INAPP
PUBLIC POLICY INNOVATION

WORKING PAPER

INAPP WP n. 60

# Tax breaks for incentive pay productivity and wages: evidence from a reform

*Mirella Damiani*
*Fabrizio Pompei*
*Andrea Ricci*

MARZO 2021

# Tax breaks for incentive pay productivity and wages: evidence from a reform

**Mirella Damiani**
*Università degli studi di Perugia, Dipartimento di Scienze Politiche, Perugia*
*mirella.damiani@unipg.it*

**Fabrizio Pompei**
*Università degli studi di Perugia, Dipartimento di Economia, Perugia*
*fabrizio.pompei@unipg.it*

**Andrea Ricci**
*Istituto nazionale per l'analisi delle politiche pubbliche (INAPP), Roma*
*Corresponding author: an.ricci@inapp.org*

MARZO 2021



CONTENTS: 1. Introduction. – 2. Theoretical background, institutional aspects and working hypotheses; 2.1 Related literature; 2.2 The Italian institutional context; 2.3 Working Hypotheses. – 3. Data and descriptive statistics; 3.1 Data; 3.2 Descriptive statistics. – 4. Econometric analysis; 4.1 Method; 4.2 Results. – 5. Conclusions. – Appendix. – References

# ABSTRACT

# Tax breaks for incentive pay productivity and wages: evidence from a reform

This paper analyses the impact of a tax break for incentive pay (introduced in Law n. 208/2015) on labour productivity and average wages in Italian firms. We use a unique source of firm-level information provided by *Rilevazione su Imprese e Lavoro* - Istituto nazionale per l'analisi delle politiche pubbliche (RIL-Inapp) surveys merged with the Orbis archive over a three-year reference period 2010-2014-2018. By applying a policy evaluation framework, we obtain the following results. First, a tax break has a positive effect on both labour productivity and average wages. Second, our estimates support the hypothesis that the tax break is associated with a distributive effect, with productivity gains higher than those observed for average wages. Third, productivity impacts are mainly driven by family firms in Northern regions, where firms benefit in terms of bargaining reduced costs and information spillovers from the more dynamic business environment in which they operate. These results are robust to unobserved heterogeneity and endogeneity issues.

**KEYWORDS**: firms, labor productivity, wages, performance-related pay, tax incentives

**JEL CODES**: D24, J31; J33; G32

# 1. Introduction

In recent decades, the systems of industrial relations in a number of European countries have undergone a transitional phase activated by globalization, financial crises and national policies that have led to more room for company-level agreements. Following the recommendations of the ECB and the European Commission, a New European Economic Governance (NEEG) has been proposed, thus allowing company-level agreements to derogate from higher bargaining levels and labour laws and encouraging decentralized collective bargaining and higher alignments of wages with firm or regional productivity (Degryse 2012, 73).

Indeed, one aim of these deep labour reforms was achieving greater inter-firm wage differentiation and a closer link between firm performance and worker remuneration. Following these policies, firm-level collective bargaining would have played a central role in addressing some structural weaknesses, such as disappointing productivity growth and stagnant wages, which have been two main challenges faced by a number of developed countries in recent years (Aidt and Tzannatos 2008; OECD 2017, 2018; Syverson 2011). One rationale behind these recommendations is that the diffusion of company-level agreements, also obtained with mediation bodies, provides worker and firm representatives sufficient room to adjust centralized negotiations to company conditions, attaining greater labour efficiency and simultaneously higher wages, social dialogue and good levels of inclusiveness (OECD 2018, 18).

To date, most studies have analysed the diffusion and impacts of second-level bargaining on different outcomes in labour markets and productive systems (see OECD 2018, chapter 3; Eurofound 2015). Much less attention, instead, has been paid to the specific role of public policies, such as fiscal incentives, aimed at favouring decentralization.

In this regard, Italy offers an interesting case study as the recent introduction of Law n. 208/2015 has allowed a significant tax break for performance-related pay agreements and strengthen the link between labour productivity and wages, as recommended by the ECB and the European Commission. In this study, we adopt a policy evaluation framework to verify whether this public intervention has been conducive to higher productivity and partial distribution of these efficiency gains to employees through higher wages. We also inquire whether the effectiveness of this fiscal incentive is conditioned by firm governance.

We conjecture that on the one hand, fiscal incentives may be more efficacious when adopted by family firms, where a climate of 'relational governance' may mitigate the potential drawbacks of wage incentives, such as free-rider problems. On the other hand, we hypothesize that family firms, especially when run by dynastic management, are more oriented to nepotism than meritocracy and likely design less efficient incentive schemes (Bloom and van Reenen 2011).

Finally, we tested the impacts of the tax breaks across different industries and geographic areas of Italy to verify whether the impacts of this policy have been limited to firms located in the north-central regions or operating in industry or to firms in the Southern areas or of services sectors. The adequate diffusion and effectiveness of PRP schemes across industries and different areas of Italy (North-Centre versus Southern regions) has been a central concern in the Italian economy, which features a strong 'neo-dualism' in the distribution of business productivities, as documented by recent studies (Dosi *et al.* 2019).

To explore these issues, we take advantage of a unique source of firm-level information derived from the *Rilevazione su Imprese e Lavoro* (RIL), a survey conducted by Inapp (Istituto nazionale per l'analisi delle politiche pubbliche) on a representative sample of Italian firms (the reference period refers to the years 2010, 2014 and 2018), merged with the Orbis archive. Using different econometric techniques (pooled OLS, simple difference-in difference, and triple difference-in-difference panel data models) on the longitudinal RIL-Orbis dataset, we find the following main results. First, a tax break has a positive effect on both labour productivity and average wages. Second, the tax break leads to a distributive effect, with productivity gains higher than those observed on average wages. Third, productivity impacts are mainly driven by family ownership in Northern regions, where these firms benefit from the more dynamic business environment in terms of lower bargaining costs and advantages due to information spillovers. These results are robust to an econometric strategy that controls for unobserved heterogeneity and other endogeneity issues.

In doing so, we contribute to the literature on industrial relations in different ways.

First, we analyse a political intervention that, among other measures adopted in other European economies for promoting broad-based decentralized bargaining, represents an interesting and unique case study (OECD 2018) that permits us to evaluate the role of fiscal relief to *directly* encourage performance-related payments, whereas other countries have adopted only *indirect* measures to promote contingent rewards[1].

Second, verifying that the direct impact of fiscal incentives on PRP may be conditioned by behavioural and managerial characteristics that typify family governance, we document the role of one of the most pervasive traits of the Italian economy, which is also ubiquitous in most European countries (Maury 2006; Breda 2018).

Third, our results show that the effectiveness of fiscal incentives intended to decentralize industrial relations and boost productivity depends on sectorial specialization and the geographical location in which firms operate. Then, policy makers may target fiscal benefits to some firms' observable characteristics and behaviours, rather than offering unconditional *erga omnes* tax relief. This finding could be a useful reference for other European countries affected by pervasive firm heterogeneities.

The paper is organized as follows. Section 2 briefly discusses the related literature and describes the main features of the Italian institutional setting. Section 3 presents the data used and descriptive statistics. Section 4 illustrates the econometric framework employed and our estimation results. Section 5 concludes the paper.

[1] In the last few years, many countries have adopted *indirect* measures to promote a stronger link between alignment of wages and firm conditions. The Nordic European countries Norway, Sweden and Finland have introduced measures to encourage union membership and attain high bargaining coverage, whereas France has promoted the possibility of signing company-level agreements in small firms, even in the absence of union delegates (OECD 2018, sections 3.5.1). However, Italy is a different case because the political intervention has been *directly* designed to introduce important novelties into tax breaks on variable bonuses that linked wages more closely to productivity results.

# 2. Theoretical background, institutional aspects and working hypotheses

## *2.1 Related literature*

**The power of wage incentives**

The persistent stagnation of the Italian economy is rooted in the decline of productivity growth that has affected the country since the 1990s. In 2000, labour productivity was 20 percent lower than in Germany (25 percent lower than in France), and the gap increased steadily in the following years, especially after 2009, when France and Germany started to grow again, while Italy continued to stagnate[2] (Bugamelli *et al.* 2018). Among the key drivers of this disappointing trend have been the low quality of managerial practices and labour earnings totally decoupled from labour productivity.

In this context, the ability of collective bargaining to improve labour market performance and promote inclusive growth was identified in the promotion of incentive pay as a direction for qualified political intervention (OECD 2018). Indeed, a number of studies have shown that underperforming firms employ fewer power-incentive remuneration schemes than their counterparts. (Boeri *et al.* 2013). The adoption of contingent payments may exert beneficial effects on labour productivity because these schemes are a useful device to select more motivated and talented employees. In addition, a switch from fixed wages to performance-related pay (PRP) could positively affect wages without deteriorating firm profitability.

Performance-related pay schemes produce a *sorting* effect, i.e., in the presence of heterogeneous workers represent a screening device that attracts highly capable employees, who are believed to positively influence firm performance and prefer contingent rather than fixed rewards (Lazear 2000). Furthermore, remuneration linked to firm performance may induce greater effort than fixed rewards. These beneficial impacts are due to higher commitment and incentives to invest in firm-specific human capital, better teamwork, high cooperation in facing new technology, lower labour turnover and longer average tenure (see, among others, Prendergast 1999).

However, the 'power of incentives' is also conditioned by the adoption of complementary practices and managerial ability to implement these schemes (Black and Lynch 2001; Ichniowski and Shaw 2003). For instance, the managerial role of properly dealing with the possible trade-off between extrinsic and intrinsic motivation is strategic since contingent rewards may conflict with intrinsic motivation, thus impairing performance (Benabou and Tirole 2003). Furthermore, additional concerns are related to perverse effects of collective bonuses that may induce employees to free-ride on the efforts of others and thus cut productivity. Therefore, managerial monitoring and peer pressure among workers may be a solution to this problem (Kandel and Lazear 1992).

In addition, dysfunctional responses to incentives arise in situations where measuring productivity also involves combining multiple indicators because workers have been delegated to perform a wide spectrum of tasks. In such a case, it is likely that firms may be unable to correctly measure the output of all tasks (Holmstrom and Milgrom 1991), and multitasking induces additional agency problems:

[2] These data refer to private agricultural and non-financial sectors. The stagnant productivity is a well-known phenomenon that has characterized the Italian economy since the beginning of the 2000s. However, the malaise appears to be a more widespread pattern affecting most OECD countries (Syverson 2017).

workers can 'game' the compensation system (Baker 1992) and misallocate efforts towards those activities that are highly compensated and away from those that earn less compensation.

In summary, under asymmetric information and uncertainty, enterprises may use PRP to select and retain more productive employees (Lazear 2000) to stimulate cooperative worker behaviour (FitzRoy and Kraft 1987; Kruse *et al.* 2010; Doucouliagos *et al.* 2020) and higher investments in employee training (Green and Heywood 2011). However, as seen above, a number of positive but also counterproductive effects may be conceivable. Some of their determinants relate to ownership structure and control.

The impact of ownership structure on pay–performance relations is still a controversial issue because governance relates to a multidimensional set of behavioural traits and skills that influence the relationship between human resource management (HRM) and productivity (Bloom and Van Reenen 2011) and the design and efficacy of the enterprise compensation system.

From one side, family firms, i.e., those controlled or owned by a single individual or a family, usually offer greater job security and lower dismissal rates, as shown by studies based on cross-sectional and panel data but also lower wages (Breda 2018). Indeed, family firms are more risk-averse and mainly oriented to conserve family capital and maintain the family business for their descendants. Their business survival and dynastic succession, obtained at the cost of lower profitability, strongly condition their time horizon and wage policies. These motivations induce family owners to ensure more protection to their workers at the cost of lower remunerations (Sraer and Thesmar 2007). In addition, in these firms, which are typically smaller and have fewer resources than their nonfamily counterparts, the recourse to high-level technical competences for implementing incentive systems is often too expensive (Cruz *et al.* 2011).

On the other hand, the employee reward system, rather than being shaped by control-oriented systems, features cooperative and altruistic behaviour that represents self-enforcing systems of incentives (Cruz *et al.* 2011, 180), as also shown by their lower absenteeism rates (Bennedsen *et al.* 2019). Hence, a number of dysfunctional traits of incentive pay systems, analysed above, are mitigated by family business. This situation is particularly relevant when family firms pursue different aims apart from economic gains (Berrone *et al.* 2012), such as the preservation of socioemotional wealth (SEW), i.e., the stock of affected value that a family derives from its controlling position in a firm (Gómez-Mejía *et al.* 2007). This aim implies that a higher degree of trust, social ties and 'leader-member exchange' improve the quality of all relations inside the firm (Pearson and Marler 2010) and that family firms are interested in maintaining valuable implicit contracts with their employees (Mueller and Philippon 2011). All these traits may reduce the side effects of contingent incentives and mitigate free-riding in the case of collective premiums (Pompei *et al.* 2019).

These behavioural considerations conform with organizational behaviour research that shows how employee responses to incentive pay are influenced by employee expectancy of fair-dealing by management, as seen in reviews of motivational theory (Ambrose and Kulik 1999; Marsden and Belfield 2010).

**Tax breaks**

It is still a controversial issue whether governments should encourage incentive payments (Boeri *et al.* 2013). The fact that a mode of pay has positive effects does not itself justify policy interventions

because it is likely that firms where the incentive scheme pays off most adopt it quickly, whereas others do not obtain the same benefit. Thus, their lower adoption of PRP is 'ideal' (Boeri *et al.* 2013). Hence, given firm heterogeneity, PRP could be the right strategy for some companies and workers but not for others. However, the limited recourse to PRP and good management practices could also be due to low managerial quality and low managerial incentive (Bloom and Van Reenen 2011), as shown for the Italian economy (Damiani and Ricci 2014). Note also that some firms (for instance, those small family firms that have limited financial resources) do not have much information to design and manage individual and group wage incentives and could benefit from tax breaks, especially if combined with information and training support. So far, limited evidence is available to evaluate the potential effects of such policies on productivity and wages.

In Great Britain and France, the legislative measures of tax breaks or social insurance exemptions have exerted a positive role in promoting the diffusion of PRP. Fiscal incentives may encourage the adoption of wage bonuses, largely by reducing the cost to the employer of adopting such pay schemes (Marsden and Belfield 2010, 262). Furthermore, the aim of tax breaks and social insurance exemptions is also to compensate employees for the risk to which they are exposed in the case of volatile and uncertain bonuses, such as those related to profit-sharing schemes (Delahaie and Duhautois 2019, 110-111 and note 3). This aim is because at least risk-adverse employees may be reluctant to negotiate agreements that include variable wage components linked to firm performance and prefer to ask for fixed remuneration. Hence, legislative measures, such as those adopted in France, are particularly important when the variable wage component substitutes, at least partially, the base wage. In such a case, workers must have incentives to accept variable bonuses instead of fixed compensation, as was suggested by Weitzman (1983).

Note that legislative measures may induce only 'cosmetic' changes in pay practices, such as those adopted only to take advantage of tax levers, without changing actual operation, and thus, without achieving any productivity gains. It also explains why, so far, the role of tax incentives is largely debated, which is also due to large differences that may be obtained across firms (Boeri *et al.* 2013).

**Geographical imbalances and heterogeneity across macro-sectors**

Geographical differentials come to the forefront in our study because regional imbalances are still remarkable in terms of lower diffusion of decentralized agreements and diffusion of PRP schemes in Southern regions (Resce 2016; Resce and Paliotta 2019). Furthermore, in the Italian economy, wages set by collective bargaining tend to be more responsive to employment conditions in Northern than in Southern regions (Ciani *et al.* 2017).

In relation to fiscal incentives for PRP bonuses, auxiliary information provided by Inapp shows a number of geographical differentials. In particular, computing the number of total beneficiaries out of the average number of people employed per region from 2015 to 2017, the total wages facing tax reduction was 6 billion, 43% of which concentrated in the North-West, 26% in the North- East, 22% in the Centre and only 9% in the South and the Islands (Resce and Paliotta 2019, 135).

Note that a number of external influences that typify territorial environments are relevant for incentive pay (Marsden and Belfield 2010). For instance, the decisions about pay strategies for other firms are particularly relevant when these other firms are close labour market competitors and operate in the same area because worker mobility may cause a higher degree of convergence towards

similar patterns of human resource management strategies. This situation may especially occur in the typical "Made in Italy" industrial districts (Naldi *et al.* 2013; Pompei *et al.* 2019), and their uneven distribution across the different macro-areas of the country highly influences the effects of PRP on productivity outcomes. In addition, there are network activities related to the development of new and more advanced types of HRM systems because enterprises may benefit from local employer organizations and human resource manager clubs and "such externalities will be greatest for independent employer establishments that are not able to draw on the resources of a larger organization" (Marsden and Belfield 2010, 246). It also means that there is room for multi-employer activities, and fiscal subsidies may be more effective in more dynamic areas.

Finally, we cannot neglect the different role that incentives play in service sectors compared to the secondary sector, where manufacturing covers the lion's share of the sector. In particular, in knowledge-intensive service sectors, innovation is not acquired by formal R&D investments but is generated by work experience, cumulative learning, sharing knowledge and teamwork (Hipp and Grupp 2005). Thus, in services, compared to manufacturing firms that are more capital intensive and have a more rigid job structure, multiple skills are not easily programmable, and incentives that enhance worker capabilities are a major concern.

### *2.2 The Italian institutional context*

Italy recorded a substantial increase in performance-related pay (PRP) schemes in the late 1980s, at a time when companies were involved in the process of deep restructuring and were oriented towards implementing more collaborative labour relations. A new phase was opened with the July 1993 Agreement, which provided a new institutional setting for wage determination based on a multilevel bargaining structure. The scope of the agreement was to introduce i) the corporatist features of a centralized system and ii) the promotion of company-level arrangements. Indeed, the July 1993 Agreement stated that individual companies may determine wage increases only in accordance with profit and productivity gains at the firm level. This agreement was the first time that such a provision was included in Italian legislation on wages. Employees and management were expected to cooperate to acquire all the specific and detailed information needed to evaluate the firm's economic performance and competitiveness. Hence, the agreement changed pay settings encouraging the diffusion of company-level agreements "correlated with the achievement of a target jointly set by the parties and geared to improvements in productivity, quality and other elements of international competitiveness,… as well as to the company economic performance" (The Protocol of Incomes and Employment Policy, 23 July 1993).

It should be stressed that up to 1997, Italy had no legislative measures designed to encourage the adoption of PRP schemes. The first measure to stimulate the adoption of employee participation in enterprise results was introduced in 1997, with Decree Law n. 67 of 25 March 1997, later converted into Law n. 135 of 23 May 1997. The provision determined a partial fiscal exemption for the wage component set at the firm level and linked to enterprise results. Variable bonuses were exempted from the employer contributions up to a maximum of 1% for 1997 and 2% for 1998. In 1999, new measures were approved, and tax relief increased because the limit was raised to 3%. The 1997 Law

also stated that only a solidarity contribution of 10% (thus a third of the usual)[3] had to be paid by the employers on variable bonuses determined in company negotiations.
Experimental tax incentives for PRP that also addressed employees were introduced with Legislative Decree n. 93/2008 and further refined in 2011 (Legislative Decree n. 78/2010). However, the incidence of agreements about PRP remained limited over the years, and in 2014, only a small fraction of Italian firms (approximately 14%) adopted these schemes. The unstable financial coverage for tax bonuses and the very broad target definition "…productivity, profitability, innovation… and any other element regarded as relevant for the improvement of corporate competitiveness" (legislative decree n. 78/2010) likely created uncertainty among firms and employees. Furthermore, some agreements were only activated to minimize the fiscal burden, without positive repercussions on labour productivity (the so-named 'cosmetic agreements', see Antonioli and Pini 2013).
In 2015, with 208/2015 art.1, co. 182, tax breaks were made structural to promote the diffusion of PRP at the firm level. One important novelty of the tax reform, formalized with additional provisions in the Decree of 25 March 2016 and the 2016 Stability Law, was that access to incentives was conditional on the online registration of criteria for measuring and verifying the achievement of specific indicators of firm performance. With these additional requirements, the achievement of the firm targets had to be objectively verifiable through the comparison of identified numerical or other specified indicators. Variable premiums linked to productivity, profitability, quality, efficiency and innovation were subject to a tax deduction, and the compulsory contribution was set at 10% over a maximum amount not exceeding 2000 euros. The base of worker applicants was significantly enlarged, and in 2017, workers earning up to 80,000 Euros per year were included as eligible individuals. In addition, for the application of this measure, the premium should have been paid in the execution of company or territorial contracts concluded by comparatively more representative trade unions at the national level.

### *2.3 Working Hypotheses*

We assume that Law n. 208/2015 introduces a sufficient level of novelty to tax incentives for the PRP to be evaluated within a policy evaluation framework in which a Diff-in-Diff approach may be adopted (Imbens and Wooldridge 2009).
Until August 2017, the tax bonuses were worth almost six billion Euros and covered with public financial resources (Resce and Paliotta 2019, 131). In the wake of the Sovereign Debt Crisis, which severely hit Italy between 2011 and 2013, the intention of Italian policy makers and EU authorities, who warmly recommended the reform, was to restore firms' economic results by tying wage increases to firm productivity.

- H1. We expect that effective tax incentives boosted both productivity and average wages paid by firms, with positive variations for the former being higher than those registered by the latter.
- H2. Although Law n. 208/2015 does not identify specific targets, we hypothesize that the effectiveness of this law should also be evaluated through its positive effects on the weaker categories of firms, such as family-owned firms that normally show poorer performance and pay

[3] In Italy, the average value of social contributions are more than 30% of total wages.

lower wages (Pompei *et al.* 2019). As explained below, this hypothesis will be tested by implementing a triple Diff-in-Diff model.

- H3. Exogenous technological and geographical contexts may condition the results expected in H1 and H2.
- *H3a.* The large differences between industry/manufacturing and services concerning labour intensity and technology of production processes somehow influence incentive pay functioning.
- *H3b.* Against an optimistic view according to which the effectiveness of PRP tax incentives should be symmetric across the country's geographical areas, we conjecture that the macroregional competitive environment and network activities influence efforts that firms in general (or more specifically family-owned firms) make in implementing an efficient PRP system.

Thus, concerning these last two hypotheses, our expectation is that a large heterogeneity of results, synthesised in H1 and H2, emerges if we split the sample to consider sectoral and geographical dimensions.

# 3. Data and descriptive statistics

## *3.1 Data*

The empirical analysis is based on the last three waves of the *Rilevazione Imprese e Lavoro* (RIL) conducted by Inapp (reference period 2010, 2014 and 2018) on a representative sample of partnerships and limited liability firms[4]. Each wave of the survey covers over 25,000 firms operating in the non-agricultural private sector. A subsample of the included firms (approximately 40%) is followed over time, making the RIL partially a panel dataset over the period under study.

The RIL survey collects a rich set of information about management and corporate governance, workforce characteristics and firms' productive specialization. In particular, the dataset contains data on the demographic profile of the entrepreneurs, on the ownership structure and the presence of external or dynastic recruitment of the management. This dataset offers the great advantage of controlling for important sources of firms' behaviour and heterogeneity as emphasized in the previous literature (Bloom and van Reenen 2011). The RIL survey adds detailed information on the composition of the workforce (education, age, professional status, gender, contractual arrangements, citizenship, hiring) and the assets of industrial relations. Moreover, we have data on an extensive set of firms' productive characteristics and strategies (such as size, product and process innovations, the propensity to compete in foreign markets, firm age since entry into the market, sectorial specialization, geographical location) and on their compliance with specific policies (the 2011 pension reform and the gradual abolishment of the regional tax on business activities paid, IRAP).

In this regard, it is worth noting that the 2018 wave of the RIL survey included a new set of questions designed to collect information on firms that used the tax cut on PRP introduced by Law n. 208/2015, as discussed above.

[4] For more details on RIL questionnaire, sample design and methodological issues, see: http://www.inapp.org/it/ril.

To investigate the impact of this policy on labour productivity and wages, we merge RIL data with the Orbis archive provided by Moodys for the same sample years. The Orbis data offer comprehensive information on the balance sheets of almost all Italian corporations operating in the private sector. In particular, this dataset contains yearly values for a number of variables, such as value added, book value of physical capital, total wage bill and employees. Consequently, we can use indicators of labour productivity (value added per employee), average wages (total labour cost per employee)[5], and fixed capital (the total amount of physical assets per employee).

To deflate our monetary variables, we relied on sectoral deflators (NACE 2 digit) provided by the National Statistical Institute (base year 2010) based on industrial production prices[6]. The complete set of variables included in the analysis is reported in table A1 (see the appendix), where a short description is also provided.

For sample selection, we excluded firms with fewer than 5 employees from the RIL-Orbis merged dataset. After excluding firms with missing information for the key variables, the longitudinal dataset consists of approximately 3000 firm-year observations analysed over the period 2010-2014-2018.

### *3.2 Descriptive statistics*

Table 1 shows non-adjusted descriptive statistics for treatment and non-treatment firms, referred to as 2010 and 2014 (before treatment) and after treatment (2018).

Concerning labour productivity, treated firms recorded higher performance than no treated firms before treatment, thus, a potential problem of self-selection of best performers and structured firms in the group of firms that apply for PRP tax relief clearly emerges. After treatment, both treated and control firms increased labour productivity. Note also that these differences between the two groups are mirrored in average wages. A Diff-in-Diff model, in which we include a rich set of covariates, helps us consider several confounding factors.

Turning to the explanatory variables, table 1 makes it evident that the treated and nontreated firms differ along a number of characteristics, such as management and governance traits, workforce composition, industrial relations, and other distinctive firm characteristics and strategies (size, internalization, innovation, capital intensity, localization).

Data on the human capital of management, *proxied* by educational degree, show more firms run by management with tertiary education in the group of treated firms compared to the control group (in 2014, higher educated management was 62% vs 20%, respectively, in the two groups), and similar differentials are confirmed after treatment. This evidence is consistent with disparities found in corporate governance traits between the two groups and signals the higher frequency of more structured management at companies among firms that applied for PRP tax bonuses.

[5] Unfortunately, direct information on net wages is not available. We assume, however, that an increase in total labour costs necessarily indicates that the net wage component paid to employees more than offsets the reduction in personal income tax and social contributions due to the introduction of the Law n. 208/2015.

[6] The deflators are available at: http://dati.istat.it/#.

**Table 1.** Descriptive statistics

| | Pre-treatment | | | | Pre-control | | | | Post-treatment | | Post-control | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2010 | | 2014 | | 2010 | | 2014 | | 2018 | | | |
| | mean | std dev | mean | std dev | mean | std dev | mean | std dev | mean | std dev | mean | std dev |
| Labour produtivity | 11.16 | 0.50 | 11.18 | 0.57 | **10.89** | 0.59 | **10.75** | 0.63 | 11.20 | 0.46 | **10.77** | 0.61 |
| Average wages | 10.70 | 0.31 | 10.75 | 0.29 | **10.38** | 0.49 | **10.28** | 0.67 | 10.79 | 0.29 | **10.38** | 0.58 |
| **Management** | | | | | | | | | | | | |
| Tertiary education | 0.43 | 0.5 | 0.62 | 0.49 | 0.23 | 0.42 | 0.20 | 0.40 | 0.66 | 0.48 | 0.22 | 0.42 |
| Upper secondary ed. | 0.43 | 0.5 | 0.29 | 0.45 | 0.57 | 0.5 | 0.61 | 0.49 | 0.29 | 0.45 | 0.58 | 0.49 |
| Females | 0.13 | 0.34 | 0.13 | 0.33 | 0.17 | 0.38 | 0.15 | 0.35 | 0.23 | 0.42 | 0.15 | 0.36 |
| Age >50 | 0.29 | 0.45 | 0.27 | 0.44 | 0.24 | 0.42 | 0.37 | 0.48 | 0.48 | 0.5 | 0.35 | 0.48 |
| 34<Age<49 | 0.29 | 0.45 | 0.36 | 0.48 | 0.35 | 0.48 | 0.27 | 0.44 | 0.17 | 0.38 | 0.23 | 0.42 |
| External management | 0.11 | 0.32 | 0.25 | 0.43 | 0.02 | 0.14 | 0.02 | 0.15 | 0.23 | 0.42 | 0.03 | 0.16 |
| Family ownership | 0.59 | 0.49 | 0.48 | 0.5 | 0.92 | 0.27 | 0.94 | 0.24 | 0.53 | 0.5 | 0.93 | 0.26 |
| **Workforce** | | | | | | | | | | | | |
| Tertiary education | 0.15 | 0.2 | 0.17 | 0.22 | 0.1 | 0.21 | 0.1 | 0.21 | 0.29 | 0.35 | 0.12 | 0.23 |
| Upper secondary | 0.41 | 0.19 | 0.46 | 0.25 | 0.55 | 0.34 | 0.57 | 0.34 | 0.4 | 0.29 | 0.58 | 0.34 |
| &lower secondary | 0.44 | 0.26 | 0.37 | 0.28 | 0.35 | 0.34 | 0.33 | 0.35 | 0.31 | 0.29 | 0.3 | 0.34 |
| Females | 0.32 | 0.22 | 0.31 | 0.22 | 0.4 | 0.33 | 0.44 | 0.35 | 0.23 | 0.18 | 0.42 | 0.34 |
| Age>50 | 0.23 | 0.13 | 0.27 | 0.15 | 0.18 | 0.24 | 0.26 | 0.28 | 0.34 | 0.18 | 0.33 | 0.3 |
| 34< Age<49 | 0.51 | 0.19 | 0.49 | 0.16 | 0.5 | 0.33 | 0.45 | 0.32 | 0.4 | 0.19 | 0.46 | 0.3 |
| Executives | 0.06 | 0.06 | 0.05 | 0.06 | 0.04 | 0.14 | 0.04 | 0.11 | 0.05 | 0.07 | 0.04 | 0.11 |
| White collars | 0.41 | 0.28 | 0.46 | 0.32 | 0.43 | 0.37 | 0.53 | 0.37 | 0.45 | 0.3 | 0.48 | 0.36 |
| Blue collars | 0.53 | 0.3 | 0.49 | 0.32 | 0.53 | 0.39 | 0.43 | 0.38 | 0.5 | 0.33 | 0.48 | 0.37 |
| Temporary contracts | 0.07 | 0.1 | 0.09 | 0.1 | 0.1 | 0.2 | 0.07 | 0.17 | 0.09 | 0.13 | 0.1 | 0.2 |
| Hiring (0/1) | 0.65 | 0.48 | 0.79 | 0.41 | 0.35 | 0.48 | 0.34 | 0.47 | 0.84 | 0.37 | 0.4 | 0.49 |
| **Firms charact.** | | | | | | | | | | | | |
| Foreign markets | 0.61 | 0.49 | 0.51 | 0.5 | 0.25 | 0.43 | 0.29 | 0.45 | 0.49 | 0.5 | 0.27 | 0.44 |
| Multinational | 0.07 | 0.26 | 0.11 | 0.32 | 0.02 | 0.13 | 0.01 | 0.08 | 0.09 | 0.29 | 0.01 | 0.1 |
| Employers' association | 0.81 | 0.39 | 0.85 | 0.36 | 0.48 | 0.5 | 0.49 | 0.5 | 0.77 | 0.42 | 0.42 | 0.49 |
| Prod innov. | 0.53 | 0.5 | 0.43 | 0.5 | 0.35 | 0.48 | 0.36 | 0.48 | 0.47 | 0.5 | 0.26 | 0.44 |
| Proc innov. | 0.57 | 0.5 | 0.44 | 0.5 | 0.27 | 0.45 | 0.28 | 0.45 | 0.48 | 0.5 | 0.22 | 0.42 |
| Irap tax cut | | | 0.05 | 0.21 | | | 0.03 | 0.17 | 0.06 | 0.23 | 0.03 | 0.17 |
| Pension reform | | | 0.16 | 0.37 | | | 0.03 | 0.18 | 0.19 | 0.39 | 0.04 | 0.19 |
| Firm age (in years) | 30.5 | 18.5 | 33.3 | 18.7 | 22.3 | 16.1 | 25.6 | 16.4 | 38.3 | 21.7 | 29.4 | 12.5 |
| N. empl.<10 | 0.07 | 0.25 | 0.01 | 0.11 | 0.67 | 0.47 | 0.71 | 0.45 | 0.04 | 0.2 | 0.66 | 0.47 |
| 9< N. empl.<50 | 0.39 | 0.49 | 0.5 | 0.5 | 0.29 | 0.45 | 0.26 | 0.44 | 0.53 | 0.5 | 0.31 | 0.46 |
| 49< N. empl.<100 | 0.18 | 0.39 | 0.15 | 0.36 | 0.03 | 0.16 | 0.02 | 0.12 | 0.11 | 0.31 | 0.02 | 0.14 |
| 99< N. empl.<250 | 0.24 | 0.43 | 0.18 | 0.39 | 0.01 | 0.1 | 0.01 | 0.08 | 0.16 | 0.36 | 0.01 | 0.08 |
| N. empl.>249 | 0.13 | 0.33 | 0.16 | 0.37 | 0 | 0.07 | 0 | 0.05 | 0.16 | 0.37 | 0 | 0.05 |
| ln (phys. capital) | 10.5 | 1.65 | 10.6 | 1.4 | 9.94 | 1.83 | 9.71 | 1.98 | 10.44 | 1.5 | 9.84 | 2.12 |
| North West | 0.42 | 0.5 | 0.5 | 0.5 | 0.33 | 0.47 | 0.35 | 0.48 | 0.55 | 0.5 | 0.38 | 0.49 |
| North East | 0.36 | 0.48 | 0.28 | 0.45 | 0.26 | 0.44 | 0.28 | 0.45 | 0.25 | 0.43 | 0.28 | 0.45 |
| Centre | 0.13 | 0.33 | 0.17 | 0.38 | 0.25 | 0.43 | 0.19 | 0.39 | 0.16 | 0.37 | 0.2 | 0.4 |
| South | 0.09 | 0.29 | 0.05 | 0.22 | 0.17 | 0.38 | 0.18 | 0.38 | 0.04 | 0.2 | 0.14 | 0.35 |
| N of obs. | 236 | | 265 | | 2,207 | | 2,472 | | 244 | | 2,262 | |

Note: sampling weights applied.
Source: our elaborations on RIL-Orbis dataset

Indeed, the strong prevalence of family-owned firms, which represent more than 90% of nontreated firms, marks one of the largest differences with respect to treated firms, where family-owned companies are only approximately 50% of firms (in 2010 and 2014, as well as in 2018). Furthermore, the intergenerational transmission of control that typifies family-owned firms is a pervasive characteristic of nontreated firms because only 2%-3% of these firms were run by professional management selected on the basis of merit considerations. In the other group, the incidence of external management, selected for talent rather than family ties, was more than 20% in 2014 and 2018.

This evidence is accompanied by the presence of firms with more than 250 employees in the subsample of treated firms (they range between 13 and 16%), whereas in the control group, large firms represent a very tiny minority (less than 1%), i.e., a percentage in line with values reported on average for the whole Italian economy. In terms of workforce composition, the group of treated firms is characterized by higher shares of educated workers, a lower percentage of females, and more dynamism in terms of labour recruitment, as shown by higher shares of new hiring. These differences seem magnified after treatment, as reported in the last columns of table 2.

The higher dynamism of treated firms is also mirrored in internationalization strategies, as shown by their greater presence in foreign markets and higher propensity for innovation. It is also remarkable that mediation bodies, such as employer associations, may play an important role as counterparts of worker representations in collective bargaining.

Finally, the percentage of treated firms located in Southern regions fluctuates by approximately 5% over the three years. This finding is perfectly in line with descriptive evidence on the heterogeneous geographical distribution of those applying for the tax bonus for PRP (Resce and Paliotta 2019, 131).

Summing up, the overall portrait of treated firms, more involved in incentive strategies and benefitting from tax breaks in 2015, shows that they were more successful in terms of per capita value added, paid higher wages, more frequently were run by professional managers and less frequently were family owned. These firms, more internationalised and more active in hiring policies, were also more frequently affiliated in employer associations.

All these peculiar characteristics that differentiated treated from control firms, on the other hand, may also indicate the existence of self- selection in the adoption of PRP and related benefits from fiscal tax breaks after the policy change occurred in 2015.

To better identify casual effects of this policy change, we shall consider these problematic issues in our empirical strategy.

# 4. Econometric analysis

## *4.1 Method*

The first step of our econometric analysis relies on a canonical *Diff in Diff model* in which we exploit the panel structure of our RIL-Orbis data (2010, 2014, 2018) and the circumstance that the policy change occurred in late 2015 to evaluate its effects on productivity and wages. We observe the same individuals before and after the Law n. 208/2015 and two periods before this law (2010 and 2014) are

also reported allowing us to test the common trend assumption. After a pooled OLS, we specify a *Diff in Diff* with *fixed effects model* as follows:

$$Y_{i,} = \alpha_i + \beta_1 \cdot tax\_prp_i + \beta_2 \cdot year\_2018 + \beta_3 \cdot (tax\ prp_i \cdot year\_2018) + \gamma \cdot M_{i,t} + \delta \cdot W_{i,t} + \lambda \cdot F_{i,t} + \varepsilon_{i,t} \quad [1]$$

where $Y_{i,}$ indicates alternatively the (log of) labour productivity and the (log of) average wages, for each i firm at year t=[2010, 2014, 2018], while $tax\_prp_i$ is a dummy equal to 1 whether the firm used *tax-cut on performance related pay* in 2015 (treated group), 0 otherwise (control group)[7]; year_2018 is a time indicator for post-treatment period and the interaction ($tax\_prp_i \cdot year\_2018$) identifies the *Diff in Diff* impact. As for other controls, the vector $M_{i,t}$ includes managerial characteristics, $W_{i,t}$ represents the workforce composition while $F_{i,t}$ formalizes a rich set of firms' productive characteristics, geographical location and economic activity (all these covariates have been already discussed in descriptive section, see table 2); eventually, $\varepsilon_{i,t}$ is the idiosyncratic error term. The basic interpretation of the parameter of interest $\beta_3$ relies on subtracting the difference of means in control group between 2014 and 2018 from difference of means in treated group in the same period:

$$\left(\bar{Y}_{i,2018,tax\_prp=1} - \bar{Y}_{i,2014,tax\_prp=1}\right) - \left(\bar{Y}_{i,2018,tax\_prp=0} - \bar{Y}_{i,2014,tax\_prp=0}\right) = \beta_3 \quad [2]$$

with the only difference that in the *within estimator* case each term in equation [2] is the average of the deviations from firm-level means calculated over the three years ($Y_{i,t} - \overline{Y_i}$). According to Pischke (2005), we can use a *fixed effects model* whenever we lack of natural units where treatment is assigned (such as states or regions) and only have individuals (firms) that get treated at some point in time and others that do not. The Diff-in-Diff principle in this case still holds, provided that the treatment is only determined by the fixed effect $\alpha_i$ and covariates ($M_{i,t,}$ $W_{i,t}$ and $F_{i,t}$).

Given the specifications above, the common trend assumption is simply tested by augmenting equation [1] with a second interaction term ($tax\_prp_i \cdot year\_2014$). An estimated coefficient for this term resulting not significantly different from zero tells us that nothing was altering the difference between treated firms and control firms in the pre-treatment period. We have a rich set of covariates too. Indeed, adding proxies of managerial attitudes and capabilities to standard controls for firm productive characteristics and workforce composition should make the selection on observables hypothesis less difficult to accept because, in recent literature, both management and corporate governance features are important sources of firms heterogeneity (Bloom and van Reenen 2007; 2011).

However, this simple Diff-in-Diff approach could be not enough to control for important confounding factors that hinder a correct identification of the impact of tax incentives on productivity and wages. For example, one of the most important novelty introduced by the Law n. 208/2015 was the mandatory "Compliance Statement"[8]. According to this statement the employers have access to tax incentives only if they specify the parameters for measuring the results expected in terms of productivity, profitability, improved product or process quality and indicate the firm-level agreement entered into with trade unions or the local-level agreement that they want to implement (Resce and Paliotta 2019). Collecting data for this monitoring activity is not free of cost and it is plausible to expect a self-selection of most structured, managerial, large and medium enterprises in applying for tax

[7] In the fixed effect model, the main effect *tax_prp* is absorbed by the fixed effect $\alpha_i$.

[8] Actually, the "Compliance Statement" was introduced through the inter-ministerial Decree of 25 March 2016.

incentives. Family owned are much less prone than managerial units to apply for tax incentives to implement a PRP scheme, especially when the application procedures are complex, require a more structured organization and stable relationships with trade unions. As already discussed in the previous section we find, on average, within the group of treated units nearly half of family firms than those we observe in the control group (table 2). This evidence underpins the self-selection argument and leads us to consider a third element in the interactions presented in equation [1], in order to implement a triple Diff-in-Diff model as follows:

$$Y_{i,}=\alpha_i+\beta_1\cdot tax\_prp_i+\beta_2\cdot year\_2018+\beta_3\cdot FF+\beta_4\cdot(tax\_prp_i\cdot year\_2018)+\beta_5\cdot(tax\_prp_i\cdot FF)+ \\ +\beta_6\cdot(FF\cdot year\_2018)+\beta_7\cdot(tax\_prp_i\cdot FF\cdot year\_2018)+\gamma\cdot M_{i,t}+\delta\cdot W_{i,t}+\lambda\cdot F_{i,t}+\varepsilon_{i,t} \quad [3]$$

$$t=[2010,2014,2018]$$

where now FF is an additional dummy that takes value equal to 1 if we have a family owned firm, ($tax\_prp_{i\cdot t}\cdot FF\cdot year\_2018$) is the triple interaction of interest and the model is saturated with three first level interactions whose impacts are captured by coefficients $\beta_{4,}$ $\beta_5$ and $\beta_6$. Again, in the *fixed effects model* we omit the main effects for $tax\_prp_{i\cdot t}$ and FF, because they are absorbed by the firm level fixed effect $\alpha_i$. The coefficient of interest, $\beta_7$, captures now the triple Diff-in-Diff impact as follows:

$$\left[\left(\bar{Y}_{i,2018,\text{tax}_{\text{prp}}=1,FF=1}-\bar{Y}_{i,2014,\text{tax}_{\text{prp}}=1,FF=1}\right)-\left(\bar{Y}_{i,2018,\text{tax}_{\text{prp}}=1,FF=0}-\bar{Y}_{i,2014,\text{tax}_{\text{prp}}=1,FF=0}\right)\right]- \\ \left[\left(\bar{Y}_{i,2018,\text{tax}_{\text{prp}}=0,FF=1}-\bar{Y}_{i,2014,\text{tax}_{\text{prp}}=0,FF=1}\right)-\left(\bar{Y}_{i,2018,\text{tax}_{\text{prp}}=0,FF=0}-\bar{Y}_{i,2014,\text{tax}_{\text{prp}}=0,FF=0}\right)\right]=\beta_7 \quad [4]$$

According to Wooldridge (2010), the coefficient $\beta_7$ tells us about the impact of tax incentive policy on productivity and wages by adding a further control. We are, indeed, subtracting the productivity /wage differences occurred over the period 2014-2018 between family and non-family firms that did not apply for the 2015 provision (control units reported in the second brackets), from the differences between family and non-family firms that did so in the same period (treated units reported in the first brackets).

Olden and Møen (2020) demonstrated that only a single Common Trend Assumption test is required for the Triple Diff-in-Diff specification reported in equations [3] and [4]. Thus, similarly to what we did for equations [1] and [2], we test the statistical significance of the coefficient associated to the triple interaction *$tax\_prp_{i\cdot}$·FF·year_2014*. This approach also allows us to say whether the tax break on PRP is somehow reverting the trend in outcomes of family owned firms that normally perform worse than their peers (non-family and large firms).

In the final step of the econometric analysis we reply the models above in different geographic or sectoral subsamples in order to show whether these two dimensions matter as potential divers of the overall results.

### *4.2 Results*

**Whole sample**

The main results showing the impact of PRP tax incentives on productivity and wages for the whole sample of Italian firms are reported in table 2. To improve the readability of the following tables, we only present coefficients of the key variables involved in the Diff-in-Diff model. However, all covariates discussed in table 1 have been used in all estimates we present below and included in “other controls”.

**Table 2.** Pooled OLS, Diff-in-Diff and Triple Diff-in-Diff with fixed effects estimates. Whole sample

| | Labour productivity | | | Average wages | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | OLS | Diff FE | 3 Diff FE | OLS | Diff FE | 3 Diff FE |
| tax_prp | 0.086*** | | | 0.042** | | |
| | [0.031] | | | [0.017] | | |
| tax_prp*2018 | | 0.063** | -0.044 | | 0.043*** | 0.001 |
| | | [0.031] | [0.054] | | [0.016] | [0.029] |
| tax_prp*2014 | | 0.012 | -0.062 | | 0.037** | 0.016 |
| | | [0.041] | [0.082] | | [0.015] | [0.026] |
| tax_prp*fam firm*2018 | | | 0.174** | | | 0.074** |
| | | | [0.072] | | | [0.035] |
| tax_prp*fam firm*2014 | | | 0.129 | | | 0.040 |
| | | | [0.091] | | | [0.032] |
| fam firm*2018 | | | -0.063** | | | -0.021 |
| | | | [0.032] | | | [0.020] |
| fam firm*2014 | | | -0.026 | | | -0.004 |
| | | | [0.031] | | | [0.018] |
| year 2018 | -0.025* | 0.029** | 0.159*** | -0.018* | 0.051*** | 0.069*** |
| | [0.014] | [0.014] | [0.030] | [0.010] | [0.012] | [0.020] |
| year 2014 | -0.049*** | -0.014 | 0.053* | -0.026*** | 0.015* | 0.018 |
| | [0.012] | [0.011] | [0.029] | [0.009] | [0.009] | [0.016] |
| fam firm | -0.096*** | | | -0.103*** | | |
| | [0.021] | | | [0.013] | | |
| management characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| workforce characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| firms characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| constant | 9.775*** | 9.585*** | 9.502*** | 9.978*** | 9.794*** | 9.798*** |
| | [0.086] | [0.197] | [0.197] | [0.065] | [0.172] | [0.171] |
| N of Obs | 7845 | 7612 | 7619 | 8220 | 7978 | 7978 |
| R2 | 0.336 | 0.129 | 0.147 | 0.362 | 0.16 | 0.161 |

Note: the vector of management characteristics include level of education, age and gender of managers/entrepreneurs who run a firm, the presence of an external management; workforce characteristics control for educational, age and professional composition, share of female, share of temporary workers; firms' characteristics include foreign trade, multinationals, hiring, firms' size in four classes, hiring decision, log of physical capital per employee, membership to an employers' association, effect on hiring strategies of the pension reform 2011, effect on investment planning of the tax cut in 2015. All regressions controls for 2-digit sectors of activity and nuts 1 macro-regions fixed effects. Clustered standard errors in parentheses: * statistical significance at 10%, ** at 5%, *** at 1%.
Source: our calculations on longitudinal sample of RIL-Orbis data

First, columns (1) and (4) show the outcome in the pooled sample (no panel data structure) for firms that simply declared in 2018 to have applied for PRP tax bonuses (no Diff-in-Diff model). These firms benefited a significant 8.6% increase in their productivity and, on average, paid wages 4.2% higher than firms who did not apply for PRP tax bonuses. It is also worth noting that family firms showed poorer productivity (-9.6%) and, on average, paid lower wages (-10.3%) than nonfamily firms.

However, many confounding factors could make these findings highly biased. As explained in the previous section, we have the opportunity to control for unobserved heterogeneity among firms and, at the same time, compare firms that did and did not apply for PRP tax bonuses before and after the introduction of Law n. 208/2015. The results for the Diff-in-Diff model with fixed effects specifications are reported in columns (2) and (5), where the interaction of *tax_prp*2018* refers to the $\beta_3$ coefficient of equations [1] and [2] discussed in the previous section. According to these results, the difference in labour productivity between firms that did apply and firms that did not apply after the introduction of

Law n. 208/2015 was 6.3% in favour of the former. The test for the common trend assumption tells us that movements in labour productivity before treatment were not dissimilar, i.e., the coefficient associated to *tax_prp*2014* is not significantly different from zero. This finding is a first support of the claim that labour productivity improvement is due to compliance with the 2015 Law.

For wages (column 5), the result is less clear cut as the statistically significant 4.3% increase for treated firms is not backed by a common trend assumption. Since a significant and dominant trend in wages was detected for treated firms before treatment (*tax_prp*2014* equals 3.7%, significant at the 5 percent level), we cannot conclude that the wage improvement is due to compliance with Law n. 208/2015.

In summary, working hypothesis *H1* is only partially supported. According to the literature, implementing a PRP system i) stimulates commitment and firm-specific human capital investment from incumbent workers and ii) attracts highly capable employees. These findings are two crucial channels to boost productivity. It seems, therefore, that the policy provision was successful on this side but failed to tie wages to productivity increases.

However, these results could still be biased. As said above, the potential self-selection of more structured companies, such as nonfamily and larger firms, are important confounding factors that may influence the relationship between PRP tax incentives and productivity outcomes. Regardless of PRP introduction, nonfamily and managerial firms pay higher wages than family firms, which could have conditioned the results we obtained for wages.

In columns (3) and (6), we consider this issue by applying a Triple Diff-in-Diff. The coefficient of interest is now the triple interaction term, *tax_prp*fam_firm*2018*, *or* $\beta_7$ reported in equations [3] and [4] and discussed in the previous section. It is worth noting that when we compare the labour productivity difference for family and non-family firms before and after treatment, we observe a 17.4% positive and significant increase in the productivity difference in favour of those family firms that applied for the PRP tax bonus (see the breakdown of the $\beta_7$ coefficient reported in equation 6 for more details). Since the trends for the two *differences in differences* before the treatment were not dissimilar (*tax_prp*fam_firm*2014* is not significantly different from zero), we can conclude that the positive deviation in favour of family firms that did apply is due to the policy provision. Interestingly, we now find a similar positive and significant difference for wages paid by compliant family firms (+7.4%) supported by the common trend assumption, as the value for the *tax_prp*fam_firm*2014* coefficient in column (6) is not statistically significant. This lack of significance means that the tax break for PRP is reverting the trend in outcomes for family ownership that normally performs worse than their nonfamily peers. Furthermore, the productivity increase is higher than the positive variation in labour earnings, and the positive redistributive effects targeted by the policy provision guaranteed improvements in competitiveness.

Working hypothesis H2 is, therefore, largely supported for family firms, and two points are worth noting here for the whole sample. First, if we tackle the issue of potential self-selection of non-family and managerial firms, fiscal relief reveals an appropriate way to achieve a higher alignment of productivity and wages but also a way *to add* a component to the fixed wage, thus increasing total compensation. Second, the fiscal incentive to adopt PRP schemes seems to be especially effective for family firms. On the one hand, the introduction of PRP could signal changes in family firm priorities towards requiring more commitment from incumbent workers and attraction of more capable

employees. On the other hand, the better relational context and the main characteristics of implicit contracts persist within family firms and probably contribute to alleviate the free-rider problems that normally plague the introduction of collective PRP.

**Industry and Services**

In tables 3 and 4, the results for the estimation strategy already discussed for table 2 are reported for subsamples identifying industry (where manufacturing is the lion share) and services, respectively. Overall, these results show a weaker significance level of the coefficients even though the common trend assumption is confirmed. Significant heterogeneities emerge, and the partial support of H3a deserves further discussion.

**Table 3.** Pooled OLS, Diff-in-Diff and Triple Diff-in-Diff with fixed effects estimates. *Industry*

| | **Labour productivity** | | | **Average wages** | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | OLS | Diff FE | 3 Diff FE | OLS | Diff FE | 3 Diff FE |
| tax_prp | 0.087*** | | | 0.051*** | | |
| | [0.031] | | | [0.017] | | |
| tax_prp*2018 | | 0.067* | 0.032 | | 0.027* | 0.002 |
| | | [0.035] | [0.063] | | [0.015] | [0.031] |
| tax_prp*2014 | | -0.019 | -0.088 | | 0.015 | 0.014 |
| | | [0.053] | [0.109] | | [0.014] | [0.024] |
| tax_prp*fam firm*2018 | | | 0.067 | | | 0.037 |
| | | | [0.084] | | | [0.037] |
| tax_prp*fam firm*2014 | | | 0.130 | | | 0.005 |
| | | | [0.118] | | | [0.031] |
| fam firm*2018 | | | 0.003 | | | -0.016 |
| | | | [0.043] | | | [0.026 |
| fam firm*2014 | | | -0.008 | | | 0.004 |
| | | | [0.045] | | | [0.02 |
| year 2018 | -0.003 | 0.052*** | 0.049 | -0.005 | 0.075*** | 0.089*** |
| | [0.017] | [0.018] | [0.040] | [0.011] | [0.012] | [0.025] |
| year 2014 | -0.024* | 0.014 | 0.020 | -0.004 | 0.042*** | 0.039** |
| | [0.015] | [0.014] | [0.043] | [0.010] | [0.010] | [0.018] |
| fam firm | -0.063*** | | | -0.065*** | | |
| | [0.024] | | | [0.014] | | |
| management characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| workforce characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| firms characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| constant | 9.893*** | 9.979*** | 9.993*** | 10.125*** | 10.103*** | 10.108*** |
| | [0.099] | [0.221] | [0.227] | [0.070] | [0.197] | [0.198] |
| Obs | 4849 | 4695 | 4695 | 5018 | 4860 | 4860 |
| R2 | 0.302 | 0.08 | 0.083 | 0.331 | 0.132 | 0.132 |

Note: the vector of management characteristics include level of education, age and gender of managers/entrepreneurs who run a firm, the presence of an external management; workforce characteristics control for educational, age and professional composition, share of female, share of temporary workers; firms' characteristics include foreign trade, multinationals, hiring, firms' size in four classes, hiring decision, log of physical capital per employee, membership to an employers' association, effect on hiring strategies of the pension reform 2011, effect on investment planning of the tax cut in 2015. All regressions controls for 2-digit sectors of activity and nuts 1 macro-regions fixed effects. Clustered standard errors in parentheses: * statistical significance at 10%, ** at 5%, *** at 1%.
Source: our calculations on longitudinal sample of RIL-Orbis data

In industrial sectors, we find significant results for the impact of the policy provision on productivity (+6.7%) and wages (+2.7%) only with the Diff-in-Diff model (table 3 columns 2 and 5). We conjecture that differentials in technologies and in labour intensity come to the forefront in this case. Among other rationales and regardless of the firms' governance traits, it is likely that in manufacturing industries, where tasks are more easily programmable and conditioned by capital structure, firms have fewer problems with output appraisals and obtaining good performance measures (see also other countries' experiences, Boeri *et al.* 2013).

Instead, in the service sector, significant results are only obtained for the triple interaction *tax_prp*fam_firm*2018* (table 4, columns 3 and 6).

**Table 4.** Pooled OLS, Diff-in-Diff and Triple Diff-in-Diff with Fixed Effects estimates. *Services*

| | **Labour productivity** | | | **Average wages** | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | OLS | Diff FE | 3 Diff FE | OLS | Diff FE | 3 Diff FE |
| tax_prp | 0.070 | | | 0.010 | | |
| | [0.071] | | | [0.044] | | |
| tax_prp*2018 | | 0.056 | -0.073 | | 0.054 | -0.010 |
| | | [0.062] | [0.096] | | [0.041] | [0.062] |
| tax_prp*2014 | | 0.102* | 0.065 | | 0.074* | 0.034 |
| | | [0.061] | [0.100] | | [0.038] | [0.064] |
| tax_prp*fam firm*2018 | | | 0.202* | | | 0.146* |
| | | | [0.122] | | | [0.086] |
| tax_prp*fam firm*2014 | | | 0.026 | | | 0.073 |
| | | | [0.127] | | | [0.086] |
| 2018*fam firm | | | -0.135*** | | | -0.028 |
| | | | [0.046] | | | [0.031] |
| 2014* fam firm | | | -0.057 | | | -0.022 |
| | | | [0.042] | | | [0.030] |
| year 2018 | -0.061*** | -0.015 | 0.093** | -0.038** | 0.017 | 0.041 |
| | [0.024] | [0.025] | [0.045] | [0.018] | [0.025] | [0.034] |
| year 2014 | -0.092*** | -0.053*** | -0.006 | -0.059*** | -0.022 | -0.002 |
| | [0.019] | [0.018] | [0.038] | [0.016] | [0.015] | [0.028] |
| fam firm | -0.142*** | | | -0.148*** | | |
| | [0.037] | | | [0.024] | | |
| management characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| workforce characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| firms characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| constant | 9.639*** | 8.257*** | 8.175*** | 9.852*** | 9.155*** | 9.144*** |
| | [0.120] | [0.304] | [0.307] | [0.096] | [0.270] | [0.270] |
| N of Obs | 2986 | 2908 | 2913 | 3192 | 3109 | 3114 |
| R2 | 0.374 | 0.235 | 0.238 | 0.381 | 0.225 | 0.224 |

Note: the vector of management characteristics include level of education, age and gender of managers/entrepreneurs who run a firm, the presence of an external management; workforce characteristics control for educational, age and professional composition, share of female, share of temporary workers; firms' characteristics include foreign trade, multinationals, hiring, firms' size in four classes, hiring decision, log of physical capital per employee, membership to an employers' association, effect on hiring strategies of the pension reform 2011, effect on investment planning of the tax cut in 2015. All regressions controls for 2-digit sectors of activity and nuts 1 macro-regions fixed effects. Clustered standard errors in parentheses: * statistical significance at 10%, ** at 5%, *** at 1%.
Source: our calculations on longitudinal sample of RIL-Orbis data

We suggest that in sectors where the ability to measure output indicators is more uncertain and relies on subjective evaluations, such as with nonroutine tasks involved in customer relations typical of some service jobs, the industrial relations climate is relevant. In these industries, family firms whose priorities are long-term relations, family image, commitment and reciprocal behaviour may be more efficient at promoting skills and acquiring valued capabilities to deal with customer relations.
The comparative advantages of family firms, related to the implicit contracts and greater job security they offer their employees, allow them to promote acquisitions of firm-specific skills and noncodified tacit information that coexist with performance-based payments.
These arguments may be a major concern in knowledge-intensive services, where the component of labour productivity that can be explained by human capital may be large and the complementarities among organizational changes, skills acquisition and new technologies, such as ICT, play a key role (Inklaar *et al.* 2008; Cardinaleschi *et al.* 2020).

**Macroregions**

Tables 5 and 6 report the results for the two macroareas of the country: the Central-Northern and Southern regions, respectively.
In this case, the Triple Diff-in-Diff results, where we control for potential self-selection of nonfamily firms, are significant only for those firms located in the Central-Northern regions of Italy (see tables 5 and 6, columns 3 and 6). As conjectured in H3b, this macroarea appears to be the main driver of the overall results reported in table 2.
It is plausible that in these regions, interactions with other firms provide information related to the incentive design (the choice of the set of targets, monitoring technologies), foster the sharing of legal information and reduce bargaining costs. It is also possible because the bulk of Italian industrial districts are concentrated in the central-northern regions, i.e., 121 out of 141 total industrial districts (Schilirò 2017).
The regional concentration of small family firms encourages vertical specialization and strong links between users and suppliers along the industry's supply chains. Not only are firms owned and managed by the same people but very often in industrial districts, former craft and skilled workers spin off from firms in which they were employed and become entrepreneurs (Lazonick 2015).
The preservation of family image and community reputation positively influences the alignment of a firm's aims with those of the local community, fostering adherence to the norms of conduct and tacit rules prevailing in the district.
Both Naldi *et al.* (2013) and Pompei *et al.* (2019) found a positive impact of PRP on productivity and wages for family firms located in industrial districts and hypothesized that sorting effects might be more effective in these contexts because family firms may resort to labour supply pools where workers likely have the required industry-specific skills and share the same entrepreneurial values.

**Table 5.** Pooled OLS, Diff-in-Diff and Triple Diff-in-Diff with Fixed Effects estimates. *Northern Centre regions*

| | **Labour productivity** | | | **Average wages** | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | OLS | Diff FE | 3 Diff FE | OLS | Diff FE | 3 Diff FE |
| tax_prp | 0.082** | | | 0.038** | | |
| | [0.032] | | | [0.017] | | |
| tax_prp*2018 | | 0.043 | -0.073 | | 0.028* | -0.015 |
| | | [0.031] | [0.051] | | [0.016] | [0.030] |
| tax_prp*2014 | | -0.004 | -0.088 | | 0.027* | 0.015 |
| | | [0.043] | [0.082] | | [0.015] | [0.027] |
| tax_prp*fam firm*2018 | | | 0.195*** | | | 0.079** |
| | | | [0.072] | | | [0.036] |
| tax_prp*fam firm*2014 | | | 0.152 | | | 0.029 |
| | | | [0.092] | | | [0.033] |
| fam firm*2018 | | | -0.067** | | | -0.020 |
| | | | [0.033] | | | [0.020] |
| fam firm*2014 | | | -0.028 | | | 0.004 |
| | | | [0.031] | | | [0.017] |
| year 2018 | -0.018 | 0.035** | 0.089*** | -0.016 | 0.054*** | 0.071*** |
| | [0.016] | [0.016] | [0.031] | [0.010] | [0.010] | [0.020] |
| year 2014 | -0.045*** | -0.010 | 0.013 | -0.021** | 0.017** | 0.014 |
| | [0.013] | [0.012] | [0.029] | [0.009] | [0.007] | [0.016] |
| fam firm | -0.078*** | | | -0.085*** | | |
| | [0.020] | | | [0.012] | | |
| management characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| workforce characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| firms characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| constant | 9.828*** | 9.695*** | 9.698*** | 10.013*** | 10.034*** | 10.042*** |
| | [0.096] | [0.234] | [0.231] | [0.067] | [0.178] | [0.176] |
| N of Obs | 6426 | 6230 | 6230 | 6738 | 6535 | 6542 |
| R2 | 0.333 | 0.115 | 0.119 | 0.389 | 0.169 | 0.17 |

Note: the vector of management characteristics include level of education, age and gender of managers/entrepreneurs who run a firm, the presence of an external management; workforce characteristics control for educational, age and professional composition, share of female, share of temporary workers; firms' characteristics include foreign trade, multinationals, hiring, firms' size in four classes, hiring decision, log of physical capital per employee, membership to an employers' association, effect on hiring strategies of the pension reform 2011, effect on investment planning of the tax cut in 2015. All regressions controls for 2-digit sectors of activity and nuts 1 macro-regions fixed effects. Clustered standard errors in parentheses: * statistical significance at 10%, ** at 5%, *** at 1%.
Source: our calculations on longitudinal sample of RIL-Orbis data

**Table 6.** Pooled OLS, Diff-in-Diff and Triple Diff-in-Diff with Fixed Effects estimate. *Southern regions*

| | **Labour productivity** | | | **Average wages** | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | OLS | Diff FE | 3 Diff FE | OLS | Diff FE | 3 Diff FE |
| tax_prp | 0.194** | | | 0.091 | | |
| | [0.089] | | | [0.071] | | |
| tax_prp*2018 | | 0.282** | 0.446* | | 0.098 | 0.151 |
| | | [0.138] | [0.265] | | [0.068] | [0.120] |
| tax_prp*2014 | | 0.203 | 0.355 | | 0.091 | 0.107 |
| | | [0.159] | [0.331] | | [0.063] | [0.095] |
| tax_prp*fam firm*2018 | | | -0.241 | | | -0.063 |
| | | | [0.294] | | | [0.167] |
| tax_prp*fam firm*2014 | | | -0.235 | | | -0.03 |
| | | | [0.348] | | | [0.125] |
| fam firm*2018 | | | 0.086 | | | 0.042 |
| | | | [0.096] | | | [0.065] |
| fam firm*2014 | | | 0.045 | | | -0.019 |
| | | | [0.123] | | | [0.079] |
| year 2018 | -0.068* | 0.028 | -0.049 | -0.040 | 0.037 | 0.001 |
| | [0.035] | [0.046] | [0.099] | [0.036] | [0.041] | [0.064] |
| year 2014 | -0.073** | -0.021 | -0.062 | -0.051* | 0.009 | 0.027 |
| | [0.031] | [0.033] | [0.123] | [0.028] | [0.030] | [0.075] |
| fam firm | -0.275*** | | | -0.244*** | | |
| | [0.083] | | | [0.058] | | |
| management characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| workforce characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| firms characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| constant | 9.665*** | 9.500*** | 9.532*** | 9.875*** | 9.441*** | 9.435*** |
| | [0.195] | [0.384] | [0.396] | [0.178] | [0.428] | [0.430] |
| N of Obs | 1412 | 1375 | 1375 | 1475 | 1436 | 1436 |
| R2 | 0.365 | 0.22 | 0.219 | 0.313 | 0.219 | 0.216 |

Note: the vector of management characteristics include level of education, age and gender of managers/entrepreneurs who run a firm, the presence of an external management; workforce characteristics control for educational, age and professional composition, share of female, share of temporary workers; firms' characteristics include foreign trade, multinationals, hiring, firms' size in four classes, hiring decision, log of physical capital per employee, membership to an employers' association, effect on hiring strategies of the pension reform 2011, effect on investment planning of the tax cut in 2015. All regressions controls for 2-digit sectors of activity and nuts 1 macro-regions fixed effects. Clustered standard errors in parentheses: * statistical significance at 10%, ** at 5%, *** at 1%.
Source: our calculations on longitudinal sample of RIL-Orbis data

# 5. Conclusions

We have analysed the causal effect on productivity and wages of a legislative reform introduced in the Italian economy that offered tax bonuses on PRP. The novelty of this reform, introduced with Law n. 208/2015 and revived by the 2016 Stability Law, was the higher degree of strictness in identifying the criteria for assessing productivity increases required to obtain tax relief, thus reducing the high subjectivity of social partners prevailing before this reform. Furthermore, the tax break was conditioned by the expressed requirement of the approval of collective agreements (i.e., firm level or territorial negotiations) and marked a clear discontinuity with the past, when access to tax relief was also limited by a progressive downsizing of government funds and the adoption of the 'first come, first served' principle.

Our results indicate that due to this reform, firms whose workers benefit from tax incentives for PRP behave differently from their counterparts and obtain higher productivity gains. This finding confirms that the promotion of PRP may induce more motivation and effort, a higher degree of loyalty, and likely the selection of high-quality workers. In addition, our estimates show that in some circumstances., i.e., when adopted by family firms, these variable premiums do not simply replace fixed bonuses but allow a net increase in rewards, thus rendering collective decentralized bargaining simultaneously more flexible and more inclusive.

Corporate governance traits (family vs nonfamily firms) appear to be important controls for potential self-selection, and our results show that companies with poorer performance benefit most from the introduction of Law n. 208/2015.

However, this scenario emerging from our findings for the whole economy turns out to be much more heterogeneous when estimates are differentiated by sector and region.

In industrial sectors, the corporate governance traits of firms do not play a significant role. Instead, in services where firms are less capital intensive and have a less rigid job structure, we find that tax relief is a significant driver of productivity gains for family firms. This evidence deserves additional exploration in future research. However, one possible explanation may be that family governance, which usually offers greater job security and reduces labour conflicts (Mueller and Philippon 2011), induces workers to reduce their intention to 'game' the compensation system (Baker 1992). These concerns have a major influence in labour-intensive service sectors, where incentives have particular relevance to encourage knowledge creation processes.

Finally, as hypothesized, large regional differentials emerge. We find a significant divide between the Southern regions (where there are fewer applicants for PRP tax benefits) and the rest of the country. It is likely that the specific, more advanced socioeconomic context that frames the Northern industrial districts also fosters the circulation of information to apply for tax relief and facilitates the implementation of PRP schemes. In contrast, in the Southern regions, featuring a different business ecosystem, the sharing of knowledge and provision of information for decentralized bargaining plays a limited role.

If this first evidence was confirmed by additional investigations, a revision of the policy measures would be necessary to address the stagnant productivity and wage growth in Southern Italy.

Recent studies show that a number of microeconomic determinants related to collective organizational capabilities, complex learning processes, informal and firm-specific forms of training,

and network structures are behind heterogeneous firm performance, and the stagnation of the Italian economy is also explained by these large firm differentials (Dosi *et al.* 2019; Costa *et al.* 2020). In this paper, we have shown that political measures to promote more efficient and inclusive managerial practices may be efficacious and in some cases also reverse the disappointing trends of some firms (such as family-owned firms) that normally perform worse than their nonfamily counterparts. However, these measures, far from being efficacious across all business units that operate in different sectors and regions and that likely feature different organization capabilities, do not appear to be a definitive solution to the strong and widening dualism that typifies the Italian economy.

In other words, to increase the effectiveness of fiscal incentives aimed at shaping a positive link between decentralized industrial relations, productivity and wages, *policy makers* should consider firm heterogeneity and the productivity and cultural contexts in which these units of production operate.

A new and more coherent industrial policy oriented to finance and encourage job training activities, paying more attention to the organization of the firm (rather than individual workers), should promote organizational capabilities complementary to technology policies. This new policy could represent a potential pathway going forward, capable of accompanying and complementing more comprehensive managerial practices and not limited to offering pecuniary incentives.

# Appendix

**Table A1.** Variables definition and description

| Variables | Description |
|---|---|
| | **Balance sheet variables (Orbis) and policy reform** |
| Labour productivity | (log of) the value added on the total number of employees. The amount of value added is derived from Orbis archive and it is deflated relying on sectoral (2-digit NACE) deflators of production prices. The total number of employees is calculated on RIL data. |
| Average wages | (log of) the total labour costs on the total number of employees. The amount of labour cost is derived from Orbis archive and it is deflated relying on sectoral (2-digit NACE) deflators of production prices. The total number of employees is calculated on RIL data. |
| Capital intensity | (log of) total amount of total tangible capital on the total number of employees. The amount of tangible capital is derived from AIDA archive and is deflated by relying on sectoral (2-digit NACE) deflators at production prices. The total number of employees is calculated on RIL data. |
| Tax break on PRP | dummy variable that equals to 1 if the firm has used the tax break on performance related pay agreements (PRP), as introduced by Article 1 co 182 Law n. 208/2015, 0 otherwise. |
| | **Management and corporate governance** |
| Education | three dummy variables that equals to 1 whether the educational level of the employers/managers who run the firm is, respectively: i) tertiary; ii) upper secondary; iii) lower secondary or no education (0 otherwise). |
| Age | three dummy variables that equals to 1 whether the age cohort to which the employer/managers who run the firm belong to is respectively: i) <35 years; ii) 34< years<55; iii) >54 years. |
| Female | dummy variable that equals to 1 if the manager/employer who run the firm is female, 0 otherwise. |
| Family owner | dummy variable that equals to 1 if the ownership of the firm is held by a family, 0 otherwise. |
| External management | dummy variable that equals to 1 if firm is run by an external manager which has been recruited on the labor market, i.e outside dynastic ties of firms ownership, 0 otherwise. |
| | **Workforce characteristics** |
| Educational composition | three variables indicating the share of employees (on the firms' total number of employees) with: i) tertiary education; ii) upper secondary education; iii) lower secondary, primary or no education. |
| Age composition | three variables indicating the share of employees (on the firms' total number of employees) with: i) less than 35 years old; ii) between 34 and 50 years old; iii) more than 49 years old. |
| Professional composition | three variables indicating the share of employees (on the firms' total number of employees) who are: i) executives; ii) white collars; iii) blue collars. |
| Sh temporary | share of employees with fixed term contract (on the firms total number of employees). |
| Sh female | share of female employees (on the firms' total number of employees). |
| | **Firms' characteristics** |
| Size | 4 dummy variables for different size classes of the total number of employees: i) 9< n. empl.<50; ii) 49< n. empl.<100; iii) 99< n. empl.<250; iv) n. empl.>249. |
| Hirings | dummy variable that equals to 1 if firms hired in the current years, 0 otherwise. |
| Foreign trade | dummy variable that equals to 1 if firm operates (selling or buying products/services) on international trade markets, 0 otherwise. |
| Multinational | dummy variable that equals to 1 if firm is a mutinational, 0 otherwise. |
| Product innov | dummy variable that equals to 1 if the firm has invested in product innovation in the current year and/or during the past two years before the survey, 0 otherwise. |
| Process innov | dummy variable that equals to 1 if the firm has invested in process innovation in the current year and/or during the past two years before the survey, 0 otherwise. |
| Employers' association | dummy variable that equals to 1 if the firm belong to an employer's membership (i.e., Confindustria), 0 otherwise. |
| Pension reform | dummy variable that equals to 1 if the firm was forced to give up previously planned hirings because of the Law n. 201/2011 (the so-called 'Fornero pension reform'), 0 otherwise. |
| Irap tax cut | dummy variable that equals to 1 if the firm has planned investment because of the IRAP tax cut in 2015, 0 otherwise. |
| Firms' age | number of years since the firm' entry in the market, 0 otherwise. |
| Geographical localization | 4 dummy variables for: i) North West; ii) North East; iii) Centre; iv) South. |
| Sector of activity | fourteen dummies variables derived from 2 digit NACE classification: electricity, gas water distribution, food, textile, tobacco; chemistry, metallurgy mechanics and other manufacturing goods; construction; retail and wholesale, tourism, hotels and restaurants transportation; insurance and financial intermediation, information and communication; other business services; healthcare, educational and social services, others. |

Note: * numerators of the balance sheet variables are drawn from Orbis archive and deflated by Istat indexes.
Source: RIL data

## References


Aidt T., Tzannatos Z. (2008), Trade unions, collective bargaining and macroeconomic performance. A review, *Industrial Relations Journal*, 39, n.4, pp.258-295

Ambrose M.L., Kulik C.T. (1999), Old friends, new faces. Motivation research in the 1990s', *Journal of Management*, 25, n.3, pp.231-292

Antonioli D., Pini P. (2013), Retribuzioni e contrattazione decentrata. L'accordo sbagliato tra le parti sociali, *Argomenti*, 37, pp.45-70

Baker G.P. (1992), Incentive Contracts and Performance Measurement, *Journal of Political Economy*, 100, n.3, pp.598-614

Bennedsen M., Tsoutsoura M., Wolfenzon D. (2019), Drivers of effort. Evidence from employee absenteeism, *Journal of Financial Economics*, 133, n.3, pp.658-684

Benabou R., Tirole J. (2003), Intrinsic and Extrinsic Motivation, *The Review of Economic Studies*, 70, n.3, pp.489-520

Berrone P., Cruz C., Gómez-Mejía L.R. (2012), Socioemotional wealth in family firms. Theoretical dimensions, assessment approaches, and agenda for future research, *Family Business Review*, 25, n.3, pp.258-279

Black S.E., Lynch L.M. (2001), How to compete. The impact of workplace practices and information technology on productivity, *Review of Economics and Statistics*, 83, n.3, pp.434-445

Bloom N., van Reenen J. (2011), Human Resource Management and Productivity, in Ashenfelter O., Card D. (eds.)*, Handbook of Labor Economics Vol. 4B*, Amsterdam, Elsevier, pp.1697-1767

Bloom N., van Reenen J. (2007), Measuring and Explaining Management Practices Across Firms and Countries, *The Quarterly Journal of Economics,* 122, n.4, pp.1351-1408

Boeri T., Lucifora C., Murphy K.J. (eds.) (2013), *Executive remuneration and employee performance-related pay. A transatlantic perspective*, Oxford, Oxford University Press

Breda T. (2018), *Working in family firms*, IZA World of Labor n.434, Bonn, IZA <https://bit.ly/3emWwWd>

Bugamelli M., Lotti F. (eds.) (2018), *Productivity growth in Italy. A tale of a slow-motion change*, Questioni di economia e finanza n.422, Roma, Banca d'Italia <https://bit.ly/3chpqUZ>

Cardinaleschi S., Damiani M., Pompei F. (2020), Knowledge-intensive sectors and the role of collective performance-related pay, *Industry and Innovation*, 27, n.5, pp.480-512

Ciani E., David F., De Blasio G. (2017), *Local labour market heterogeneity in Italy. Estimates and simulations using responses to labour demand shocks*, Temi di Discussione n.1112, Roma, Banca d'Italia <https://bit.ly/3qzK9by>

Costa S., De Santis E., Dosi G., Monducci R., Sbardella A., Virgillito M.E. (2020), Alle radici della stagnazione. Una tassonomia della struttura produttiva italiana, *Economia Italiana*, 2, pp.73-122

Cruz C., Firfiray S., Gómez-Mejía L.R. (2011), Socioemotional wealth and human resource management (HRM) in family-controlled firms, in Joshi A., Liao H., Martocchio J.J. (eds.), *Research in personnel and human resources management*, 30, Bingley, Emerald Group Publishing Limited, pp.159-217

Damiani M., Ricci A. (2014), Managers' education and the choice of different variable pay schemes. Evidence from Italian firms, *European Management Journal*, 32, n.6, pp.891-902

Degryse C. (2012), *The new European economic governance*, ETUI Working Paper n.14, Brussels, European Trade Unit Institute

Delahaie N., Duhautois R. (2019), Profit-Sharing and Wages. An Empirical Analysis Using French Data between 2000 and 2007, *British Journal of Industrial Relations*, 57, n.1, pp.107-142

Doucouliagos H., Laroche P., Kruse D.L., Stanley T.D. (2020), Is Profit Sharing Productive? A Meta-Regression Analysis, *British Journal of Industrial Relations*, 58, n.2, pp.364-395

Dosi G., Guarascio D., Ricci A., Virgillito M.E. (2019), Neodualism in the Italian business firms. Training, organizational capabilities, and productivity distributions, *Small Business Economics*, pp.1-23

Eurofound (2015), *Pay in Europe in different wage-bargaining regimes*, Luxembourg, Publications Office of the European Union

FitzRoy F.R., Kraft K. (1987), Cooperation, productivity, and profit sharing, *The Quarterly Journal of Economics,* 102, n.1, pp.23-35

Gómez-Mejía L.R., Haynes K.T., Nunez-Nickel M., Jacobson K.J., Moyano-Fuentes J. (2007), Socioemotional wealth and business risks in family-controlled firms. Evidence from Spanish olive oil mills, *Administrative science quarterly*, 52, n.1, pp.106-137

Green C.P., Heywood J.S. (2011), Profit sharing, separation and training, *British Journal of Industrial Relations*, 49, n.4, pp.623-642

Hipp C., Grupp H. (2005), Innovation in the Service Sector. The Demand for Service-Specific Innovation Measurement Concepts and Typologies, *Research Policy*, 34, n.4, pp.517-535

Holmstrom B., Milgrom P. (1991), Multitask Principal-Agent Analyses. Linear Contracts, Asset Ownership and Job Design, *Journal of Law, Economics & Organization,* 7, special issue, pp.24-52

Ichniowski C., Shaw K. (2003), Beyond incentive pay. Insiders' estimates of the value of complementary human resources management practices, *Journal of Economic Perspectives*, 17, n.1, pp.155-180

Imbens G.W., Wooldridge J.M. (2009), Recent developments in the econometrics of program evaluation, *Journal of economic literature*, 47, n.1, pp.5-86

Inklaar R., Timmer M.P., van Ark B. (2008), Market services productivity across Europe and the US, *Economic Policy*, 23, n.53, pp.140-194

Kandel E., Lazear E.P. (1992), Peer Pressure and Partnership, *Journal of Political Economy*, 100, n.4, pp.801-817

Kruse D.L., Freeman R., Blasi J.R. (eds.) (2010), *Shared Capitalism at Work. Employee Ownership, Profit and Gain Sharing, and Broad-based Stock Options*, Chicago, University of Chicago Press

Lazear E. (2000), Performance pay and productivity, *American Economic Review,* 90, n.5, pp.1346-1361

Lazonick W. (2015), Innovative Enterprise and the Theory of the Firm, *The Political Quarterly*, 86, n.S2, pp.77-97

Marsden D., Belfield R. (2010), Institutions and the management of human resources. Incentive pay systems in France and Great Britain, *British Journal of Industrial Relations*, 48, n.2, pp.235-283

Maury B. (2006), Family ownership and firm performance. Empirical evidence from estern European corporations, *Journal of Corporate Finance*, 12, n.2, pp.321-341

Mueller H.M., Philippon T. (2011), Family firms and labor relations, *American Economic Journal: Macroeconomics*, 3, n.2, pp.218-245

Naldi L., Cennamo C., Corbetta G., Gómez-Mejía L.R. (2013), Preserving socioemotional wealth in family firms. Asset or liability? The moderating role of business context, *Entrepreneurship Theory and Practice*, 37, n.6, pp.1341-1360

OECD (2018), *Employment Outlook*, Paris, OECD Publishing

OECD (2017), *Employment Outlook*, Paris, OECD Publishing

Olden A., Møen J. (2020), *The Triple Difference Estimator*, NHH Discussion Paper n.1, Bergen, NHH Norwegian School of Economics

Pearson A.W., Marler L.E. (2010), A leadership perspective of reciprocal stewardship in family firms, *Entrepreneurship Theory and Practice*, 34, n.6, pp.1117-1124

Pischke J.S. (2005), *Empirical methods in applied economics. Lecture Notes*, London, LSE Department of Economics <https://bit.ly/3bw5rTj>

Prendergast C. (1999), The provision of incentives in firms, *Journal of Economic Literature*, 37, n.1, pp.7-63

Pompei F., Damiani M., Ricci A. (2019), Family firms, performance-related pay, and the great crisis. Evidence from the Italian case, *Industrial and Corporate Change*, 28, n.5, pp.1193-1225

Resce M. (2016), Evoluzione delle politiche per il mercato del lavoro in Italia durante la crisi, in Isfol, Bergamante F. (a cura di), *Crisi economica e squilibri territoriali. Una lettura multidimensionale dei contesti regionali*, Roma, Isfol, pp.55-88 <https://bit.ly/3esxFjG>

Resce M., Paliotta A.P. (2019), Decentralized Bargaining and Measures for Productivity and Occupational Welfare Growth in Italy. Empirical Evidence from Administrative Data, *E-Journal of International and Comparative Labour Studies*, 8, n.3, pp.114-152 <https://bit.ly/2Nh2rkm>

Schilirò D. (2017), Italian industrial districts. Theories, profiles and competitiveness, *Management and Organizational Studies*, 4, n.4, pp.1-11

Sraer D., Thesmar D. (2007), Performance and behavior of family firms. Evidence from the French stock market, *Journal of the European Economic Association*, 5, n.4, pp.709-751

Syverson C. (2017), Challenges to mismeasurement explanations for the US productivity slowdown, *Journal of Economic Perspectives*, 31, n.2, pp.165-186

Syverson C. (2011), What determines productivity?, *Journal of Economic literature*, 49, n.2, pp.326-365

Weitzman L.M. (1983), Some macroeconomics implications of alternative compensation systems, *Economic Journal*, 93, n.372, pp.763-783

Wooldridge J.M. (2010), *Econometric analysis of cross section and panel data*, Cambridge MA, MIT press