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# Training, quality of management and firm level bargaining

Mirella Damiani \* and Andrea Ricci\*\*

## Abstract

The double aim of this paper is to investigate the link between firm training behaviour and the adoption of performance-related pay (PRP) and to verify how the quality of management contributes to explaining the strength of this link. Using Ordinary Least Squares Estimates and Fixed Effect Estimates for a sample of Italian firms, we find that training is a significant determinant of firm level bargaining on PRP. Furthermore, we find that managerial quality plays a significant positive role and suggest that this is because managerial quality favours the evolution of social norms based on wage bonuses that enhance trust, sustain collaborative relationships and motivate co-workers to train each other.

**Jel Classifications:** M53; M52; J50; I20

**Keywords:** Training; Compensation; Management; Education

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## Introduction

Intangible assets, such as human capital and organisational changes, are important sources of labour productivity growth and a significant part of the entire stock of knowledge is built up by skills and experiences acquired from vocational and on-the-job training (EU Commission, 2014). In this context, flexibility in internal labour markets and personnel management practices oriented to encourage the upgrading of employees' skills are strategical aims. However, many more steps targeting this issue should be implemented as human capital does not readily adjust to the changing demands of labour. As revealed by the Eurofound survey, only half of the surveyed workers believe that their skills correspond well with the tasks they perform in the workplace, and more than ten percent of the workers report a need for more training (Eurofound, 2012, p. 9; EU Commission, 2014, p. 37).<sup>1</sup>

Theory argues that management practices that may stimulate investments in firm specific training may be limitedly implemented because these investments have no market value and these

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<sup>1</sup> The Eurofound survey indicates that across all sectors and all EU Member States, only 55% of the surveyed workers felt that their skills corresponded well with their tasks, 13% of the workers reported needing more training and 32% said they had the skills to cope with more demanding duties (Eurofound, 2012, p.9).

specific skills are intrinsically difficult to contract upon. Even for training that is technically general, imperfections in the labour market may *de facto* cause that training to be firm specific (Acemoglu and Pischke, 1999). Contract incompleteness implies a moral hazard problem because the non-investor party may opportunistically appropriate part of the returns without sharing the initial cost sustained by the other party. When the investor party does not receive the full marginal return on his investment, he will under-invest as shown in the survey of Leuven (2005).

However, economic theory has determined that training provided at the company level may encourage workers and firms to bargain over the expected returns of firm-specific skills accumulation (Hashimoto and Yu, 1980, Hashimoto, 1981). Thus, incentives, such as pay schemes linked to company performance, may mitigate the threat of opportunistic behaviour (Green and Heywood, 2011).

Managerial ability should be at the core of this issue as it takes significant time to build skills, and only an entrepreneur who visualises long-term targets as well as short-term goals would be willing to invest sufficient effort into developing skills and talent throughout the organisation and adopt the appropriate bargaining strategies to pursue this strategic aim. For instance, firms invest the socially optimal amount if they are able to sufficiently motivate workers by reciprocity (Leuven (2005). Furthermore, because employees allocate effort to on-the-job training by helping co-workers, a managerial design that provides incentives to help in multi-agent situations (Itoh, 1991) could motivate co-workers to provide training (Green and Heywood, 2011). These designs, however, require firm organisations that tend to focus on “people management” (Bloom, Sadun, and Van Reenen, J. 2010).

Thus far, only limited empirical research has investigated these claims by testing whether the quality of management plays some role in explaining the propensity of firms to share the benefits of investments in human capital accumulation with their workforce (Bloom et al. 2014). The contribution of this paper is to investigate the link between firm training behaviour and firms’ bargaining strategies and to verify how the quality of management may contribute to explaining the strength of this link. For our empirical analysis, we use detailed representative firm-level data on approximately 4000 Italian firms for the years 2007 and 2010, and we first examine whether training has played a role in explaining firm level bargaining (FLB) and its components, i.e., performance-related pay (PRP) and labour organisations (LO). Second, we verify whether the role of training is greater in firms characterised by high-quality management.

On the basis of our rich data set, which contains a wide set of information about employment composition and firm characteristics and performing fixed effect estimates, we control for both

*observed* and *unobserved* factors that may obscure and distort inferences of the relationship among training, management quality and firm bargaining.

This paper is organised as follows: section 2 offers a brief discussion of the related literature; section 3 presents the data and descriptive statistics; section 4 illustrates the econometric strategy and estimation results; section 5 concludes.

## **2. Related literature**

Previous studies focused on training have examined whether providing a profit sharing scheme reduces turnover and, through this indirect channel, increases the optimal levels of skill acquisition (Azfar and Danninger, 2001). Other contributions have empirically analysed whether profit sharing also plays a direct role by creating a contract that rewards training and/or encourages co-workers to provide training (Green and Heywood, 2011, Itoh, 1991). In a similar vein, Gielen (2011) examined whether profit sharing increases incentives for employees to more efficiently apply their skills and, in turn, stimulate employers to invest more in training.

We reconsider these issues from a different perspective and explore the determinants not of training intensity but of bargaining intensity, with the main aim to verify the role of skill accumulation as a determinant of bargaining on labour organisations and, more specifically, on contingent rewards such as performance-related pay.

As theory presents different rationales to explain agreements at the company level on wage bonuses, it is relevant to identify the specific role that investments in human capital may play in conditioning the probability of the adoption of these agreements. Accordingly, some broad lines of research are considered.

First, the payment of wage bonuses may act as an incentive to promote efficiency in the production process. As such, these bonuses may help manage the asymmetric information and moral hazard problems that influence training programmes and cause suboptimal levels of investments in human capital. We summarise the main arguments from the on-the-job literature according to Leuven (2005).

In a competitive setting, workers finance the general training they receive by, for example, accepting lower wages during the training period. This is because they could leave after training and find alternative jobs where they could be paid a wage that is equal to their marginal productivity. Thus, they receive a full return and have the incentive to finance their training when they are not liquidity constrained. However, workers may fear a hold-up problem from their current employer if

it is costly to find alternative employment and if the range of their outside options is limited (Leuven, 2005; Green and Heywood, 2011, p.626).

On the contrary, some firms finance specific on-the-job training that is useful only to the firm, i.e., it is not valuable outside their firm. However, if, after training, the worker and the firm separate, the investment in training is lost (Becker, 1962). To address these problems, the worker and the firm may maximise the joint surplus by setting the wage in such a way that it balances the cost of inefficient quits vs. the cost of inefficient layoffs (Hashimoto and Yu, 1980). By paying a high wage, the firm reduces workers' voluntary quits and wage schemes such as profit sharing, that reduce separation, also play an indirect role in encouraging training, as found by Azfar and Danninger (2001).

Under imperfect competition, training that is technologically general is de facto equivalent to firm specific training because wages are below marginal productivity, and thus, the firm may reap benefits from providing training (Acemoglu and Pischke, 1999). In this case, the employer has control over the worker's time, and he may pay a low wage with a promise of training (Acemoglu and Pischke, 1999). Accordingly, some relevant labour market imperfections are crucial factors for understanding why firms pay for general training. As stated by the authors, when wages are below the marginal product, the equilibrium wage structure is compressed, and firms bear some of the cost of training, even when workers can also invest in skills.

However, under contract incompleteness, training duties involve intangible activities that cannot be clearly specified and cannot be easily verified by courts. In such circumstances, difficulties in monitoring the firm's compliance make it possible for the employer to renege on his training promises, thus resulting in suboptimal training in firm-specific skills. Though this problem could be solved by a reputation mechanism, this mechanism is highly imperfect because training within the firm is difficult to observe by *outsiders* (Katz and Ziderman, 1990). As determined by the authors, a training firm under asymmetric information is more informed than the market as potential recruiters do not know the specific training a prospective employee has received from previous employers. Thus, the consequence is that the recruiter assigns a lower expected value to a recruited worker with general training than does the firm that trained him. This tends to lower the employee's outside options and reduce his bargaining power on wage.

Firms are also constrained from investing in training when they fear that the employee will quit after training (Loewenstein and Spletzer, 1997) or they believe the employee will not efficiently execute the newly learned skills. In this context, schemes, such as efficiency wages (Akerlof and Yellen, 1986), especially when worker effort to accumulate firm specific skills cannot be easily monitored, reduce opportunities for trained employees to perform sub-optimally and reduce

suboptimal investments in human capital. Furthermore, collective bonuses that reward not only individual effort but also team cooperation may encourage co-workers to provide on-the-job training to new hires. (Itoh, 1991; Green and Heywood, 2011).

Offering wage schemes that link employees remuneration to firm-level performance commonly involves the distribution of rents. These forms of financial participation give employees a residual claim over part of the firm's surplus, for example, in the form of profit- and gain-sharing (see the overview of Boeri et al. 2013). As previously stated, training provided at the company level encourages workers and firms to bargain over the expected returns of firm-specific skills accumulation (Hashimoto, 1981). Indeed, "by writing a contract in which it is specified that workers get a certain percentage of profits, workers can feel more confident that they will not be held up *ex post*" (Parent, 2004, p. 38). However, the bargaining process, oriented to provide the right incentives to overcome the possibility of underinvestment, could be a game with multiple equilibria. For instance, as argued by Leuven et al. 2005, "When a firm invests more in a worker's skills than theory predicts, the worker may interpret this as a 'kind' action of the firm which deserves some reward. The worker can give this reward by behaving less opportunistically than standard theory assumes he will do. If the firm anticipates this kindness, it will be prepared to invest more" (p. 138).

Only when managers perceives the threat of underinvestment and has a realistic perspective of potential failures, do they introduce contracts as remedies to ensure an efficient equilibrium. On the contrary, myopic perceptions tend to result in poorly designed agreements and suboptimal levels of human capital investments.

Based on these arguments, it may be inferred that managerial quality is a central concern in on-the-job training literature due to its strategic importance to those bargaining strategies that may restore an efficient level of human capital accumulation. Research on management literature, though not strictly focused on training, supports the relevance of quality of management and provides useful suggestions for our analysis.

First, the individual attributes of managers, such as education, are important in explaining the quality of entrepreneurial performance. The level of education, as argued by (Lazear, 2004), is acknowledged to be one of the most important components of managerial abilities and human capital. Empirical studies reviewed by van der Sluis et al. (2008) confirm that among the many factors that contribute to entrepreneurial success, one important determinant is education. Indeed, personnel policies and management decisions, especially when many dimensions of the interaction between employers and workers, such as training, are left unspecified by contracts, require generalist skills, such as those provided by formal education, to properly address contract

incompleteness. Furthermore, as determined by Baptista et al. (2013), skilled entrepreneurs, i.e., highly educated entrepreneurs, may offer employees higher pay for their skills and manage better performing business.

Second, well-educated managers are likely to possess a deeper knowledge of the bundles and complementarities of modern management practices (Milgrom and Roberts, 1995) as related to rewarding workers for tasks and complex jobs that cannot be easily regulated by explicit contracts (Baker et al. 1994). Among these tasks, it is plausible to include those related to learning activities and on-the-job training. It is noted that the adoption of holistic forms of workplace organisation, including incentive systems and multi-tasking, may be a central concern for training. For instance, as reviewed by Leuven (2005, p. 100), although firms cannot attach wages to skills, they can attach wages to tasks. Thus, the well-known ‘up-or-out practice’<sup>2</sup> or the credible ‘up-or-stay promotion rule’ (Huberman and Kahn, 1988) may induce the gathering of non-verifiable firm-specific human capital. Indeed, as hypothesised by Huberman and Kahn (1988), in any given firm, there may be jobs that involve both easy and difficult tasks. A trained worker is assumed to be more productive when successfully performing more difficult tasks, while an untrained worker is more productive when successfully performing an easy task. If different wages can credibly be assigned to different jobs, a worker will invest in training if the wage increase for promotion is greater than the cost of the investment. However, these contractual solutions entail managerial ability.

Third, with respect to training, many dimensions of the interactions between employers and workers are left unspecified by employment contracts. For such contracts, game theoretic models and experimental methods demonstrate the importance of fairness (Fehr and Gächter, 2000). In particular, firms earn a reputation by rewarding training, but workers are motivated by fairness and reciprocity as well as monetary payoffs. As empirically tested by Leuven et al. (2005), workers who exhibit a high sensitivity to reciprocity have higher training rates than workers who exhibit a low sensitivity to reciprocity (Leuven et al. 2005). These results conform and align with the upper echelon perspective that considers any economic organisation to be a reflection of the personal characteristics, including education, of its managers (Hambrick and Mason, 1984).

Summing up, we hypothesize that the quality and education of managers may favour the evolution of social norms based on gift exchange and collective bonuses that enhance trust. These agreements promote enforcement mechanisms that induce the accumulation of firm specific skills, reduce separation after training, sustain collaborative relationships and motivate co-workers to train each other (Green and Heywood, 2011).

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<sup>2</sup> "The up or out" rule requires that each worker in the organisation must achieve a certain rank within a certain period of time. If they fail to do so, they must leave the organisation.

### 3. Data and descriptive statistics

#### 3.1. Data

The empirical analysis is based on a dataset obtained by merging information from two sources, namely, balance-sheet data from the Bureau Van Dijk AIDA archive and firm-level information obtained from the employer and employee surveys (RIL) conducted by the ISFOL (Institute for the Development of Vocational Training of Workers). The RIL data cover a representative sample of 250,000 partnerships and limited liability Italian firms that operated in the private non-agricultural sector. The main advantage of the RIL surveys is that they offer information on firms of all sizes on a national scale and for all private non-agricultural sectors, whereas other datasets for Italy are restricted to large companies, particular areas of the country or selected industries. The other advantage of the RIL surveys is their richness of information as it enables us to have data on the presence of firm level bargaining and the bargaining issues as well as firm and employee characteristics.

With respect to the other key variables, the RIL surveys offer information on training, defined as the percentage of total trained employees. Furthermore, the surveys provide data on the presence of firm-level bargaining (FLB), on agreements on labour organisations (LO), such as work time, labour organisation, and union relations, and on the presence of performance-related pay (PRP) schemes. Each firm is asked whether such a scheme has been adopted; therefore, our PRP variable is a dummy variable indicating whether some type of PRP scheme is offered<sup>3</sup>. Furthermore, the 2010 survey provides data on the educational levels of managers as a proxy for quality. We use a dummy variable that equals 1 if the manager of the firm has a tertiary education (post-secondary education), and 0 otherwise. The dataset we use contains other information on firm strategies, such as product and process innovation, internalisation, i.e., the presence of firms in international markets as exporters, and merger activity (for a detailed definition of all variables, see Appendix, Table A1). Other information includes employment composition by gender, employment contracts and occupation.

We also use the Bureau Van Dijk AIDA archive that contains information on balance sheet data for Italian firms with a turnover of more than 100,000 Euros. Merging the two databases, the sample that we use is an unbalanced panel of 3736 firms for 2007 and 3810 for 2010.

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<sup>3</sup>The dataset does not provide statistics on how many workers in the firm receive PRP or whether these schemes are offered to all or to a selected group of employees (managers, blue-collars, or all workers).



We use the merged dataset and exclude only firms with fewer than five employees. The threshold of five employees should guarantee that we retain only those firms characterised by structured personnel policies. However, in a second step, as a robustness check, we also performed estimates by splitting the entire sample into two sub-groups, specifically, firms with fewer than 15 employees and firms with 15 or more employees (see Appendix). The threshold of 15 workers is justified as the Italian institutional setting mandates that only firms with 15 or more employees must have work councils that can call general meetings and hold consultations regarding collective wage agreements.

### 3.2 Descriptive statistics

Table 1 provides summary statistics for the matched database RIL-AIDA. Our key variables are i) diffusion of firm level bargaining (FLB); ii) bargaining with respect to performance related pay (PRP), iii) bargaining regarding labour organisation (LO); iv) diffusion of training (Training).

Insert Table 1

From Table 1, it can be deduced that the incidence of agreements at the company level was modest and relatively stable over the sampled period. Indeed, only 8.9 percent and 9.4 percent of firms, in 2007 and 2010, respectively, engaged in FLB. The agreements on labour issues (LO), such as working time and labour organisation, were less frequently adopted over time, and their adoption declined from 3.4 percent in 2007 to only 1.6 percent in 2010. Notice, however, that bargaining on wage flexibility and PRP recorded a slight increase, from only 5.5 percent in 2007 to 7.8 percent in 2010.

Interestingly, this last change was accompanied by an increase in the proportion of trained employees from 19 percent in 2007 to approximately 23 percent in 2010. This suggests that following the beginning of the great economic crisis of 2008, Italian enterprises were characterised by a structural low recourse to firm level contracts and an even lower recourse on agreements on labour organisation; however, the Italian firms exhibited a greater propensity to adopt incentive wage schemes (PRP) and a greater intensity to provide training programmes for their workforces. We also observed a slight decline in fixed-term contracts, which dropped from approximately 8.8 percent in 2007 to 8.1 percent in 2010. These tendencies for training and fixed-term contracts confirm that in Italy, as in other European countries, during the economic crisis, “firms try to protect the human capital embodied in skilled blue-collar and white-collar workers” (Békes et al.

2011, p. 2) by giving priority to the retention of human capital embodied in skilled labour and by retraining other workers.

Regarding other employee characteristics, we observe an invariant structure of the workforce in terms of gender composition and occupational categories, i.e., executives, white- and blue-collar workers. With respect to firm performances and strategies, the major changes observed after the crisis included the significant stagnation of labour productivity coupled with a lower degree of involvement of Italian enterprises in product and process innovation. This tendency is revealed by the reduced number of firms that engaged in product innovation, with a decline from 56 percent in 2007 to 45 percent in 2010, as well as the decline in process innovation, with a reduction from 40 percent in 2007 to 37 percent in 2010.

For the year 2010, our database also recorded an increasing number of mergers and acquisitions involving Italian enterprises. The proportion was 3.4 percent, which is approximately three times that recorded for 2007. Moreover, the number of firms that weathered the crisis by relying on international markets increased, thus revealing the importance of the extensive margin, i.e., the change in the number of exporting firms as a strategic response to mitigate and compensate for the contraction in domestic demand.

However, the focus of this paper is to examine the differences among firms that adopt FLB, PRP and LO and to verify how these disparities may be related to firms' training activities. Summary statistics for the complete sample, broken down by training, are presented in Table 2.

#### Insert Table 2

The sample distribution of enterprises by training indicates that the greatest incidences of FLB and PRP were found among training firms, i.e., firms that offered training to their employees. Indeed, in 2007, the incidence of FLB in training firms was 13 percent, which was more than double the incidence in non-training firms at 6 percent, and a similar difference was recorded for PRP, with the diffusion at 9 percent in training firms and only 4 percent in non-training firms. Note that all of these disparities were confirmed for 2010.

Going beyond these descriptive statistics, we verify whether training firms demonstrated a greater propensity to adopt payment for results, likely with the aim to mitigate the specific agency and hold-up problems characterising their organisation. In this context, we analyse heterogeneity in firm responses after the crisis, i.e., with respect to wage flexibility and training strategies, and the influence of managerial quality.

#### **4. Econometric strategy and results**

## 4.1 Econometric strategy

We first explore, for the whole sample, the association among training, the adoption of FLB and its components, negotiations on performance-related pay (PRP) and labour organisation (LO). This empirical analysis is performed by estimating the following equations:

$$\begin{aligned}
 (1) \quad FLB_{i,t} &= \alpha \cdot Training_{i,t} + \beta \cdot L_{i,t} + \delta \cdot X_{i,t} + \mu_i + \varepsilon_{i,t} & t=2007,2010 \\
 (2) \quad PRP_{i,t} &= \alpha \cdot Training_{i,t} + \beta \cdot L_{i,t} + \delta \cdot X_{i,t} + \mu_i + \varepsilon_{i,t} & t=2007,2010 \\
 (3) \quad LO_{i,t} &= \alpha \cdot Training_{i,t} + \beta \cdot L_{i,t} + \delta \cdot X_{i,t} + \mu_i + \varepsilon_{i,t} & t=2007,2010
 \end{aligned}$$

where *Training* is the share of trained employees; the vectors  $L_{it}$  and  $X_{it}$  represent workforce and firm characteristics, respectively;  $\mu_i$  denotes the time invariant unobserved effect;  $\varepsilon_{it}$  is the error term that is assumed to be independent of  $L_{it}$  and  $X_{it}$  and normally distributed, i.e.  $N(0, \sigma_\varepsilon)$ . The pooled OLS estimates of Equations (1), (2) and (3) have been replicated in two samples of firms. The first includes firms run by managers with a tertiary level of education (*High Qual.Man*), and the second includes the group of firms run by managers with a lower degree of education (upper secondary education, primary and lower second education (*Low Qual.Man*)).

It is noted that the pooled OLS estimates may be biased because they do not take into account the problems of sorting firms that will typically arise if firms with FLB agreements are more likely to adopt training programmes and are run by management of high quality. Indeed, part of the differences imputed to training and quality of management could be due to unobserved factors. To circumvent this problem, although our time variability is limited because we have data for only two years (Wooldridge, 2012), we adopt the fixed effect estimator that permits us to disentangle, for the whole sample and the subsamples of *High Qual.Man* and *Low Qual.Man* firms, the differences actually attributable to the different impacts of training based on other sources of firm unobserved heterogeneity. By using longitudinal data, the firm-individual fixed effects that are included in the model control for the individual (firm) specific characteristics not captured by  $X$ , thus permitting a more appropriate solution to the problem of unobserved firm heterogeneity.

## 4.2 OLS Estimates

Table 3 presents the OLS pooled estimates where our key regressor, training, is a determinant of the adoption of firm level bargaining (column 1). Furthermore, the estimates reported in columns 2

and 3 allow us to evaluate the presence of a composition effect, i.e., whether training influenced differently the bargaining issues, PRP and LO, respectively. Notice that all pooled estimates are obtained by including time, sector and regional (NUTS) dummies to control for time-varying, sector-specific factors, as well as geographical disparities that likely impact bargaining intensity and bargaining issues but cannot be captured by other controls included in this analysis. All other control variables regarding firm and employee characteristics are reported in Table 1 (for brevity, only the coefficients associated with the key regressors are reported).

Insert Table 3

Our results provide clear evidence that a higher probability of FLB is positively associated with training. This link is driven primarily by the impact of training on wage premium (PRP) agreements, whereas we found a smaller association between training and labour organisation (LO). In particular, according to the OLS estimates, it may be expected that an increase of 10 percent of the trained employees (equivalent to a standard deviation) leads to a higher probability of PRP agreements of  $0.1 \times 0.052$  ( $0.34 \times 0.052\%$ , where 0.34 is the standard deviation of training reported in the last column of Table 1). With respect to the influence of bargaining on labour matters, the increased probability is equal only to  $0.1 \times 0.016$  ( $0.34 \times 0.016\%$ ).

The share of female employees decreases the probability for firm-level bargaining on labour matters (-3.3 percent) and, with greater intensity, on PRP (-7.4 percent). These results were derived by controlling for typology of contracts, i.e., fixed-term or permanent contracts, and occupational positions, i.e., executives and white- and blue-collar workers. These findings are consistent with recent EU evidence and confirm that women and men are affected by different workplace practices and different methods of rewarding employees through PRP (EU Commission, 2013, p.5). The reduced ability of women to access firm level bargaining may prevent women from reaching the same pay levels as men and may be the cause of different actual structures of pay systems regarding PRP, which may result in different rates of pay for female and male employees (EU Commission, 2013, p. 5).

Another aspect of the workforce relevant for our analysis concerns the precarious position of employees. The share of fixed-term contracts is negatively and significantly associated with a lower adoption of PRP (-7.5 percent). In the Italian institutional setting, PRP wage premiums, which are paid at the second level of bargaining, are *added* to the base wage, which is established in the first level of bargaining, and could be zero when firms do not pay these premiums. Thus, the negative coefficient of fixed-term contracts derived from our PRP estimates signal that workers do not receive any wage premiums and confirm the significance of the wage penalty associated with

temporary jobs, a finding also observed in other Italian studies (see Bosio, 2014). This finding suggests that temporary jobs can be associated with a wage penalty (low incidence of PRP) perhaps because these precarious positions are associated with a depreciation in acquired workers' skills and the use of flexible contracts may lessen any wage-tenure effect" (Bosio, 2014, p. 65). The third component of outsiders in the Italian workforce are newly hired employees whose presence reduces the probability of FLB and PRP.

Pooled OLS estimates indicate that firm size is another significant determinant of bargaining with respect to both PRP and LO, likely because enterprise negotiations and related transaction costs are expensive to implement and are, thus, more likely affordable by large firms. Labour productivity, which represents the indicator of ability to pay, is positively associated only with concessionary bargaining and, accordingly, with payments of PRP (Boeri et. 2013). Finally, bargaining practices were affected by the economic crisis of 2008, as evidenced by the coefficient associated with the dummy variable for the year 2010, which is negative and significant in all three sets of estimates, namely, FLB, PRP and LO, indicating that Italian firms engaged in less intense bargaining activities as a reaction to the crisis.

All of our results have been subjected to an additional robustness check by splitting the sample into two subsamples according to firm size, i.e., firms with more than 15 employees and firms with 15 or fewer employees. The choice of this threshold is motivated by the Italian institutional setting characterised by more stringent regulations for firms with more than 15 employees. These regulations concern not only different employment protection norms for dismissals but also mandatory rules for work councils that must be established in firms with more than 15 employees. In summary, the results reported in the Appendix (Tables A2 and A3) indicate that in smaller enterprises, the impact of training is significant only in pooled OLS estimates and that when unobserved heterogeneity is considered, training loses its significance. This outcome is consistent with other characteristics of small Italian enterprises that are characterised by dynastic management and, at times, by untalented management (Caselli and Gennaioli, 2013). In these firms, managerial styles are dominated by informal agreements and informal processes and the adoption of formal negotiations among employers, employees and their unionised representatives are less frequent. In these governance structures characterised by family capitalism, the lack of work council-type bodies leads to the absence of formal rights of employees to influence key managerial decisions and strategies. Thus, in small Italian firms, the probabilities of FLB and the implementation of a training strategy are limited and insignificant, as confirmed by our estimates.

Our key test is whether some of the differences in the association between training and FLB, and its components, are related to variations in managerial quality. Following previous literature (see the survey of van der Sluis et al. 2008), we hypothesise that formal schooling and higher education levels of entrepreneurs and managers reflect their general abilities and that these abilities foster good personnel policies and firm success (Lazear, 2004). Accordingly, we contend that firms that are run by high-quality management and managers with tertiary levels of education show a greater propensity to adopt the best management practices, such as PRP, to reduce separation and turnover rates in cases of firm-specific human capital investments.

Our results indicate that the educational attributes of managers contribute to the differences across firms (see Table 4). The association of training and the adoption of FLB is higher in *High Qual.Man* firms (8.1 percent) compared to the other firms (5.3 percent). Furthermore, a significant disparity is found with respect to the PRP component as the estimated coefficient is 6.9 percent for *High Qual.Man* firms and 4.3 percent for *Low Qual.Man* firms. Moreover, the comparison of the two groups indicates that the impact of training on bargaining on the labour organisation (LO) is lower and insignificant in *Low Qual.Man* firms.

Insert Table 4

However, as some of the differences we found could be due to unobserved factors, we use fixed effect estimates to circumvent the problem of unobserved heterogeneity.

### 4.3 Fixed Effects Estimates

Some of the differences we found with previous estimates could be due to unobserved factors, such as characteristics of firms not strictly attributable to training and managerial quality, our key variables, but rather to other firm attributes for which we do not control. We take this issue into account by using fixed effect estimates (FE) and the results obtained using the estimators are presented in Table 5.

Insert Table 5

When comparing the OLS and fixed effect estimates (Tables 3 and 5, respectively), we find that all of our previous results hold and, in fact, are now even more significant. The fixed effect estimates with respect to the whole sample regarding the impact of training on the FLB are lower than the OLS estimates, i.e., 3.6 percent and 6.3 percent, respectively. A similar

difference is found in the PRP regression as the training coefficient obtained from the OLS is 5.2, whereas the fixed effect estimate is 3.3. Furthermore, the influence of bargaining on the labour organisation (LO) based on fixed effect estimates reduces both in magnitude and significance. However, the divide between firms run by high and low managerial quality is even more obvious when we adopt fixed effects estimates. For firms run by high-quality managers we have additional confirmation that the associations between training and our dependent variables, especially FLB and PRP, were not driven by unobserved characteristics of Italian firms. For this group of firms, the fixed effect estimates indicate that the role of training is even higher than that obtained with pooled OLS estimates. (In fixed effects estimates the coefficients for FLB and PRP are 0,089 and 0,0076, whereas the OLS estimates are, respectively, 0.081 and 0.069). Only the coefficient associated with bargaining in labour organisations (LO) loses significance. It is evident that in *Low Qual.Man* firms, only unobserved characteristics motivate the positive role of training, according to our dependent variables. Therefore, by correcting for unobserved firm individual heterogeneity in firms led by low quality management, the influence of training evaporates. On the contrary, for those firms led by high-quality management, opposite results are obtained. Accordingly, management quality may be behind the adoption of wage bonuses that are offered to obtain reciprocal behaviour and loyalty as well as to prevent the failure to accumulate firm specific skills. These types of agreements, which may well discourage separation and reduce turnover rates, may also represent a contractual solution to the failure to provide adequate firm-financed training.

## 5. Conclusions

Previous research has provided evidence that business performance is conditioned by manager attributes and that the education of managers is a good predictor of business success (Maes et al. 2012). This paper contributes to previous research by disclosing the impact of managerial quality in on-the-job training. Training represents a typical management scenario as it features inherent incompleteness and a relational nature similar to that of many other employment contracts, and as such, it brings to the forefront the determinant role of manager attributes in shaping strategic interactions between employers and employees. Accordingly, this paper shows that educated managers more clearly perceive that increasing expected returns on human capital investments require the adoption of firm level agreements, such as those regarding performance-related pay.

The introduction of the role of managerial quality is consistent with the original fixed effects panel data model that was designed to control for this unmeasured managerial capability (Mundlak,

1961). By introducing education as a signal of the quality of the entrepreneurs and managers, we proxied and quantified the effect of this unmeasurable input. Interestingly, the fixed effect correction we adopt reveals even clearer evidence that training in firms run by qualified managers is a key driver of agreements regarding pay for performance schemes. The propensity of highly educated managers to use PRP bonuses reveals a commitment strategy that favours reciprocity in the workplace and minimises opportunistic behaviours. Moreover, these wage agreements represent a signal of loyalty that is transmitted from management to employees, and as such, it may well mitigate the problem of suboptimal investments in human capital. These agreements, based on gift exchange and payment of *collective* bonuses, reveal enforcement mechanisms that induce the accumulation of firm specific skills, reduce separation after training, and sustain collaborative relationships that may motivate co-workers to provide training to their colleagues (Green and Heywood, 2011).

This paper represents an attempt to conjoin different areas of research that, to date, have not been strictly integrated, namely, studies on training, performance-related pay and management quality. Further and deeper research to integrate these fields may represent promising avenues for future research.

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## Training, quality of management and firm level bargaining

**Table 1 Descriptive statistics**

	Year 2007		Year 2010		Years 2007-2010	
	Mean	Std. Dev	Mean	Std. Dev.	Mean	STD. Dev.
<b>FLB</b>	0.089	0.284	0.094	0.292	0.091	0.288
<b>PRP</b>	0.055	0.228	0.078	0.269	0.068	0.251
<b>LB</b>	0.034	0.181	0.016	0.125	0.024	0.154
<b>Workforce characteristics</b>						
% trained	0.189	0.326	0.231	0.351	0.212	0.340
% hired	0.134	0.163	0.090	0.153	0.111	0.159
% fixed-term contracts	0.088	0.147	0.081	0.131	0.084	0.139
% executives	0.036	0.080	0.043	0.088	0.040	0.085
% white-collars	0.394	0.303	0.394	0.297	0.394	0.300
% blue-collars	0.570	0.317	0.563	0.316	0.566	0.316
% females	0.324	0.258	0.338	0.259	0.332	0.258
<b>Firm characteristics</b>						
M & As	0.013	0.114	0.034	0.181	0.024	0.154
Product innovation	0.558	0.497	0.448	0.497	0.499	0.500
Process innovation	0.402	0.490	0.370	0.483	0.385	0.487
Exporters	0.209	0.406	0.366	0.482	0.293	0.455
ln(labour product.)	10.788	0.524	10.775	0.533	10.781	0.529
ln (capital per empl.)	9.670	1.479	10.073	1.724	9.886	1.627
N. obs.	3736		3810		7546	

Note: RIL-AIDA. descriptive statistics with sample weights

**Table 2**

	Year 2007				Year 2010			
	N. firms	FLB	PRP	LB	N. firms	FLB	PRP	LB
Non-training firms	2086	0.06	0.04	0.03	1926	0.06	0.05	0.01
Training firms	1650	0.13	0.09	0.05	1884	0.14	0.11	0.03
N. obs.	3736	0.09	0.06	0.03	3810	0.09	0.08	0.02

Note: RIL-AIDA. descriptive statistics with sample weights

**Table 3: OLS Estimates-Probability of adoption of FLB,PRP, LO**

	<b>FLB</b>	<b>PRP</b>	<b>LB</b>
	[1]	[2]	[3]
% trained	0.063*** [0.012]	0.052*** [0.01]	0.016** [0.007]
% hired	-0.045** [0.022]	-0.043** [0.02]	-0.008 [0.012]
% fixed-term contracts	-0.102*** [0.026]	-0.075*** [0.023]	-0.034** [0.014]
% females	-0.097*** [0.017]	-0.074*** [0.015]	-0.033*** [0.01]
ln(labour product.)	0.030*** [0.008]	0.028*** [0.007]	0.006 [0.004]
14<n employees<50	0.094*** [0.008]	0.072*** [0.007]	0.023*** [0.005]
49<n employees<250	0.310*** [0.013]	0.256*** [0.012]	0.079*** [0.01]
n employees>249	0.618*** [0.031]	0.530*** [0.033]	0.223*** [0.045]
year 2010	-0.013* [0.008]	0.012* [0.007]	-0.027*** [0.005]
Constant	-0.158* [0.093]	-0.185** [0.082]	0.015 [0.051]
Controls			
Macroarea	Yes	Yes	Yes
Sectors	Yes	Yes	Yes
M&As	Yes	Yes	Yes
Product Innovation	Yes	Yes	Yes
Process Innovation	Yes	Yes	Yes
Exporters	Yes	Yes	Yes
ln (capital per empl.)	Yes	Yes	Yes
Employee categories	Yes	Yes	Yes
F(.)	58.25	43.28	6.13
Prob > F	0.000	0.000	0.000
R2	0.201	0.186	0.046
N. obs.	7546	7533	6625

Note: Data RIL-AIDA. \*, \*\*, \*\*\* Significant at 10%, \*\* at 5%, \*\*\* at 1%, respectively.  
Robust Standard errors.

**Table 4. OLS Estimates: Probability of adoption of FLB, PRP, LO by manager education**

	<i>High Qual.Man</i>			<i>Low Qual.Man</i>		
	FLB	PRP	LO	FLB	PRP	LO
% trained	0.081*** [0.021]	0.069*** [0.02]	0.024* [0.014]	0.053*** [0.014]	0.043*** [0.012]	0.012 [0.008]
% hired	-0.041 [0.046]	-0.009 [0.042]	-0.032 [0.024]	-0.035 [0.026]	-0.044** [0.022]	0.001 [0.015]
% fixed term contracts	-0.153*** [0.054]	-0.147*** [0.048]	-0.02 [0.03]	-0.085*** [0.029]	-0.052** [0.025]	-0.038** [0.015]
% females	-0.182*** [0.032]	-0.129*** [0.03]	-0.075*** [0.019]	-0.048** [0.019]	-0.039** [0.016]	-0.013 [0.013]
ln(labour product.)	0.015 [0.014]	0.009 [0.012]	0.007 [0.009]	0.035*** [0.009]	0.034*** [0.008]	0.005 [0.005]
15<n of employees<100	0.111*** [0.015]	0.085*** [0.013]	0.027*** [0.009]	0.078*** [0.009]	0.059*** [0.007]	0.020*** [0.005]
99<n of employee<250	0.353*** [0.021]	0.308*** [0.02]	0.077*** [0.016]	0.257*** [0.017]	0.199*** [0.015]	0.078*** [0.012]
n of employees>249	0.634*** [0.041]	0.547*** [0.045]	0.266*** [0.073]	0.523*** [0.048]	0.457*** [0.05]	0.148*** [0.053]
year 2010	-0.006 [0.015]	0.019 [0.014]	-0.028*** [0.01]	-0.015* [0.009]	0.011 [0.008]	- [0.006]
Constant	0.044 [0.169]	0.012 [0.152]	0.047 [0.099]	-0.234** [0.105]	-0.258*** [0.092]	0.01 [0.058]
Controls						
Macroarea	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
M&As	Yes	Yes	Yes	Yes	Yes	Yes
Product innovations	Yes	Yes	Yes	Yes	Yes	Yes
Process innovation	Yes	Yes	Yes	Yes	Yes	Yes
Exporters	Yes	Yes	Yes	Yes	Yes	Yes
ln (capital per empl.)	Yes	Yes	Yes	Yes	Yes	Yes
Employee category	Yes	Yes	Yes	Yes	Yes	Yes
N. obs.	2465	2456	2009	5029	5025	4571
Adj. R-Squ~e	0.261	0.243	0.055	0.143	0.129	0.035

Note: Data RIL-AIDA. \*, \*\*, \*\*\* Significant at 10%, \*\* at 5%, \*\*\* at 1%, respectively. Robust Standard errors.

**Table 5:Panel fixed effects estimate- Probability of adoption of FLB,PRP,LO**

	<b>FLB</b>	<b>PRP</b>	<b>LB</b>
	[1]	[2]	[3]
% trained	0.036** [0.014]	0.033*** [0.013]	0.007 [0.01]
% hired	-0.024 [0.035]	-0.029 [0.031]	0.002 [0.024]
% fixed-term contracts	-0.017 [0.044]	-0.015 [0.04]	-0.015 [0.03]
% females	-0.017 [0.059]	-0.007 [0.053]	-0.039 [0.04]
ln(labour product.)	0.024* [0.015]	0.024* [0.013]	0.009 [0.01]
14<n employees<50	0.012 [0.019]	0.02 [0.017]	-0.008 [0.013]
49<n employees<250	0.001 [0.035]	0.007 [0.031]	-0.018 [0.025]
n employees>249	0.074 [0.069]	0.018 [0.062]	0.202*** [0.075]
year 2010	0.000 [0.007]	0.024*** [0.006]	-0.016*** [0.005]
Constant	0.029 [0.218] [0.093]	-0.04 [0.195] [0.082]	0.04 [0.151] [0.051]
Controls			
Macroarea	Yes	Yes	Yes
Sectors	Yes	Yes	Yes
M& As	Yes	Yes	Yes
Product innovation	Yes	Yes	Yes
Process Innovation	Yes	Yes	Yes
Exporters	Yes	Yes	Yes
ln (capital per empl.)	Yes	Yes	Yes
Employee category	Yes	Yes	Yes
N. obs.	7546	7533	6625

Nota: Note: Data RIL-AIDA. \*,\*\*,\*\*\*Significant at 10%, \*\* at 5%, \*\*\*at 1%, respectively. Robust Standard errors.

**Table 6. Fixed-effects (within) regressions of the probability of adoption of FLB,PRP, LO, results by managers' education**

	<i>High Qual.Man</i>			<i>Low Qual.Man</i>		
	FLB	PRP	LO	FLB	PRP	LO
% trained	0.089*** [0.026 [0.021	0.076*** [0.025 [0.02	0.019 [0.019 [0.014	0.01 [0.017 [0.014	0.012 [0.015 [0.012	0.001 [0.012 [0.008
% hired	-0.047 [0.069	-0.057 [0.066	0.003 [0.048	-0.014 [0.04	-0.015 [0.035	-0.002 [0.028
% fixed term contracts	-0.101 [0.09	-0.115 [0.086	-0.005 [0.059	-0.005 [0.05	0.008 [0.043	-0.022 [0.035
ln(labour product.)	0.027 [0.026	0.019 [0.025	0.005 [0.019	0.026 [0.018	0.030* [0.016	0.011 [0.013
15<n of employees<100	-0.022 [0.037	0.004 [0.035	-0.031 [0.024	0.029 [0.022	0.031* [0.019	0.001 [0.015
99<n of employees<250	-0.131** [0.06	-0.023 [0.058	-0.125*** [0.041	0.078* [0.043	0.019 [0.037	0.054* [0.032
n of employees>249	-0.089 [0.112	-0.127 [0.107	0.344** [0.161	0.196** [0.089	0.146* [0.077	0.200** [0.085
year 2010	0.012 [0.013	0.037*** [0.012	-0.019** [0.009	-0.005 [0.008	0.021*** [0.007	-0.016*** [0.006
Constant	0.462 [0.327	0.359 [0.312	0.186 [0.231	-0.066 [0.308	-0.264 [0.266	0.121 [0.207
Controls						
Macroarea	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
M&As	Yes	Yes	Yes	Yes	Yes	Yes
Product innovations	Yes	Yes	Yes	Yes	Yes	Yes
Process innovation	Yes	Yes	Yes	Yes	Yes	Yes
Exporters	Yes	Yes	Yes	Yes	Yes	Yes
ln (capital per empl.)	Yes	Yes	Yes	Yes	Yes	Yes
Employee category	Yes	Yes	Yes	Yes	Yes	Yes
N. Obs.	2465	2456	2009	5029	5025	4571

Note: Data RIL-AIDA. \*, \*\*, \*\*\*Significant at 10%, \*\* at 5%, \*\*\*at 1%, respectively. Robust Standard errors.

## APPENDIX

**Table A1: Data descriptions**

Variable	Definition
FLB	Dummy variable that equals 1 if the firm adopts firm level bargaining, 0 otherwise
PRP	Dummy variable that equals 1 if the firm adopts PRP payments of any kind, 0 otherwise.
LO	Dummy variable that equals 1 if the firm adopts bargaining on labour organization of any kind, 0 otherwise.
ln (labour product.)	Log of value-added per employee (source AIDA) deflated by the value added deflator (source ISTAT)
ln (capital per empl. )	Log of capital stock per employee (source AIDA) deflated by the investment deflator (source ISTAT)
Employees category:	
Executives	Percentage of managers and supervisors
White collar workers	Percentage of white collar workers
Blue-collar workers	Percentage of manual workers
Females	Percentage of women among total workers
Fixed-term contracts	Percentage of fixed-term workers
Hiring	Percentage of hired workers
Process Innovation	Dummy variable that equals 1 if the firm adopted process innovations in the 3 previous years, 0 otherwise
Product Innovation	Dummy variable that equals 1 if the firm originated new products in the 3 previous years, 0 otherwise
Exporters	Dummy variable that equals 1 if the firm exported in the last three years, 0 otherwise
M&As	Dummy variable that equals 1 if the firm experienced merger or acquisition in the 3 previous years, 0 otherwise
Macro area	Localization in i) North-Western regions, ii) North Eastern regions; iii) Central regions; iV) Southern regions
Sectors	Dummy variable for sectors that equals 1 if the firm is localized in sector shown in table1, 0 otherwise



**Table A2: Pooled OLS estimates for firms of different size**

	<15 employees			>15 employees		
	FLB	PRP	LO	FLB	PRP	LO
	[1]	[2]	[3]	[4]	[5]	[6]
% trained	0.040*** [0.012]	0.026*** [0.01]	0.014* [0.008]	0.101*** [0.019]	0.088*** [0.017]	0.022* [0.012]
% hiring	-0.028 [0.019]	-0.018 [0.015]	-0.011 [0.011]	-0.009 [0.042]	-0.02 [0.038]	0.003 [0.023]
% fixed term	0.027 [0.028]	0.028 [0.023]	0.002 [0.017]	-0.191*** [0.041]	-0.138*** [0.037]	-0.060*** [0.023]
% females	-0.018 [0.016]	-0.015 [0.012]	-0.001 [0.011]	-0.160*** [0.028]	-0.119*** [0.025]	-0.060*** [0.018]
ln(labour product .)	0.019** [0.008]	0.018*** [0.006]	0.002 [0.005]	0.043*** [0.014]	0.037*** [0.013]	0.011 [0.007]
Year 2010	0.000 [0.007]	0.012** [0.006]	-0.010** [0.005]	-0.029** [0.013]	0.007 [0.012]	-0.041*** [0.008]
Constant	-0.208** [0.097]	-0.187** [0.079]	-0.026 [0.06]	0.085 [0.174]	0.022 [0.159]	0.094 [0.085]
Controls						
Macroarea	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
M&As	Yes	Yes	Yes	Yes	Yes	Yes
Product innovation	Yes	Yes	Yes	Yes	Yes	Yes
Process innovation	Yes	Yes	Yes	Yes	Yes	Yes
Exporters	Yes	Yes	Yes	Yes	Yes	Yes
ln (capital per empl.)	Yes	Yes	Yes	Yes	Yes	Yes
Employee category	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.021	0.02	0.008			
N. Obs.	3082	3085	3005	0.081 4464	0.083 4448	0.0246 3620

**Table A3: Panel Fixed effects estimates for firms of different size**

	Firms <15 employees			Firms >15 employees		
	FLB	PRP	LO	FLB	PRP	LO
	[1]	[2]	[3]	[4]	[5]	[6]
% trained	0.027 [0.017]	0.012 [0.014]	0.012 [0.011]	0.037 [0.023]	0.044** [0.022]	0.002 [0.018]
% hirings	-0.079** [0.038]	-0.075** [0.031]	-0.008 [0.025]	0.005 [0.064]	0.016 [0.06]	-0.026 [0.048]
% fixed-term contracts	-0.014 [0.047]	0.009 [0.038]	-0.021 [0.03]	-0.051 [0.086]	-0.049 [0.08]	-0.024 [0.063]
females	0.005 [0.061*]	-0.03 [0.049]	0.037 [0.038]	-0.052 [0.118]	-0.01 [0.11]	-0.126 [0.087]
ln(product. per empl.)	0.034** [0.016] [0.014]	0.028** [0.013] [0.012]	0.012 [0.011] [0.009]	0.047* [0.027] [0.017]	0.04 [0.025] [0.016]	0.02 [0.023] [0.014]
Year 2010	0.002 [0.008]	0.01 [0.006]	-0.005 [0.005]	-0.003 [0.011]	0.036*** [0.01]	-0.029*** [0.009]
Constant	-0.246 [0.208]	-0.288* [0.168]	-0.046 [0.134]	0.024 [0.406]	-0.038 [0.378]	0.093 [0.322]
Controls						
Macroarea	Yes	Yes	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes	Yes	Yes
M & As	Yes	Yes	Yes	Yes	Yes	Yes
Product innovation	Yes	Yes	Yes	Yes	Yes	Yes
Process innovation	Yes	Yes	Yes	Yes	Yes	Yes
Exporters	Yes	Yes	Yes	Yes	Yes	Yes
ln (capital per empl.)	Yes	Yes	Yes	Yes	Yes	Yes
Employee category	Yes	Yes	Yes	Yes	Yes	Yes
N. Obs.	3082	3085	3005	4464	4448	3620

Nota: dati RIL-AIDA. Altre variabili incluse nella regressione: dirigenti, impiegati, operai, innovazioni di processo, innovazioni di prodotto, retribuzione integrativa, commercio internazionale, dimensione, ln(capitale fisico per dipendente). Significatività statistica: \* al 10%, \*\* al 5%, \*\*\* al 1%. Standard error robusti