-0.049	0.2042	0.0306	0.1424	0.1127	-0.0215	0.0024	1									
Voting pact	0.0618	-0.0494	0.0054	0.0303	-0.0156	0.0125	0.0026	-0.1741	0.0494	0.0544	-0.1674	1								
STAR	0.0918	0.0611	0.019	-0.0012	-0.0959	-0.0505	-0.0089	-0.245	-0.0081	0.001	-0.2268	0.1356	1							
Indep Rem Committee	0.1495	0.0648	-0.0339	0.0079	-0.2089	-0.103	-0.0746	0.1819	0.0624	0.1766	-0.1261	-0.0183	0.1947	1						
Firm age	-0.0327	-0.037	-0.0526	0.0032	0.1503	-0.3265	-0.051	0.1033	0.103	0.0884	0.1097	-0.0337	-0.1474	-0.0047	1					
ROA_industry	0.2401	-0.0592	-0.0616	-0.0033	0.0779	0.0362	0.0737	-0.1229	-0.1047	0.063	0.0545	0.1177	-0.0978	-0.085	0.0262	1				
Type 2	0.1985	-0.145	-0.0369	0.048	0.041	0.0502	0.1184	-0.0498	0.0146	0.0234	-0.2104	0.0429	0.22	0.1232	0.0263	0.0122	1			
High Imp Pen	0.243	-0.063	0.0011	0.0217	0.0408	0.1333	0.2188	-0.0787	-0.0174	0.0469	-0.0456	-0.0344	0.1801	0.1133	-0.0785	-0.0556	0.6455	1		
Cr5mean_q2	0.1842	0.0093	-0.0118	0.0102	-0.0289	-0.0581	0.0303	0.0224	-0.0202	0.1579	0.0019	-0.0065	-0.1964	0.1147	0.2338	0.1612	0.2024	0.2042	1	
Cr5mean_q3	0.0139	0.0124	0.0179	0.0136	0.0358	-0.0393	0.0226	-0.0496	0.0112	0.0898	-0.0555	0.0222	-0.0041	0.0184	0.229	-0.0913	0.2239	0.1897	0.769	1