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The role of employee incentive pay in the competitiveness of family and non-family firms

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Abstract

Insufficient attention has been paid to the different roles of wage incentives in the competitiveness of family and non-family firms. This paper addresses this issue and uses a sample of listed and non-listed Italian firms for 2007 and 2010 to show that family firms that adopt incentive wages obtain greater gains in competitiveness with respect to non-family firms. Unlike what happens in non-family firms, the efficiency enhancing effect of incentive wages more than compensates for the premiums paid to employees and enables family firms to achieve significant gains in terms of competitiveness.

JEL Classifications: G32, J33, D24.

Keywords: family firms; performance related pay; labour productivity; wages; competitiveness.

Introduction

A large strand of literature has analyzed the role of incentive payments in the financial performance of firms and rigorous efforts have been made to understand differences in the nature of agency costs in family and non-family firms (Chrisman et al., 2004). However, the focus has been on executive compensations, while comparisons of employee rewards in family (FFs) and non–family (NFFs) firms have received much less attention. As noted by Carrasco-Hernandez & Sánchez-Marín (2007) this is quite surprising given that employee compensation costs often exceed 80% of total operating expenses and offer a more realistic image of firms' costs than executive compensation costs. Furthermore, in particular with respect to differences in labor productivity and competitiveness between the two groups of firms, incentive pays offered to employees could play a significant role. Note also that, thus

far, the family business research has predominantly paid attention to the principals' interests evaluated in terms of financial outcome measures (see the recent review of Evert et al., 2016), whereas the field of study that analyzes scenarios where agents' contracts are decoupled from purely economic goals has been overlooked. A more comprehensive approach to capturing differentials between family and non-family firms may be grounded in the socioemotional wealth view (SEW). Based on the behavioral agency model and borrowing from prospect theory, the SEW approach emphasizes that the uniqueness of family firms resides in their reference points and in assigning more weights to the preservation of affective endowments (Gomez-Mejia et al., 2007). Thus, maintaining SEW, defined as the stock of affected related value that a family derives from its controlling position in a firm, is "the primary frame of reference in the management of the firm" (Gomez et al., 2011, p.656). Furthermore, the emotional connection family owners have with their firm permeates the entire organization, and as argued by Cennamo et al. (2012), family firms that want to preserve their affective endowment are more prone to adopt proactive engagement with their stakeholders. However, how these attitudes translate into distinctive practices with respect to employees, who represent a significant group of stakeholders, and how these practices influence firm competitiveness are issues that have not been explored thus far. The extant research adopting the SEW framework has produced few studies on human resource management practices and no evidence for incentive payments to employees, as indicated by the survey by Cruz et al. (2011).

This paper intends to fill this gap. Its main purpose is to verify whether the adoption of wage incentive strategies, such as performance-related pay (PRP)[1], gives rise to different wage

[1] In the majority of European countries, including Italy, the diffusion of equity based compensation is quite limited, as documented by the European Working Conditions Surveys (EWCS), while one of the most important form of employee incentives are cash incentives that are performance-based. In the paper, with the term performance related pay (PRP), we refer only to this form of wage incentive for employees. However, in order to avoid word repetition sometimes we also use wage incentives or incentive pays in place of PRP.

increases and productivity gains in family and non-family firms. Furthermore, it analyses the role of PRP in the productivity-wage gap to ascertain its efficacy in enhancing competitiveness within the two groups of firms.

Our paper provides evidence on these issues on the basis of the behavior of family firms in Italy. We believe the Italian example is of interest not only because, similar to the worldwide evidence (La Porta et al., 1999; Westhead & Howorth, 2006), family ownership is the prevalent form of ownership in Italy. What makes the Italian case interesting is that in this economy, family involvement in top managerial positions is a pervasive feature. More than 90 percent of (listed and nonlisted) firms that are owned by families are also under family management[2]. In terms of the relevance of the SEW view, this characteristic is of great importance. The family's influence and ability to exercise authority, that are derived from owning *and* managing the firm, are typical aspects of affective, non-financial goals of family businesses (Berrone et al., 2012). Furthermore, family management also has an instrumental motive because the preservation of affective endowments, such as image and reputation, requires control over strategic decisions. In our sample, the desire to control and influence the firm is the peculiar trait of Italian family firms.

An additional advantage of our research, which is carried out on a national scale, is the wide coverage and richness of our data set, which offers information for about 4,400 Italian firms of all sizes operating in all non-agricultural private sectors. The data at our disposal contain information on a wide array of variables, such as firm ownership and management, employment composition, personnel organization, and other firm and workplace characteristics. This information, which includes the diffusion of PRP negotiated by firms and employees in firm-level bargaining, makes it possible to identify the different roles of this important component of human resource management practices in FFs and NFFs.

[2] As shown below, this information comes directly from the database we use.

The paper is organized as follows: Section 2 briefly reviews the related literature and introduces our hypotheses; section 3 presents the data and descriptive statistics; section 4 illustrates the econometric framework and main results; and finally, section 5 concludes.

Literature review and hypotheses

The different motivations of family and non-family firms may translate into distinct organizational designs (Astrachan et al., 2002) that mirror differences in human resources management (HRM) practices and differences in wage incentive strategies. However, thus far, a limited amount of research has investigated the wage setting policy of family firms, with only a few exceptions (Werner et al., 2005 and Carrasco-Hernandez & Sánchez-Marín, 2007). The interaction of family owners, family or non-family managers and employees has been considered for the purpose of verifying how incentive policies may mitigate the conflict of interests of the family or non-family principals and their agents and how "the impact of ownership structure on pay–performance relations cascades to lower rungs of the organizational ladder" (Werner et al., 2005, p. 378).

One limitation of this approach is its restriction to individualistic and economic motivations. Indeed, part of the differentials in HRM strategies, including PRP, may have a different explanation with respect to agency theory (see the overview by Sharma, 2004).

A first response to the inadequacies of agency theory is found in other studies that adopt the stewardship view proposed by Davis, Schoorman, & Donaldson (1997), which offers a conceptual lens to explain governance devices that deviate from agency theory (Miller & Le Breton-Miller, 2005). Adopting this framework, it has been argued that in some family businesses, managers and employees behave as stewards whose intrinsic desire is to serve the firm (see the recent review of Madison et al., 2016). In this vein, a number of traits, such as "degree of trust" and "embeddedness of social ties in emotions and sentiments, often contribute to building a collectivistic culture within the family firm" (Corbetta & Salvato, 2004, p. 359). According to these hypotheses, the employee reward system, rather than being

shaped by agency contracts and control-oriented systems, features cooperative and altruistic behavior that represents self-enforcing systems of incentives (Cruz et al., 2011 p. 180).

However, in terms of HRM policies, both views are characterized by certain pitfalls. The agency view fails to predict below-market wages, the low incidence of contingent payments and the presence of cooperative behavior. The stewardship approach does not offer adequate arguments to predict situations where, instead of high-trust relationships, HRM practices are affected by entrenchment and low commitment of employees, as found by Bloom & Van Reeen (2007).

A third, integrated perspective, based on a behavioral agency model, is the SEW view, which centers on the role of the preservation of affective endowment as the distinctive trait of family firm decisions. In this view, HRM strategies are developed according to the strong intertwined connections of families with their business; these ties encourage family principals and their employees to consider the firm "an inescapable and integral part of their life" (Berrone et al., 2012, p. 260).

Thus, the SEW view, as with the stewardship approach, counters the traditional approach grounded in agency theory and may account for collaborative actions to preserve affective endowments, which, more than value creation, is the main reference point of family firms. However, the SEW approach does not reject the idea that family members pursue personal aims, which is the basic premise in which agency theory is rooted (Berrone et al., 2012, p. 261).

Previous studies have argued that cooperation and coordination provide a foundation for the creation and use of family social capital (FSC), which is made up of attributes such as stability, interdependence, frequent interaction, and closure (Arregle et al., 2007). These specific traits of FSC also inform the organizational social capital, which strongly conditions human resources practices (such as reward systems) and reflects the character of social relations inside the firm (Arregle et al., 2007). These arguments support our first conjecture

that FFs are characterized by a lower propensity to adopt PRP for their employees with respect to NFFs. There are a number of reasons behind this conjecture.

First, it may be expected that FFs are less likely to adopt incentive pay because this type of payment is less important according to the SEW framework. It is well known that wage incentives play three main functions: selection, motivation and retention (Lazear, 2000). Concerning selection, the adoption of incentive payments is a wage policy used to attract more highly skilled workers (Lazear & Oyer, 2012), and incentive pay may cause sorting effects, thus helping firms to attract the most skilled workers from outside (Lazear, 2000). However, family owners, interested in SEW preservation, are interested in the compatibility of hired workers "with the organization's core philosophy and a poor compatibility is difficult to remedy upon selection" (Cruz et al., 2011, p.189). The reliance on the 'person – organization' fit as opposed to the 'person-job' fit does not need competence requirements and does not call for wage incentives to select employees with greater abilities.

Second, when employees enjoy greater employment security, may trade their more protected position at the expense of lower earnings. This implicit contract is more likely to be enforced in FFs. In these firms, family owners, because of their longer-term horizons, reputation concerns, and aims to conserve the family social capital (Arregle et al., 2007), are more interested in honoring implicit labor contracts with their employees. Thus, in FFs, assuring the transmission of the value of the firm to future generations and family heirs (Anderson & Reeb 2003), may reveal a credible commitment that favor implicit contracts and FFs may offer a compensation package that involves lower pay, as shown by Sraer & Thesmar (2007) and Bassanini et al. (2013).

Third, a rich literature confirms that HRM competences in designing reward systems are important and require professional practices. In FFs, which are typically smaller and have fewer resources than NFFs, the recourse to high-level technical competences for implementing incentive systems is often not affordable. As documented by some empirical

studies, FFs show a lower tendency to rely on formalized recruitment systems and performance appraisals (Cruz et al., 2011).

In sum, under the goal of SEW preservation, more likely adopted by FFs, implicit rewards partially substitute explicit rewards, and FFs introduce PRP schemes less frequently; furthermore, even when these schemes are implemented, FFs pay low-wage incentive bonuses with respect to NFFs. Building on the above considerations, we propose the following hypotheses:

Hypothesis 1a: FFs, which are supposed to adopt SEW as a frame of reference, are less likely than NFFs to adopt a reward system based on PRP.

Hypothesis 1b: FFs, which are supposed to adopt SEW as a frame of reference, also compensate their employees with nonmonetary rewards; thus, even when FFs adopt PRP, they pay lower levels of PRP bonuses than do NFFs.

However, there will be certain circumstances in which a pay policy based on implicit and non-monetary incentives may not be enough to guarantee a satisfactory firm performance and firm survival. In particular, we expect that in volatile environments, for instance due to fluctuations of demand, fixed wages are an inadequate response to the high degree of uncertainty that hits the firm. In such a case, wage flexibility, adopted with PRP, could represent a valuable response to economic fluctuations, thus mitigating the likely negative outcomes due to adverse shocks that may arrive at the firm. Under uncertainty, employees, anticipating that their firm may not have enough financial resources to pay fixed bonuses and to retain their job position, would also accept an incentive pay policy, based on PRP. Note that in our case, risk-averse employees would also likely accept payment in the form of these schemes; in the Italian economy, which features a two-tiered bargaining regime, firm-level agreements are only allowed to set upward deviations from wages agreed at the sectoral level. Thus, under positive demand shocks, firms could distribute wage incentives

linked to firm results, whereas in cases of adverse shocks, these wage premiums would be zero.

The opportunity to introduce a PRP scheme, driven by the experience of volatile environments, could equally affect FFs and NFFs. However, for FFs, this opportunity would be particular interesting because it could represent a particular circumstance that exemplifies situations in which FFs "alternate between affective and economic frames of reference." (Shukla et al., 2014). Thus, great uncertainty in market demand and the potential losses that might call into question the survival of the firm, could represent a 'contingency variable' (Gomez-Mejia et al., 2011) capable of moderating the influence of SEW. In this case, FFs may be induced to adopt a decision more motivated by economic rationales rather than affective utility motives. If this hypothesis is confirmed by our estimates, we have a result that shows how the behavioral agency model might be useful to explain those circumstances in which purely economic motives coexist with affective, non-financial goals.

In sum, we expect that FFs and NFFs that have in the past experienced a high degree of volatility in sales would be more willing to adopt PRP that links pay to their results as a strategy for obtaining improved performance. Formally stated:

Hypothesis 2: FFs and NFFs that have experienced a high degree of uncertainty, measured by the past volatility of sales, show a high probability of adoption of PRP with respect to FFs and NFFs that operate in less uncertain environments.

The second part of our analysis is focused on labor productivity and firm competitiveness (measured as the ratio of labor productivity to wages). Thus far, productivity and competitiveness differentials of family and non-family firms have been researched to a limited extent (Barth et al., 2005; Barbera & Moores, 2013).

On theoretical grounds, Fifiray et al. (2016) have suggested that independently of the SEW priorities, small FFs exhibit superior performance to that of small NFFs because the small size of FFs favor open communication, resource sharing, and mutual adaptation mechanisms. These traits help build 'affect-based trust', rooted in empathy and emotional bonds, *and* 'cognition-based trust', founded on performance-related cognitions such as competence, reliability and responsibility. However, when FFs grow in size, their priorities influence their leadership style and labor productivity. Fifiray et al. (2016) argue that when FFs rank as their primary objectives family identification, the reciprocal bonds within the family business and the renewal of family bonds, they are more likely to hire professional managers. In such a case, more advanced high performance work practices (HPWP) are adopted (Bloom and Van Reenen, 2007), and the leadership style is based on the upgrading of higher levels of cognition-based trust, with positive consequences for labor productivity.

In any case, what remains to be explored is the diverse *efficacy* of HPWP, in particular of employee incentive systems in FFs and NFFs firms. Incentives such as PRP may generate beneficial effects in the form of greater effort and commitment as well as better teamwork, greater workforce cooperation in the face of new technology and organizational changes, incentives to firm-specific human capital, and lower labor turnover (Prendergast, 1999).

However, PRP are not immune to malfunctioning[3]. As argued by (Holmstrom, 1979), there is an "informativeness" problem because the performance measure does not always reflect the agents' contribution to the principal's interests. These conditions of asymmetric information make room for opportunistic behavior, with the consequence that agents have the ability to 'game' the compensation system (Baker, 1992). In contrast, family

[3] One major issue of the incentive literature is that pay-for-performance may induce a significant trade-off between risk and incentives. Thus, the adoption of this type of scheme is limited by the ability of agents to handle risk (Prendergast, 1999). We do not consider this issue because in the Italian case, as said above, wage incentives may only be added to a fixed wage and do not expose employees to any risk.

organizational social capital, founded within a climate of industrial relations, encourages loyalty, cooperative attitudes, self-control and fairness (Arregle et al., 2007).

Consequently, we expect that, once PRP is adopted, family organizational social capital may be more effective in inducing higher productivity gains than those obtained in NFFs. This occurs because in FFs, employees respond with actions less oriented to 'gaming' the compensation system than what would occur in NFFs. A brief excursus of empirical research of FF attitudes toward employees is relevant for this conjecture. For instance, Stavrou & Swiercz (1998) document that FFs have a deep sense of responsibility toward their workforce. Nahapiet & Ghoshal (1998) show that in family firms, interpersonal relationships are characterized by stability and shared social networks. Block (2010) finds that FFs avoid deep jobs cuts because they care more about their reputation for social responsibility. Bammens et al. (2015) show that in family managed firms the work climate encourages the spontaneous engagement of employees in innovative work.

Considered together, this fragmented evidence suggests that in FFs, 'instrumental' and 'normative' reasons activate important enforcement mechanisms that promote internal informal sources of cooperation and innovation. These considerations lead us to formulate the following hypotheses:

Hypothesis 3a: FFs, which are supposed to adopt SEW as a frame of reference, obtain higher positive effects in terms of labor productivity from the adoption of PRP than do NFFs.

Finally, we expect that FFs – paying PRP bonuses in smaller amounts compared to NFFs (Hypothesis H1b) while at the same time achieving greater productivity gains (Hypothesis H3a) – obtain a greater positive differential between productivity gains and wage increases than do NFFs. Formally stated,

Hypothesis 3b: FFs, which are supposed to adopt SEW as a frame of reference, obtain higher positive effects in terms of competitiveness from the adoption of PRP than do NFFs.

3. Data and Descriptive Statistics

3.1 Data

The Employer and Employee Surveys (RIL) conducted by ISFOL provide a unique set of variables for estimating the role of PRP and testing the potential different effects for family and non-family firms. The data we use are obtained by merging information from this source and balance-sheet data from the Bureau Van Dijk AIDA archive for Italian firms.

The RIL surveys offer information for a nationally representative sample of non-agricultural private sector partnerships and limited liability firms for two years, 2007 and 2010[4]. The surveys collect a rich set of information about personnel organization, employment composition, industrial relations and other workplace characteristics[5]. For 2010, the survey also includes information on ownership/control and the management structure of firms[6]. This information enables us to distinguish between two groups of enterprises: i) family firms (FFs), those where a single family holds the majority of shares; and ii) non-family firms (NFFs), those where the majority of shares are not owned by a single family. Note that the first group of firms may be subdivided into two sub-groups: firms where a single family holds the majority of shares and family members run the firm, i.e., the family owned and managed

[4] The availability of information for only two years is a limitation of our research. In any case, our data make it possible to have short panel data and go beyond a simple cross-section analysis. Moreover, the two years at our disposal allow us to consider periods before and during the Great Recession. Thus, our investigation takes into account all changes that have occurred within this interval.

[5] We use a stratified sample by size, sector, geographic area and legal form. This choice requires the construction of a 'direct estimator' to take into account differing probabilities from the inclusion of firms belonging to specific strata. This direct estimator is defined for each sample unit (firm) as the inverse of the probability of inclusion in the sample.

[6] We assumed that the same information holds for 2007. Therefore, both the family and non-family firm variables are time invariant.

firms (FMs) and the firms where a single family holds the majority of shares and professional managers run the firm (FNMs). In our case, as shown below, FMs are more than 90 percent of FFs, whereas only few firms, also in absolute terms, belong to the FNMs sub-group. Thus, in our analysis, we will not consider the FNMs sub-group.

As for our dependent variables, labor productivity is measured by the value added per capita (LP), whereas wages are labor costs per capita (W). Both variables are used in log transformation. From their difference, ln (LP) and ln (W), it is possible to compute the indicator of competitiveness[7].

With respect to our key explanatory variable, in the RIL questionnaire, each firm was asked whether a performance-related pay scheme agreement (PRP) has been adopted. Thus, we created a dummy variable that indicates whether a PRP scheme exists for each year under study.

Note that the Italian institutional wage setting is characterized by a two-tier bargaining regime. In this regime, first-level wage contracts at the sectoral level are intended to guarantee the purchasing power of wages and thus set wage increases linked to the target inflation rate; the second level of bargaining, at the firm level, distributes wage premiums, which may be of a fixed amount or linked to productivity or profit results. In this institutional setting, the discretional pay policies of each firm may be accomplished through the second level of bargaining, where the first level sets the same conditions for all firms that operate in the same sector. Thus, PRP wage premiums linked to firm results, negotiated at the second level of bargaining, are *added* to the base wage set in the first (sectoral) level, and they are equal to zero when firms do not gain positive results[8].

[7] In our analysis, we compute and use the labor costs, which include the taxes on labor and are a more standard measure for calculating competitiveness. However, taxes on labor are not affected by the ownership structure, and in the paper, we prefer to use the term wages, as in the related literature on monetary incentives.

[8] The Italian two-tier bargaining system is also prevailing in the majority of the Continental European countries. In this system, wage floors are imposed on firm level bargaining by the central or sectoral multi-employer

In addition, we have information on the occupational composition of the labor force within the firm (percentage of executives, blue-collar workers, white-collar workers, and trained workers), gender (percentage of women), type of contract (percentage of fixed-term contracts), and new hiring (percentage of newly hired workers).

We also gather information on innovation by including two dummy variables that equal 1 if the firm adopted process and product innovations in the last three years and 0 otherwise. Concerning internationalization, we have a dummy variable that takes into account whether firms export (1 if the firm exported in the last three years and 0 otherwise).

Furthermore, we gather information on lagged sales volatility, which is used as an instrument for PRP; thus, we introduced a dummy variable that equals 1 if the standard deviation of the firm sales for the 2002-2004 period is higher than the median standard deviation at the sector-region level and 0 otherwise.

We also included dummies for sectors and regions (NUTS 1) in which firms are located and a time dummy variable, 1 for 2010 and 0 otherwise.

The longitudinal RIL-AIDA merged sample was restricted to those companies that disclose detailed accounts in accordance with the scheme of the 4th Directive CEE. We also excluded firms with less than five employees. This allows us to eliminate the self-employed as well as all small firms without an organizational structure, for which it makes sense to test the role of PRP. These selection criteria are consistent with those adopted in comparable studies (see Chrisman et al., 2004). Furthermore, we excluded firms that experienced mergers and acquisitions in the last three years[9]. Therefore, the sample that we use is an unbalanced panel of approximately 4,400 firms for 2007 and 2010.

Detailed definitions of all variables mentioned above are reported in Table A1 (Appendix A).

agreements according to the so-called "favorability principle". This principle prevents *in peius* firm-level agreements, thus workers may not be worse off than they are under the higher level bargaining.

[9] By excluding mergers and acquisitions we considered only firms that did not change ownership and control the observation period.

3.2 Descriptive statistics

Our sample of listed and non-listed firms – with 5 or more employees – that operate in the non-agricultural sectors makes it possible to have a picture on a national scale of the pervasive presence of family business in the Italian economy. Table 1 shows that firms where a single family holds the majority of shares represent more than 78 percent of all Italian (listed and non-listed) enterprises. Indeed, 3,473 of firms have a single family who owns the majority of shares (FF), whereas there are only 983 of the other ownership types. Moreover, the share of firms owned and managed by a single family represents 92 percent of firms that are family owned, and these firms represent about 72 percent of all Italian firms in the market economy (with the exclusion of agriculture). Thus, the specific characteristic of the Italian case is not the prevalence of family-owned firms, which is common in many other countries, but the predominance of family-managed firms, which represent only a minority in other economies (according to the EFIGE database, in Spain one-third of businesses that are family owned are also family managed, and the corresponding figures are one-fourth in France and Germany and only one-tenth in the UK; see Bugamelli et al., 2012, p.15).

Note that the descriptive statistics obtained for FFs and FMs, including means and proportions, are quite similar (see Table 1). In particular, concerning our key variable, PRP, we observe that a smaller fraction of FFs and FMs adopt this type of payment (9% and 8%) with respect to NFFs (27%), in conformity to Hypothesis 1a. Similar characteristics describe the portrait of FFs and FMs, and also the econometric results for FFs and FMs (not reported here for reasons of space but available upon request) are not significantly different. Thus, Table 1 is limited to tests for the significance of differences of descriptive statistics of FFs and NFFs (a test for equality of means/proportions and a Wilcoxon Rank-Sum test for the differences in distributions).

Undoubtedly, dimensional aspects significantly contribute to explain the distribution of FFs and, as expected, the share of FFs decreases with firm size. Thus, of the total number of FFs,

46% are firms in the 5-14 employee class, whereas only 2% are in the 250+ class. In the NFFs group, the percentage of small firms is significantly lower (25% are firms in the 5-14 employee class, and 9% are firms in the 250+ class).

In terms of employees' rewards we found that family firms pay lower wages (FFs in log 10.37 vs 10.56 in NFFs). This significant differential could be related to disparities in terms of human capital, as those described below, but could also reflect the role of family involvement (Hypothesis 1b), as found in other economies (Sraer & Thesmar, 2007 and Bassanini et al., 2013).

In terms of performance, our non-financial indicators show that Italian FFs suffer a performance disadvantage in terms of per capita value added (10.78 vs 11.01) and competitiveness (0.41 vs 0.46). Both differentials, significant at the 1% level[10], could be motivated by the dimensional aspect and might be coherent with other disparities, such as innovation strategies. For instance, our data show that FFs are less active than non-family enterprises in product innovation (51% of firms vs 54%). In addition, the statistical information on sectors shows that family business is more widespread in traditional industries (such as textiles and construction) and less diffused in some high-value added service sectors, such as finance and transport and communications. The sectoral dimension likely contributes to explain why the presence of FFs in international markets is, on average, comparable to that of NFFs; FFs, although smaller in size and thus less oriented toward international markets than large firms, are present in sectors where the Italian economy has some comparative advantages; a case in point is textiles.

Interestingly, however, disparities in process innovation and internationalization appear of minor magnitude and not significant, whereas meaningful differences can be found for HRM practices and human capital. These aspects, unexplored thus far, at least for the Italian case,

[10] All differentials for productivity, wages and competitiveness are also significant in the shapes of their distributions, as signaled by the Runk-Sum Test.

reveal a more significant divide with respect to that found for internationalization and innovation.

In particular, for PRP, as noted above, we observe a low diffusion of PRP incentives in family firms. As in other countries, where FFs employ less complex HRM practices (Reid & Adam, 2001; Koch et al., 2006), in the Italian economy, family firms less often adopt formalized wage agreements with employee representatives and reward systems based on performance, such as PRP. In accordance with this evidence, we also find in FFs less intense training activities (22% and 31% are the shares of trained employees in FFs and NFFs, respectively). Furthermore, significant disparities are found for human capital proxied by occupational categories. Indeed, we observe that FFs employ fewer executives compared to NFFs (a percentage over total employees of 4% vs 9% in NFFs) and fewer white-collar workers (36% vs 48%).

The disparities we observe for HRM and human capital between FFs and NFFs raise the question whether the different diffusions of PRP (as well as training) reflect different degrees of organizational complexity due solely to resource availability, which is explainable in terms of the dimensional aspect. In such a case, the 'size' factor could represent a confounding factor for our analysis.

Table 2 offers additional insights that seem to confute this conjecture. Indeed, when we analyze the various disparities between firms that adopt or do not adopt contingent rewards (PRP and Non-PRP, respectively), we find that within the total number of family firms with PRP, the percentage of smallest firms is higher than the percentage recorded for the largest firms (11% vs 9%). The opposite result is found in the subsample of NFFs, where the incidence of smallest enterprises with PRP is lower than that of the largest enterprises with PRP (5% vs 23%).

[Insert Table 1-2]

Table 2 shows other unexpected results. For one of the variables of major interest, productivity, we observe that family firms that adopt PRP reveal a larger advantage in terms of labor productivity compared to family firms that do not adopt PRP (the differential in log is + 0.15). Interestingly, this advantage is not observable for the group of NFFs. This preliminary evidence supports Hypothesis 3a.

For wages, Table 2 shows that the adoption of PRP, as expected, ensures higher rewards in both groups of firms. However, the wages paid by FFs remain lower with respect to NFFs, as suggested by Hypothesis 1b (10.54 vs 10.59)[11].

A related result of productivity and wage differentials is that obtained for competitiveness. For FFs, the degree of competitiveness achieved by firms that adopt PRP is almost the same as that obtained by FFs that do not adopt PRP (0.38 vs 0.41). When we consider NFFs, the correspondent differential (PRP and Non-PRP) is negative and significant (0.40 vs 0.48). At first sight, these data do not confirm Hypothesis 3b, at least in terms of the expected result for FFs, and deserves further investigation in the econometric analysis, where all possible confounding factors are taken into account.

Finally, Table 2 also discloses that among firms adopting PRP, both FFs and NFFs, there is a significant and higher incidence of units that faced volatile environments in the past with respect to Non-PRP firms (69% vs 43% in FFs and 80% vs 56% in NFFs). This correspondence offers preliminary support for Hypothesis 2, which states that high sales volatility in the past could lead firms to introduce PRP schemes.

The descriptive statistics above confirm the importance of taking into account all possible characteristics of firms that could affect the relationship between PRP and firm performance (productivity and competitiveness). Beyond these descriptive statistics, what remains to be discovered is the *combined* role of governance structure (ownership) and of governance

[11] Both means and distributions are significantly different at the 1% level. Results are available upon request.

devices (PRP and non PRP) to obtain a comprehensive representation of wage policies and their efficacy for competitiveness in Italy.

4 Econometric analysis

In this section, we study the effects of PRP on labor productivity, wages and competitiveness separately for family and non-family firms. We take into account all possible confounding factors affecting this relationship, i.e., all other characteristics of firms discussed above (labor force composition, size, capital intensity, innovation, exports, sectoral and geographical location).

4.1 Methods

To investigate the relationship mentioned above, we started with pooled OLS and standard quantile regressions (Koenker & Basset, 1978)[12]. The quantile regression (QR) technique makes it possible to estimate the PRP impact on different parts of the dependent variable distributions and thus to have information not only about their conditional means. However, both OLS and standard QR suffer from problems due to individual unobserved heterogeneity and endogeneity. For example, time invariant *unobserved* factors (i.e., specific firms' traits that we do not control for) may obscure and distort estimates of the relationships we would like to test. Furthermore, there may be a spurious relationship between PRP and productivity or between PRP and wages; this typically arises if more productive firms or firms that pay higher wages are more likely to adopt PRP. Our main interest is to address these two problems by means of fixed effect and instrumental variable QR.

[12]To save space, we do not report tables for these preliminary regressions. The results are available on request.

Concerning individual unobserved heterogeneity, we use the Canay (2011) method and perform a fixed effects quantile regression (FEQR). For possible PRP endogeneity, two methods have been used: i) the traditional Two-Stage Least Absolute Deviation Estimator (IVQR_2LAD) of Amemya (1982) and ii) the Quantile Treatment Effect Estimator of Abadie et al. (2002) (IVQR_AAI).

The choice of instrument is motivated by the same arguments offered to support Hypothesis 2. Briefly, we conjecture that under volatile environments, firms are more likely to tend to introduce PRP schemes as a valuable response to economic fluctuations. From an econometric point of view, the high volatility of sales at the firm level measured as the above-median standard deviation and recorded over the period 2002-2004 (long before 2007), may be a valid instrument because it is a proxy of uncertainty (Bloom, 2009). Furthermore, this variable is expected to randomly affect the probability that firms introduce PRP schemes without directly affecting the three dependent variables (productivity, wages and competitiveness). Further details on the econometric techniques mentioned above are reported in appendix B.

4.2 Results

Table 3 shows the main results for FFs obtained with the FEQR that corrects for unobserved heterogeneity. Part of the differences among firms could be due to a number of sources of unobserved heterogeneity. Indeed, even the group of family firms is not a monolithic reality (Miller et al., 2010). This is because in FFs, the protection of affective endowments has multiple facets to which the single firm assigns its own priorities. For instance, the enjoyment of family influence over the firm, reputation and family image, and the renewal of family bonds through dynastic succession represent distinct dimensions of affective endowments, to which each family firm assigns its own priorities (Berrone et al., 2012). However, these different dimensions and their weights in firms' objectives function may be difficult to measure. To take into account potential biases due to these and other unobserved

factors that affect family and non-family firms and that cannot be captured by other controls, we adopt fixed effects estimates. These estimates are obtained by including all controls for firm characteristics (presented in Tables 1 and 2)[13] and other dummies to control for time, sector and geographical (NUTS1) factors, which likely influence the dependent variables (see Tables 3 and 4).

[Insert Table 3-4]

The FEQR results show a significant positive association of PRP with labor productivity for the group of family firms along almost the entire distribution (Table 3, Panel A). The adoption of PRP is on average associated with a 5.6% rise in value added per employee. Conversely, for the group of non-family firms (Table 4, Panel A) the role of PRP in labor productivity is broadly non-significant[14]. This confirms that family ownership (and family management) matters and that FFs achieve more gains from the adoption of PRP, as conjectured by Hypothesis 3a.

If we compare the FEQR results obtained for wages, we find that in family firms, the adoption of PRP gives rise to fewer monetary incentives for employees than in non-family firms (see Panel B of Tables 3 and 4). These findings, obtained by controlling for human capital and skills, confirms that FFs, likely because they offer greater job security and more intrinsic incentives, pay less generous monetary incentive pay, such as PRP, than do NFFs, as formulated by Hypothesis 1b.

Noticeably, when we consider the third dependent variable, we find that family firms achieve higher positive effects from PRP in term of competitiveness than do non-family firms. As shown by Panel C of Table 3, in the FF group, PRP is associated with a competitive-

[13] The only exception is the variable High-Sales volatility, which we only use as an instrument in the instrumental variable QR.

[14] All these results, together with the results obtained for wages and competitiveness (panels B and C), are perfectly coherent, even though the magnitude of the coefficients is lower, with the findings of pooled OLS and standard QR estimations (not reported here for reasons of space).

enhancing role, and this positive link is rather uniform in all quantiles. It means that in family firms, the productivity effect of PRP appears to dominate the wage effect, and a high degree of competitiveness emerges as result. On the contrary, from non-family firms we infer that PRP fosters employee rewards, but productivity does not increase (see Panel A of Table 4). Therefore, the efficiency enhancement role of PRP is absent, or even negative, in non-family firms (see Panel C of Table 4). Thus, in contrast to what we obtain in the descriptive statistics, the econometric analysis unequivocally confirms Hypothesis 3b.

PRP schemes are often expensive to implement and are more likely to be affordable only for high-performing firms. Thus, firms with a higher degree of productivity or competitiveness may have a higher probability of adopting a PRP scheme. As discussed above, we take into account this endogeneity problem by introducing an instrument that influences the probability of adopting PRP schemes but at the same time randomly affects the sample firms. This instrument, as said, is a proxy for uncertainty, captured by the volatility of sales at the firm level. The probit regression results, shown in the appendix (Table A.2), highlight that high sales volatility positively and significantly influences the probability of adopting a PRP scheme in the group of FFs. Thus the instrument seems appropriate and our identification strategy valid, at least for family firms, confirming Hypothesis 2 only for the FF group. It may be argued that uncertainty and volatile environments are particularly effective for marking a tipping point for FFs, inducing them to introduce more formal wage schemes (PRP) and place more importance on an economic frame of reference. We do not observe the same thing for NFFs (for these firms, sales volatility has no significant effect on PRP adoption; see Table A.2).

Interestingly, the IV estimates offer an additional validation of Hypotheses 3a and 3b and confirm the positive effects of PRP on productivity and competitiveness only in the group of FFs, whereas for NFFs, any evidence of a positive link is not detectable (see Tables 5 and 6).

[Insert Table 5-6]

Finally, a comparison of the coefficients of PRP in terms of wages does not fully support Hypothesis 1b because the impact of these schemes on remunerations is higher in FFs than in NFFs. In any case, what appears remarkable is that also controlling for the endogeneity of PRP, in family firms, PRP schemes contribute to enhancing the degree of competitiveness. For NFFs, no evidence of a positive link between PRP and competitiveness has been found.

Discussion and Conclusions

In this paper, we evaluated the role of performance related pay in family firms, performing a comparison with their non-family counterparts. Our evidence based on the Italian experience shows that family firms make less use of this incentive scheme. However, we also found robust evidence that FFs, when using these contingent rewards to encourage commitment and motivation on the part of their workforce, obtain greater gains in terms of labor productivity with respect to NFFs. This efficiency-enhancing role of PRP, coupled with the moderate influence of these schemes on wage incentives, enables family firms to achieve significant gains in terms of competitiveness. Conversely, NFFs, pay workers higher wages, but these wages do not translate into greater labor efficiency. For these firms, PRP premiums more than compensate for the (non-significant) benefits in terms of labor productivity, with a final negative balance on their degree of competitiveness.

The arguments offered in this paper suggest that in FFs, agents are less inclined to act opportunistically and 'to game' the wage incentive system. The empirical confirmation of these hypotheses, obtained with our estimates, is in line with the idea that in FFs, the presence of 'binding social ties', which is a key normative dimension of SEW and is based on the

principles of reciprocity, ensures a sense of belonging and commitment on the part of employees to the firm. Furthermore, the desire to maintain control and influence, coupled with a strong concern for family identity and a long-term sense of dynasty, represent instrumental motives that induce family owners to care about their stakeholders and ensure their care and job tenure. Our research offers two major contributions. First, with respect to the family firm literature and the recent field of the SEW, our analysis of wage incentives is a first step to evaluating how the preservation of affective utilities, which typify family firms, translates into distinct employee reward systems, as suggested by Cruz et al. (2011). This topic, which has been overlooked in the literature, also has managerial implications. Advisors and consultants involved in HRM practices should be interested in empirical results dealing with the consequences of implementing and adapting incentive pay schemes for employees in the specific context of family firms. In addition, although Italy appears as special case in Europe, due to the prevalence of family owned and managed firms, there are also similarities in terms of two-tier bargaining systems among this country and other Continental EU countries. These similarities suggest that it could be interesting to explore whether the relationships between PRP and competitiveness also hold for other EU countries, especially those characterized by ownership concentration in family hands.

Second, concerning the vast research on the theme of competitiveness, the analysis of incentive pay as a function of family involvement may enrich the incentive literature, which with few exceptions has only rarely focused on the family (and non-family) dimension (Bloom & Van Reeenen, 2007; Barbera & Moores, 2013).

Our results, however, also reveal a controversial issue. If wage incentives, such as PRP, are beneficial for family business, it is legitimate to ask why there are so few family firms that use this type of incentive. Our suggestion is that it is exactly these kinds of intricate and puzzling issues that may be explained by the SEW view. In FFs, both parties (employers and employees) attach value to the relationship, "beyond the economic value created by

transaction" (Gomez Meja et al., 2001, p. 82). This peculiar characteristic fits well with a wide diffusion of relational contracts, intrinsic incentives and moderate compensation policies that typify FFs, as found in other studies (Gomez-Meja et al. 2001; Carrasco & Sánchez-Marin, 2007; Sraer & Thesmar, 2007). However, there are contingency variables that may moderate the influence of affective utilities on managerial decisions. The literature has shown that under conditions of firm hazard, when economic conditions are declining, the perception of potential losses induces the family to change the frame of reference, accepting the socioemotional losses while ensuring the survival of the firm (see Gomez- Meja et al., 2011 for a review). In our analysis, we have suggested, at least as a preliminary hypothesis, that the contingent variable is the degree of uncertainty regarding market demand.

Major challenges for future research are grounded in the current limitations of our study. First, additional efforts are required to accurately isolate the specific contingent variables that may influence the frame of references of FFs, particularly in relation to the largely unexplored issue of the driving forces behind the adoption of wage policies in FFs. Moreover, future research should analyze which emotional dimensions of SEW may amplify relationship conflicts in labor relations as well as the role of employee representatives in establishing priorities among different SEW dimensions.

Additional research should also introduce psychometric instruments to measure the SEW construct, for instance, including new questionnaires in surveys to identify the different dimensions of SEW. In these surveys, some of the concepts proposed thus far in the family firms literature, such as "altruism, fairness, justice and generosity" (Berrone et al., 2012, p. 265), should be mapped into specific bundles of High Performance Work Practices.

Finally, additional attention to controlling for the endogeneity of family ownership and management to obtain more robust and credible results remains an important issue in the literature, as demonstrated recently by Amit and Villalonga (2014). This remains a challenging task in our research.

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Table 1 Descriptive Statistics: Family owned, managed and non-family firms
(Sample means and proportions)

Variables	FF	FM	NFF	Test FF vs NFF	Wilcoxon Rank-Sum Test (FF vs NFF)
	(means/proportions)			*(differences)*	*(p_values)*
Key dependent and explanatory variables					
Ln(LP)	**10.78**	**10.77**	**11.01**	-0.23***	<0.01
Ln(W)	**10.37**	**10.36**	**10.56**	-0.18***	<0.01
Ln(LP)-Ln(W)	**0.41**	**0.41**	**0.46**	-0.05***	<0.01
PRP (1/0)	**0.09**	**0.08**	**0.27**	-0.18***	
Labor force characteristics					
New hirings (share)	0.11	0.12	0.11	0.01	0.027
Executives (share)	0.04	0.03	0.09	-0.05***	<0.01
White collars (share)	0.36	0.35	0.48	-0.12***	<0.01
Blue collars (share)	0.61	0.62	0.43	0.17***	<0.01
Females (share)	0.34	0.33	0.37	-0.03***	<0.01
Fixed-term contracts (share)	0.09	0.09	0.08	0.01***	0.420
Trained workers (share)	0.22	0.22	0.31	-0.09***	<0.01
Firm Characteristics					
Size: 5 ≦n of employees<15 (1/0)	0.46	0.46	0.25	0.21***	
Size: 15 ≦n employees<50 (1/0)	0.37	0.37	0.37	0.00	
Size: 50 ≦n employees<250 (1/0)	0.16	0.16	0.30	-0.14***	
Size: n of employees ≧250 (1/0)	0.02	0.01	0.09	-0.07***	
High-Sales-Volatility (1/0)	0.46	0.46	0.62	-0.16***	
Ln (K/L)	10.10	10.09	10.11	-0.02	0.983
product innovation (1/0)	0.51	0.51	0.54	-0.04***	
process innovation (1/0)	0.42	0.42	0.44	-0.01	
foreign market (1/0)	0.27	0.28	0.26	0.02	
Text., Wear. Apparel, Food (1/0)	0.15	0.15	0.10	0.05***	
Other Man., Min., Utilities (1/0)	0.34	0.35	0.31	0.03***	
Constructions (1/0)	0.13	0.13	0.05	0.08***	
Trade, hotels, restaurants (1/0)	0.14	0.14	0.12	0.02*	
Transp. and comm. (1/0)	0.04	0.04	0.11	-0.07***	
Intermed., other bus. serv. (1/0)	0.09	0.09	0.17	-0.08***	
Educ., health and soc. serv. (1/0)	0.11	0.11	0.14	-0.03***	
North- West (1/0)	0.32	0.32	0.38	-0.06***	
North-East (1/0)	0.26	0.27	0.29	-0.02**	
Centre (1/0)	0.21	0.21	0.20	0.00	
South (1/0)	0.21	0.20	0.13	0.08***	
No. Observations	6874	6326	1901		
No. Firms	3473	3198	983		

Source: RIL-AIDA data. Note: FF=Family owned firms; FM=Family owned and managed firms; NFF=Non-Family firms. (1/0) stands for binary variable. Test for differences between means and proportions: *** significant at .01 level; ** significant at .05 level; *significant at .10 level. Runk-sum test, H0: FF and NFF have the same distribution. The number of observations refers to maximum. All statistics refer to the pooled sample (2007 and 2010).

Table 2 Descriptive Statistics: Family and non-family firms and PRP
(Sample means and proportions)

Family Firms (FF)					Non-Family Firms (NFF)			
Variables	**PRP**	**No-PRP**	**Test PRP vs No-PRP**	**Wilcox-Rank-Sum Test**	**PRP**	**No-PRP**	**Diff. PRP vs No-PRP**	**Wilcox-Rank-Sum Test**
	(means/prop.)		***(Diff.)***	***(p values)***	***(means/prop.)***		***(Diff.)***	***(p values)***
Key dependent variables					**Key dependent variables**			
Ln(LP)	**10.91**	**10.76**	**0.15*** **	**<0.01**	**10.99**	**11.02**	**-0.03**	**0.703**
Ln(W)	**10.54**	**10.36**	**0.18*** **	**<0.01**	**10.59**	**10.54**	**0.05** **	**<0.01**
Ln(LP)-Ln(W)	**0.38**	**0.41**	**-0.02**	**0.021**	**0.40**	**0.48**	**-0.07** **	**0.049**
Labor force characteristics					**Labor force characteristics**			
New hirings (share)	0.08	0.12	-0.04***	0.015	0.10	0.11	-0.02**	0.341
Executives (share)	0.05	0.03	0.02***	<0.01	0.10	0.08	0.02**	<0.01
White collars (share)	0.30	0.36	-0.06***	0.013	0.42	0.50	-0.08***	<0.01
Blue collars (share)	0.65	0.60	0.04***	0.323	0.48	0.42	0.07***	<0.01
Females (share)	0.28	0.34	-0.06***	<0.01	0.32	0.38	-0.06***	<0.01
Fixed-term contracts (share)	0.07	0.09	-0.02***	0.797	0.07	0.08	-0.02**	0.319
Trained workers (share)	0.29	0.22	0.07***	<0.01	0.41	0.28	0.14***	<0.01
Firm Characteristics					**Firm Characteristics**			
Size: 5 ≦n of employees<15 (1/0)	0.11	0.49	-0.37***		0.05	0.32	-0.27***	
Size: 15 ≦n employees<50 (1/0)	0.38	0.37	0.01		0.23	0.41	-0.18***	
Size: 50 ≦n employees<250 (1/0)	0.42	0.14	0.28***		0.49	0.23	0.26***	
Size: n of employees ≧250 (1/0)	0.09	0.01	0.08***		0.23	0.03	0.19***	
High-Sales-Volatility (1/0)	0.69	0.43	0.26***		0.80	0.56	0.24***	
Ln (K/L)	10.42	10.06	0.36***	<0.01	10.33	10.03	0.30**	<0.01
product innovation (1/0)	0.61	0.50	0.12***		0.66	0.50	0.16***	
process innovation (1/0)	0.58	0.41	0.18***		0.58	0.39	0.19***	
foreign market (1/0)	0.47	0.26	0.21***		0.36	0.22	0.14***	
No. Observations	586	6176			506	1360		
No. Firms	267	2122			247	715		

Source: RIL-AIDA data. Note: FF=Family owned firms; FM=Family owned and managed firms; NFF=Non-Family firms firms. (1/0) stands for binary variable. Test for differences between means and proportions: *** significant at .01 level; ** significant at .05 level; *significant at .10 level. Runk-sum test, H0: FF and NFF have the same distribution. The number of observations refers to maximum. Statistics refer to the pooled sample (2007 and 2010). In order to save space we omitted statistics for sectors and macro-regions. The results are available upon request.

Table 3 Quantile Fixed effects estimations Family Firms

Panel A Dep. Var. : Ln (Labor productivity)						
	Q10	**Q25**	**Q50**	**Q75**	**Q90**	**FE**
PRP	0.026	0.044***	0.056***	0.066***	0.079***	**0.056***
	[0.025]	[0.013]	[0.000]	[0.012]	[0.024]	**[0.028]**
Year 2010	-0.096***	-0.023***	-0.043***	-0.031***	-0.049***	-0.087***
	[0.013]	[0.006]	[0.000]	[0.005]	[0.009]	[0.012]
Labor Force characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Macro-regions	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	9.349***	9.506***	9.476***	9.511***	9.567***	9.476***
	[0.098]	[0.051]	[0.000]	[0.045]	[0.080]	[0.297]
Pseudo R2	0.5876	0.6973	0.7962	0.8104	0.7296	
N of firms (panels)	2637					
N of Obs	3979					
Panel B Dep. Var. : Ln (wages)						
	Q10	**Q25**	**Q50**	**Q75**	**Q90**	**FE**
PRP	**0.012***	**0.007***	**0.002*****	**0.008**	**-0.002**	**0.002**
	[0.006]	**[0.004]**	**[0.000]**	**[0.007]**	**[0.009]**	**[0.025]**
Year 2010	-0.045***	-0.041***	-0.035***	-0.019***	-0.021***	-0.035***
	[0.007]	[0.004]	[0.000]	[0.004]	[0.007]	[0.009]
Labor Force characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Macro-regions	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	9.446***	9.477***	9.460***	9.487***	9.575***	9.460***
	[0.045]	[0.026]	[0.000]	[0.025]	[0.047]	[0.170]
Pseudo R2	0.650	0.738	0.812	0.817	0.741	
N of firms (panels)	2643					
N of Obs	4000					
Panel C Dep. Var. : ln(Labor productivity) – ln(wages)						
	Q10	**Q25**	**Q50**	**Q75**	**Q90**	**FE**
PRP	0.038*	0.033***	0.047***	0.052***	0.040**	0.047
	[0.019]	[0.009]	[0.000]	[0.007]	[0.018]	[0.031]
Year 2010	-0.060***	-0.054***	-0.054***	-0.029***	-0.034***	-0.054***
	[0.011]	[0.011]	[0.000]	[0.006]	[0.010]	[0.011]
Labor Force characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Macro-regions	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.060	-0.083*	0.047***	0.080***	-0.156***	0.047
	[0.201]	[0.047]	[0.000]	[0.039]	[0.075]	[0.204]
Pseudo R2	0.409	0.543	0.668	0.665	0.537	
N of firms (panels)	2637					
N of Obs.	3979					

Notes: .*** significant at .01 level; ** significant at .05 level; *significant at .10 level. boostrapped standard errors with 100 replications in square brackets. Q10, Q25, Q50, Q75, Q90 are the percentiles of the distribution. FE is the conditional mean fixed effects estimation.

Labor Force characteristics include: shares of blue-, white-collars and executives; shares of fixed term contracts, trained workers and females.

Firm characteristics include: firm's size, capital intensity (Ln(K/L); share of new hirings; product and process innovation; export.

Results for all control variables included in both Labor force and Firm characteristics are available upon request.

Table 4 Quantile Fixed effects estimations Non-Family Firms

Panel A Dep. Var. : Ln (Labor productivity)						
	Q10	**Q25**	**Q50**	**Q75**	**Q90**	**FE**
PRP	**-0.047**	**-0.020**	**-0.012*** **	**-0.001**	**0.037**	**-0.012**
	[0.034]	**[0.013]**	**[0.000]**	**[0.014]**	**[0.036]**	**[0.053]**
Year 2010	-0.035	-0.017	-0.006***	0.026*	0.009	-0.006
	[0.028]	[0.011]	[0.000]	[0.014]	[0.028]	[0.026]
Labor Force characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Macro-regions	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	10.262***	10.442***	10.497***	10.524***	10.472	10.498***
	[0.198]	[0.075]	[0.001]	[0.072]	[0.160]	[0.449]
Pseudo R2	0.454	0.595	0.693	0.657	0.591	
N of firms (panels)	775					
N of Obs	1214					
Panel B Dep. Var. : Ln (wages)						
	Q10	**Q25**	**Q50**	**Q75**	**Q90**	**FE**
PRP	**0.036*** **	**0.043*** **	**0.054*** **	**0.044*** **	**0.050*** **	**0.054**
	[0.012]	**[0.006]**	**[0.001]**	**[0.006]**	**[0.016]**	**[0.035]**
Year 2010	-0.023*	-0.028***	-0.004***	-0.005	-0.000	-0.004
	[0.012]	[0.005]	[0.000]	[0.007]	[0.014]	[0.017]
Labor Force characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Macro-regions	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	10.335***	10.357***	10.355***	10.380***	10.453***	10.355***
	[0.091]	[0.036]	[0.002]	[0.033]	[0.100]	[0.290]
Pseudo R2	0.600	0.680	0.738	0.718	0.654	
N of firms (panels)	779					
N of Obs	1223					
Panel C Dep. Var. : ln(Labor productivity) – ln(wages)						
	Q10	**Q25**	**Q50**	**Q75**	**Q90**	**FE**
PRP	**-0.058*** **	**-0.053*** **	**-0.069*** **	**-0.064*** **	**-0.094*** **	**-0.069**
	[0.019]	**[0.010]**	**[0.000]**	**[0.028]**	**[0.023]**	**[0.045]**
Year 2010	-0.006	-0.009	-0.006******	0.028***	0.031**	-0.006
	[0.022]	[0.011]	[0.000]	[0.09]	[0.016]	[0.022]
Labor Force characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Macro-regions	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.039	0.059	0.039***	0.005	-0.010	-0.080
	[0.378]	[0.064]	[0.001]	[0.050]	[0.118]	[0.136]
Pseudo R2	0.394	0.516	0.621	0.567	0.478	
N of firms (panels)	775					
N of Obs.	1214					

Notes: .*** significant at .01 level; ** significant at .05 level; *significant at .10 level. boostrapped standard errors with 100 replications in square brackets. Q10, Q25, Q50, Q75, Q90 are the percentiles of the distribution. FE is the conditional mean fixed effects estimation.

Labor Force characteristics include: shares of blue-, white-collars and executives; shares of fixed term contracts, trained workers and females.

Firm characteristics include: firm's size, capital intensity (Ln(K/L); share of new hirings; product and process innovation; export.

Results for all control variables included in both Labor force and Firm characteristics are available upon request.

Table 5 IV Quantile Regressions: Effects of PRP on Productivity, Labor Costs and Competitiveness in Family Firms

Panel A Dep. Var. : Ln (Labor productivity)						
			IVQR_AAI			**IV_2LAD**
	Q10	**Q25**	**Q50**	**Q75**	**Q90**	**Q50**
PRP	0.732***	0.563***	0.515***	0.642***	0.761***	0.492***
	[0.221]	[0.086]	[0.168]	[0.159]	[0.235]	[0.080]
Year 2010	-0.113	-0.046	-0.087	-0.098	-0.112	-0.148***
	[0.121]	[0.097]	[0.135]	[0.155]	[0.239]	[0.023]
Labor Force characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Macro-regions	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	10.563***	10.189***	10.223***	10.207***	10.054***	11.007***
	[0.658]	[0.327]	[1.668]	[1.111]	[1.843]	[0.196]
Pseudo R2						0.180
N of Obs			2441			2467
Panel B Dep. Var. : Ln (wages)						
			IVQR_AAI			**IV_2LAD**
	Q10	**Q25**	**Q50**	**Q75**	**Q90**	**Q50**
PRP	0.302**	0.251***	0.205**	0.245**	0.266	0.123***
	[0.141]	[0.090]	[0.081]	[0.111]	[0.214]	[0.037]
Year 2010	0.060	0.037	-0.008	-0.006	0.009	-0.038***
	[0.089]	[0.098]	[0.114]	[0.171]	[0.218]	[0.012]
Labor Force characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Macro-regions	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	10.833***	11.026***	11.292***	11.902***	11.916***	11.354***
	[2.111]	[1.038]	[1.522]	[0.880]	[1.847]	[0.117]
Pseudo R2						0.240
N of Obs			2454			2480
Panel C Dep. Var. : Ln (Labor productivity)- Ln (wages)						
			IVQR_AAI			**IV_2LAD**
	Q10	**Q25**	**Q50**	**Q75**	**Q90**	**Q50**
PRP	0.508***	0.349***	0.301***	0.403***	0.496	0.325***
	[0.125]	[0.103]	[0.100]	[0.094]	[0.294]	[0.051]
Year 2010	-0.078	-0.044	-0.061	-0.087	-0.109	-0.096***
	[0.092]	[0.098]	[0.091]	[0.097]	[0.252]	[0.019]
Labor Force characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Macro-regions	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-2.026***	-1.870***	-0.998	-0.891	-0.877	-0.347***
	[1.034]	[0.507]	[1.169]	[0.605]	[2.208]	[0.133]
Pseudo R2						0.100
N of Obs.			2441			2467

Notes: IVQR_AAI is the Quantile Treatment Effect Estimator of Abadie et al. (2002); IV_2LAD is the traditional Two-Stages Least Absolute Deviation Estimator of Amemya (1982). Q10, Q25, Q50, Q75, Q90 are the percentiles of the distribution.

Labor Force characteristics include: shares of blue-, white-collars and executives; shares of fixed term contracts, trained workers and females.

Firm characteristics include: firm's size, capital intensity (Ln(K/L); share of new hirings; product and process innovation; export.

Results for all control variables included in both Labor force and Firm characteristics are available upon request.

.*** significant at .01 level; ** significant at .05 level; *significant at .10 level.

Boostrapped standard errors with 100 replications in parentheses.

Table 6 IV Quantile Regressions: Effects of PRP on Productivity, Labor Costs and Competitiveness in Nonfamily Firms

Panel A Dep. Var. : Ln (Labor productivity)						
	IVQR_AAI					**IV_2LAD**
	Q10	**Q25**	**Q50**	**Q75**	**Q90**	**Q50**
PRP	0.311	0.205*	0.193	0.160	0.200	0.696***
	[0.325]	[0.104]	[0.139]	[0.120]	[0.201]	[0.174]
Year 2010	0.033	0.027	0.024	-0.025	-0.106	-0.082**
	[0.214]	[0.094]	[0.124]	[0.171]	[0.228]	[0.034]
Labor Force characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Macro-regions	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	10.794***	12.041***	12.112***	11.940***	10.940***	13.413***
	[1.931]	[0.542]	[0.722]	[0.798]	[1.213]	[0.434]
Pseudo R2						0.180
N of Obs	809					817
Panel B Dep. Var. : Ln (wages)						
			IVQR_AAI			**IV_2LAD**
	Q10	**Q25**	**Q50**	**Q75**	**Q90**	**Q50**
PRP	0.286*	0.188*	0.178*	0.151	0.060	0.288***
	[0.159]	[0.110]	[0.089]	[0.100]	[0.223]	[0.103]
Year 2010	0.102	0.079	0.019	0.036	-0.016	-0.011
	[0.079]	[0.080]	[0.055]	[0.057]	[0.077]	[0.018]
Labor Force characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Macro-regions	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	11.017***	11.296***	11.717***	11.771***	11.707***	12.496***
	[0.463]	[0.665]	[0.479]	[0.470]	[0.811]	[0.200]
Pseudo R2						0.240
N of Obs	813					821
Panel C Dep. Var. : Ln (Labor productivity)- Ln (wages)						
			IVQR_AAI			**IV_2LAD**
	Q10	**Q25**	**Q50**	**Q75**	**Q90**	**Q50**
PRP	0.309	0.165	0.162*	0.143	0.119	0.485***
	[0.393]	[0.114]	(0.087]	(0.101]	(0.179]	(0.128]
Year 2010	-0.019	0.003	-0.031	-0.006	-0.026	-0.067**
	[0.141]	[0.081]	(0.082]	(0.113]	(0.133]	(0.030]
Labor Force characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Macro-regions	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.267	0.379	0.327	0.239	0.092	0.750***
	[0.593]	[0.384]	(0.402]	(0.452]	(0.681]	(0.242]
Pseudo R2						0.097
N of Obs.	809					817

Notes: IVQR_AAI is the Quantile Treatment Effect Estimator of Abadie et al. (2002); IV_2LAD is the traditional Two-Stages Least Absolute Deviation Estimator of Amemya (1982). Q10, Q25, Q50, Q75, Q90 are the percentiles of the distribution.

Labor Force characteristics include: shares of blue-, white-collars and executives; shares of fixed term contracts, trained workers and females.

Firm characteristics include: firm's size, capital intensity (Ln(K/L); share of new hirings; product and process innovation; export.

Results for all control variables included in both Labor force and firm characteristics are available upon request.

.*** significant at .01 level; ** significant at .05 level; *significant at .10 level.

Boostrapped standard errors with 100 replications in parentheses.

APPENDIX A

Table A.1 Description of the Variables

Variable	Definition and Source
Key dependent variables	
Ln(LP)	Labour Productivity: Log of value-added per number of employees (source AIDA)
Ln(W)	Wages: Log of wage bill per number of employees (source AIDA)
Ln(LP)-Ln(W)	Competitiveness: measured as LP/W
PRP (1/0)	Dummy variable that equals 1 if the firm adopts a PRP scheme, 0 otherwise (source RIL survey).
Labor force characteristics	
New hirings (share)	New hired workers to total employees (source RIL survey)
Executives (share)	Managers and supervisors to total employees (source RIL survey)
White collars (share)	White collar workers to total employees (source RIL survey)
Blue collars (share)	Manual workers to total employees (source RIL survey)
Females (share)	Women to total employees (source RIL survey)
Fixed-term contracts (share)	Fixed-term workers to total employees (source RIL survey)
Trained workers (share)	Trained workers to total employees (source RIL survey)
Firm Characteristics	
Size: 5 ≦n of employees<15 (1/0)	1: included in the class, 0: otherwise (source RIL survey)
Size: 15 ≦n employees<50 (1/0)	1: included in the class, 0: otherwise (source RIL survey)
Size: 50 ≦n employees<250 (1/0)	1: included in the class, 0: otherwise (source RIL survey)
Size: n of employees ≧250 (1/0)	1: included in the class, 0: otherwise (source RIL survey)
High-Sales-Volatility (1/0)	1: standard deviation of the 2002-2004 sales higher than the median standard deviation of the sector-region, 0: otherwise (source AIDA).
Ln (K/L)	Log of capital stock per number of employees (source AIDA)
Process Innovation	1: presence of process innovation, 0: otherwise (source RIL survey).
Product Innovation	1: presence of product innovation, 0: otherwise (source RIL survey).
Foreign market	1: exporting firms, 0: otherwise (source RIL survey).
Macro-regions (NUTS1)	1: the firm is localised in one of the NUTS1 regions shown in Table 1, 0: otherwise (source RIL survey)
Sectors	1: the firm is localised in one of the sectors shown in Table 1, 0: otherwise (source RIL survey)

Table A.2. IV 2_LAD: First Stage (Probit Model)

Dependent Variable: PRP	Family Firms	No Family Firms
High Sales Volatility [1/0]	0.256***	0.226
	[0.084]	[0.147]
Year 2010	0.129*	0.121
	[0.076]	[0.109]
Labor Force characteristics	Yes	Yes
Firm characteristics	Yes	Yes
Macro-regions	Yes	Yes
Sectors	Yes	Yes
Constant	-0.164	-1.737**
	[0.635]	[0.883]
Observations	2454	813

Notes: standard errors are bootstrapped with 100 replications in parentheses.
*** significant at .01 level; ** significant at .05 level; *significant at .10 level.
Labor Force characteristics: blue-, white-collars and executives; fixed term contracts, trained workers and females.
Firm characteristics: firm's size, capital intensity (Ln(K/L); new hirings; product and process innovation; export.
The coefficients of all control variables are available upon request.

APPENDIX B

We estimate the effect of PRP on labor productivity by adopting an augmented production function that includes the dummy variable (PRP) and other controls for firm characteristics and workforce composition.

$$(1)\ ln\left(\frac{P}{L}\right)_{i,t} = \alpha + \beta \cdot PRP_{i,t} + \lambda \cdot ln\left(\frac{K}{L}\right) i,t \quad + \vartheta \cdot \boldsymbol{F}_{i,t} + \mu_s + \gamma_j + \eta_t + \varepsilon_{i,t} \quad t=2007,2010$$

where $\ln\left(\frac{P}{L}\right)_{i,t}$ is the (log of) valued added per employee, $\ln\left(\frac{K}{L}\right)_{it}$ is the (log of) physical capital per employee, PRP indicates the adoption of PRP. The vector $\boldsymbol{F}_{it}$ denotes controls for workforce composition and for firm characteristics (for more details see Tables 1, 2 and A.1 in the appendix). The parameter μ_s denotes sector specific fixed effects, γ_j regional (NUTS1_level) fixed effects for macro-areas, η_t represents year fixed effects and ε_{it} is the error term capturing the idiosyncratic component of labor productivity. The same regression has been performed for the other two key dependent variables, i.e. average wages, $ln\left(\frac{W}{L}\right)_{i,t}$ and competitiveness, $ln(W)_{i,t}$.

As mentioned in section 4.1, we mainly focus on fixed effect and instrumental variable QRs. The fixed effect quantile regression (FEQR), has been performed by means of the two step Canay (2011) estimator, that allows us to calculate the firm-level fixed effects in a first step panel data regression (within estimator) and then to purge the dependent variable from them in a second step quantile regression.

The IVQR_2LAD is essentially a two-step median regression. In the first step we carry out a probit regression of PRP (our endogenous binary variable) on the binary instrument (sales volatility). In the second step, we use the fitted values of PRP, obtained from the first step,

in a standard quantile regression (Amemya, 1982) [15]. The reasons for which we can only limit to the conditional median with this method are discussed in Chernozhukov &Hansen (2005) and Melly (2004). However, the IVQR_2LAD allows us to directly observe the test of the relevance of the instrument, that is the correlation between high sales volatility and PRP shown in Table A.2. At the same time we obtain econometric evidence about the influence of sales volatility on PRP, as hypothesized in H2.

The IVQR_AAI estimator is coherent with a treatment effect approach and can be adopted only when both the endogenous variable and instrument are binary variables (as in our case). Specific weights combining the latter are estimated according the routine performed by Frölich & Melly (2013). It is worth noting that good instruments are expected to be valid if i) can predict the adoption of PRP and ii) are orthogonal with respect to our dependent variables (productivity, wages and competitiveness). The first property of the instrument is tested in the first stage of the IVQR_2LAD method (see Table A.2). As regards the second property (orthogonality condition), one should note that the equation is perfectly identified because we only have one instrument and one endogenous variable. Thus, no test is available to prove orthogonality. Following Abadie et al., (2002) and Frölich & Melly, (2010; 2013), the instrument-error independence is conceivable when it is plausible to justify the random assignment of the instrument. The standard deviation of sales that we use in our case is strictly related to uncertainty (Bloom, 2009) and, likely, this volatility is randomly assigned to firms and consequently restores the random assignment of the PRP, as well.

[15] Consistent standard errors are obtained by bootstrapping them in both first and second stage regressions.