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Tax breaks for incentive pay, productivity and wages: Evidence from a reform in Italy

Mirella Damiani[1] | **Fabrizio Pompei**[2] | **Andrea Ricci**[3,*]

[1]Department of Political Sciences, University of Perugia, Perugia, Italy

[2]Department of Economics, University of Perugia, Perugia, Italy

[3]National Institute for Public Policy Innovation (INAPP), Rome, Italy

Correspondence
Fabrizio Pompei, Department of Economics, University of Perugia, 06123 Perugia, Italy.
Email: fabrizio.pompei@unipg.it

[*]The views expressed in this paper are those of the author and do not necessarily correspond to those of the Institution (INAPP) he is affiliated.

Abstract

This paper analyses the impact of a tax break on 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 drawn from a large representative survey of Italian firms merged with the ORBIS archive. By applying *difference-in-differences methods*, we obtain the following results. First, the tax break has a positive effect on both labour productivity and average wages, although the positive effect on average wages is not confirmed by robustness tests. Second, productivity impacts are mainly driven by family firms in northern regions, where firms benefit from the more dynamic business environment in which they operate. These results take into account unobserved heterogeneity and endogeneity issues.

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. Following the recommendations of the ECB and the European Commission, a New European Economic Governance has been proposed, encouraging alignments of wages with firm or regional productivity (Degryse, 2012, p. 73).

Indeed, one aim of these recommendations was to achieve greater inter-firm wage differentiation and a closer link between firm performance and worker remuneration to achieve greater labour efficiency and simultaneously higher wages, social dialogue and good levels of inclusiveness (OECD, 2018, p. 18).

To date, most studies have analysed the diffusion and impacts of greater flexibility in payment systems, such as performance-related pay (PRP), on various outcomes in labour markets and productive systems (see OECD, 2018, ch. 3; Eurofound, 2015).

However, considerably less attention has been paid to verifying the effective impact of public policies, such as fiscal incentives, intended to favour performance for pay schemes. Available evidence does not show clear results, and tax concessions seem to have helped in certain economies but have been unnecessary in others (Boeri et al., 2013; Pérotin & Robinson, 2002).

In principle, fiscal policies to encourage incentive payments are justified by empirical evidence showing that these measures may reduce the high costs faced by small and medium enterprises (Welz & Fernández-Macías, 2008) and that wage incentives are often associated with better outcomes for firms and/or workers (Boeri et al., 2013). However, this is still a controversial issue because tax breaks may also induce the adoption of 'cosmetic' schemes to obtain fiscal relief, with very small changes for the internal organization of companies. Furthermore, tax-advantaged schemes are costly for the government, and very often, these policy interventions are questioned on the basis of the different impacts of PRP on a heterogeneous population of firms.

One key aspect and important development is the adoption of a policy evaluation to bring into focus the assessment of the *causal effects* of tax breaks and reliable answers on the conditions under which these government interventions influence productivity and wage patterns.

In this regard, Italy offers an interesting case study because the recent introduction of Law n. 208/2015 allowed a significant tax break for PRP and represents a natural experiment in which some workers switched from fixed wages to variable wages that included pay for performance. This political intervention, among other measures adopted in some European economies to promote wage flexibility, permits us to evaluate the role of fiscal relief on the successful implementation of PRP.

In this study, we mainly adopt a difference-in-differences approach to verify whether this public intervention has been conducive to higher productivity and a partial or total distribution of these efficiency gains to employees through higher wages.

To explore these issues, we exploit a unique source of firm-level information offered by the *Rilevazione su Imprese e Lavoro* (RIL), a survey conducted by the National Institute for Public Policy Innovation (INAPP) on a representative sample of Italian firms (the reference period refers to the years 2010, 2014 and 2018). This statistical information has been merged with data obtained from the ORBIS archive and allows us to use a longitudinal RIL-ORBIS dataset, according to which we find the following main results.

First, a tax break has a positive and significant overall effect on labour productivity. These findings are in line with those theories that predict that firms introducing PRP may select and retain the most productive workers and encourage worker effort. Second, we find positive effects for wages, but these results are lower in magnitude than those found for productivity and not confirmed by the robustness tests.

Third, positive productivity effects are mainly driven by family ownership in northern regions. 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. Additionally, these firms benefit from the more dynamic business environment, akin to that present in northern regions, in terms of reduced

bargaining costs and advantages due to information spillovers. These results are robust to an econometric strategy that controls for unobserved heterogeneity and endogeneity issues and based on *diff-in-diff models* and their extensions.[1]

The current study adds to the literature that thus far has yielded few results with respect to the impact of fiscal benefits on PRP. Our research shows that political measures adopted to promote more efficient and inclusive managerial practices may be efficacious in Italy and reverse the disappointing trends of some firms (such as family-owned firms) that normally perform worse than their non-family counterparts. However, these measures, far from being efficacious across all business units that operate in different regions, do not appear to be a definitive solution to the strong and widening dualism that typifies the Italian economy. For this reason, policy makers should target fiscal benefits to some firms' observable characteristics and behaviours rather than offering unconditional *erga omnes* tax relief. This result could also be a useful reference for other European countries affected by pervasive firm heterogeneities.

This paper is organized as follows. Section 2 briefly discusses the related literature, describes the main features of the Italian institutional setting and indicates a number of working hypotheses. 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.

2 | THEORETICAL BACKGROUND, INSTITUTIONAL ASPECTS AND WORKING HYPOTHESES

2.1 | Related literature

The power of wage incentives

The adoption of contingent payments could exert beneficial effects on labour productivity because these schemes work through different channels.

First, PRP schemes are used to select the most qualified and productive employees. In the presence of heterogeneous workers, PRP schemes 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).

Remuneration linked to firm performance may induce greater effort than fixed rewards and a higher quality of human capital (Long & Fang, 2012; Prendergast, 1999). These beneficial impacts are due to higher commitment and incentives to invest in firm-specific human capital and higher investments in employee training (Green & Heywood, 2011). Additionally, incentive pay schemes may reduce turnover and absenteeism and support better teamwork and cooperation (Doucouliagos et al., 2020; Kruse et al., 2010).

PRP may help not only elicit worker effort but also motivate workers to efficiently use their '*specific knowledge*'. Agents frequently have more specific knowledge about how to do their jobs than their principals and a high cost of communicating their private information to the principal (Prendergast, 2002; Raith, 2008).

On the other hand, a number of potential inefficiencies associated with output measures, such as PRP, have been highlighted by theoretical literature and empirical evidence.

First, the piece rate method requires monitoring of output quality, and this method 'gives workers an incentive to skimp on quality or to use excessive amounts of materials, which requires firms to spend more on supervision or quality control' (Freeman & Kleiner, 2005, p. 309). Additionally,

changing a piece rate is expensive because the revision process, which modifies working conditions and compensation, may induce conflicts between workers and their firms (Kleiner et al., 2001; Freeman & Kleiner, 2005).

Second, performance measures are determined not only by workers' actions but also by exogenous and uncontrollable factors and expose workers to income risk, which must be compensated by the firm. Hence, broad performance measures, more closely related to firms' goals, include a variety of controllable and uncontrollable factors and are riskier. In contrast, narrower measures are less risky but may omit some aspects that employees can control and may lead to distortions (Baker, 2002). Employees may be able to use their private knowledge to manipulate their performance measure; thus, they increase their compensation without improving firm value (Gibbs et al., 2009). Dysfunctional responses to incentives arise in situations where measuring productivity involves combining multiple indicators because workers have been delegated to perform a wide spectrum of tasks (Holmstrom & Milgrom, 1991). Multitasking induces additional agency problems: 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. Subjective evaluation may mitigate distortions and may allow the supervisor to adjust the incentive design to environment changes or correct errors in the incentive strategy (Gibbs et al., 2004). However, '…the use of subjectivity will have positive effects on pay satisfaction and performance only when there is adequate trust between the subordinate and the supervisor' (Gibbs et al., 2004, p. 411).

Third, performance measures are both individual- and group-based output measures, while input measures are typically individual-based. In particular, increases in the value of *knowledge sharing* are associated with a greater weight on group-based output performance measures, as discussed by Kauhanen and Napari (2012). They underline, especially for workers who generally perform less standardized and less routine jobs, the importance of 'the pooling of specific information held by multiple agents' (p. 649). Furthermore, both individual and collective incentives generate side effects because individual bonuses reduce incentives to cooperate, whereas collective premiums make rewards dependent on the actions of all employees, so the evaluation has a great deal of uncontrollable risk (Gibbs, 2013).

As shown empirically for the United States by Hwang et al. (2009), a significant portion of the rich diversity in production employees' compensation (individual- or group-based output measures) can be explained by the extent of employees' specific knowledge and the potential value created when employees share that knowledge with other employees.

Finally, it can be signalled that group bonuses may induce employees to free-ride on the efforts of others, which reduces productivity. Therefore, managerial monitoring and peer pressure among workers may be a solution to this problem (Kandel & Lazear, 1992).

In sum, a number of positive and counterproductive effects may be conceivable, as analysed by extensive research (see the surveys of Gibbons, 1998; Prendergast, 1999; and Gibbs, 2013), although a number of empirical studies suggest that PRP is usually associated with improved employee productivity (Pérotin & Robinson, 2002; Gielen et al., 2010; Kruse et al., 2010).

Concerning wages, the main theoretical hypotheses are that pay linked to performance has a positive impact on output because it imposes a risk on employees that must be compensated by higher wages to match outside utility (Holmstrom & Milgrom, 1991). Additionally, PRP can be interpreted as an 'efficiency wage'. When it is costly to monitor individual performance, firms pay higher wages above the market levels to elicit greater effort and discourage shirking behaviour. The efficiency wage may add to the base wage and is conducive to higher compensation. Finally,

the sorting model (Lazear, 2000) predicts that with PRP and higher wages, firms distinguish highly productive workers from less productive workers.

Empirical evidence confirms these hypotheses. For instance, for the UK, Booth and Frank (1999) show that PRP raises wages. Pekkarinen and Riddell (2008) describe earnings premiums for the Finland case. Lemieux et al. (2009) show for the US labour market that sorting employees is more valuable when the marginal value of effort is higher and PRP is a channel through which higher returns to skill translate into higher wages.

In contrast, Weitzman (1983) predicts that profit sharing substitutes part of the base wage but is compensated by bonuses and has a neutral effect on total compensation. Analogously, as discussed by Delahaie and Duhautois (2019, p. 108), 'the compensating wage differentials theory predicts that the base wage is lower when other forms of compensation such as profit-sharing are improved'.

Tax breaks

Whether governments should encourage incentive payments remains a controversial issue. If all of the ensuing advantages of PRP accrue to the firm concerned, there are no arguments to sustain the need for public policy support (OECD, 1995, ch. 4). However, there are at least two beneficial effects that might favour public policy attention (European Commission, 1997, p. 9). First, PRP may increase money wage flexibility over the business cycle, and during periods of economic decline, this flexibility may reduce the level of unemployment (Booth & Frank, 1999). Second, these schemes would increase the degree of attachment between employees and their companies, thus encouraging skill formation. These considerations are particularly relevant in Italy, where as underlined by the European Commission's In-Depth Review (European Commission, 2017), 'Firm-level bargaining is not broadly used, hampering the efficient allocation of resources and the responsiveness of wages to economic conditions' (p. 2).

Fiscal incentives may stimulate the adoption of wage bonuses, largely by reducing the cost to employers of adopting such pay schemes (Marsden & Belfield, 2010). Furthermore, tax breaks compensate employees for the risk to which they are exposed in the case of volatile and uncertain bonuses (Pérotin, & Robinson, 2002; Delahaie & Duhautois, 2019).

The limited recourse to PRP could be due to low managerial quality and low managerial incentives (Bloom & Van Reenen, 2011), as shown for the Italian economy (Damiani & Ricci, 2014). Note that, given firm heterogeneity, PRP could be the right strategy for some companies and workers but not for others. Furthermore, legislative measures may induce only 'cosmetic' changes to take advantage of tax levers without changing actual operations and thus without achieving any productivity gains (Estrin et al., 1987).

Family firms, geographical imbalances and heterogeneity across macrosectors

The substantial heterogeneity observed across firms and institutional contexts could be the reason for the ambiguous effects of tax incentives on PRP (Boeri et al., 2013).

The impact of ownership structure on pay–performance relations remains a controversial issue. 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 and lower wage flexibility (Sraer & Thesmar, 2007). In addition, in these firms, which are typically smaller and have fewer resources than their non-family counterparts, the recourse to high-level technical competences for implementing incentive systems is often too expensive (Cruz et al., 2011).

On the other hand, a number of dysfunctional traits of PRP are mitigated by family businesses. For instance, in many firms' incentive contracts, the principal cannot pay for what he truly cares. This is particularly true when the value of the firm (measured by the market value of equity) may not be a contractible performance measure, as in privately held firms (Baker, 2002). Therefore, incentive contracts cannot specify a holistic measure of the workers' contribution and incentives may induce distortions. To avoid compensating the wrong actions, as shown by the multitasking literature mentioned above, the firm reduces the strength of incentives and mitigate distortions, so that in these contexts 'incentives are optimally weaker' (Baker, 2002, p. 730). In family firms, as in other non-profit organizations, the problem of non-contractible measures is even sharper because the firm objective is to pursue also non-economic priorities, such as maintaining control of the firm, the transmission of the family business to the founder's heirs and the preservation of family image (Berrone et al., 2012). However, in family firms, the employee reward system, rather than being shaped by agency contracts and control-oriented systems, features cooperative and altruistic behaviour representing self-enforcing systems of incentives, that may reduce distortions and opportunism (Cruz et al., 2011, p. 180; Pompei et al., 2019).

Other characteristics, such as geographical differentials, come to the forefront in our study because regional imbalances are still remarkable in terms of the lower diffusion of decentralized agreements and diffusion of PRP in southern regions (Resce, 2016; Resce & Paliotta, 2019).

Auxiliary information provided by INAPP shows a number of geographical differentials. In particular, 'the total amount of wages facing tax reduction is 6 billion, 43% of which are concentrated in the northwest, 26% in the northeast, 22% in the centre and only 9% in the south and the islands' (Resce & Paliotta, 2019, p. 135). Note that a number of external influences that typify territorial environments are relevant for incentive payments (Marsden & Belfield, 2010). Firm decisions on pay strategies are influenced by competitors that operate in the same area because worker mobility causes a higher degree of convergence towards similar patterns of HRM strategies. These considerations are particularly relevant in business contexts, such as industrial districts that typify the Italian economy, in which social norms and multiemployer activities are more important (Naldi et al., 2013). In these contexts, diverse experiences with new pay systems offer learning opportunities (Marsden & Belfield, 2010, p. 246).

Finally, we cannot neglect the different roles that incentives play in service sectors compared to manufacturing. 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 & Grupp, 2005). At the same time, in this sector, these incentives are more difficult to structure efficiently, especially in comparison to manufacturing firms that are more capital intensive and have a more rigid job structure.

2.2 | The Italian institutional context

Italy recorded a substantial increase in 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. After the 1993 Agreement, Italy was characterized by a two-tiered bargaining regime, where the first-level wage contracts were set through national sectoral bargaining and were linked to the target inflation rate, whereas decentralized bargaining (firm or local level) should have distributed wage premiums. These premiums were one-time payments, usually linked to productivity or profit indicators. Subsequently, there was the progressive erosion of the centrality of national sectoral agreements, leading to greater autonomy to firm bargaining to derogate *in pejus* from base wages negotiated at sectoral levels (D'Amuri & Nizzi, 2017).

In Italy, the first measure to stimulate the adoption of PRP was introduced in 1997. The provision determined a partial fiscal exemption for the wage component set at the firm level and linked to enterprise results. Experimental tax incentives for PRP that also addressed employees were introduced in the following years. However, the incidence of agreements about PRP remained limited over the years, and in 2014, only a small fraction of Italian firms (approximately 14 per cent) adopted these schemes. Furthermore, some agreements were only activated to minimize the fiscal burden, without positive repercussions on labour productivity (the so-called 'cosmetic agreements'; see Antonioli & Pini, 2013).

In 2015, with Law 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 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 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 per cent 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.

Another important novelty introduced by Law 208/2015 and the 2016 Stability Law was the possibility for firms to shift part of compensation from cash payments to welfare provisions (Resce & Paliotta, 2019). The 2015 and 2016 laws introduced fiscal breaks for firms and workers who bargained over welfare benefits, such as healthcare services, general assistance and provisions to improve work-life balance. With these new provisions, productivity bonuses were de-taxed, in the form of vouchers for access to company welfare services (Ciarini & Lucciarini, 2017).

All the policy interventions introduced by Law 208/2015 required a context of decentralized collective bargaining (at the firm or local level). A common trait of these provisions is that they extended the margins within which the firm-level or local-level agreement could legally derogate in pejorative terms from the national collective agreement.

2.3 | Working hypotheses

We assume that Law 208/2015 introduces a sufficient level of novelty in tax incentives for PRP schemes, and we evaluate its main effects with a difference-in-differences (*diff-in-diff*) approach (Imbens & Wooldridge, 2009). Building on the considerations discussed in Sections 2.1 and 2.2, we propose the following hypotheses:

H1. Tax incentives for PRP schemes have uncertain effects on labour productivity. These schemes increase workers' commitment and identification with firm interests, but could be inefficient when induce effort distortion and free-riding (Prendergast, 1999).

H2. Tax breaks on PRP have uncertain effects on wages because they may promote the adoption of bonuses that *add* to the base wage, as expected by the efficiency wage theory. On the other hand, such fiscal relief may induce a *substitution* mechanism of part of the base wage, as expected by compensating wage differentials theory (see Weitzman, 1983 and Delahaie & Duhautois, 2019; Section 2.1).

H3. Family firms are less likely to introduce PRP (Cruz et al., 2011). However, when tax relief on PRP makes the adoption of these payment schemes less expensive, family firms may obtain higher positive effects from this political intervention because their long-term relationships induce greater levels of trust, and lower probability of opportunistic behaviour and free riding by workers (Pompei et al., 2019). Concerning wages, the considerations made in H2 apply. In addition, family firms usually offer a compensation package that involves more job security but lower pay (Sraer & Thesmar, 2007). Hence, one can expect that tax breaks on PRP cause a greater decoupling of wages from productivity in family firms than in non-family firms.

H4. Considerable heterogeneity in the results emerges if we split the sample to consider sectoral and regional dimensions:

H4a. In manufacturing, performance appraisal schemes based on *objective* measurements are likely affected by fewer biases, and there are fewer possibilities for 'gaming' the compensation system. In services, firms' targets are intensely influenced by *subjective* performance measures, such as finding specific solutions that provide value for firms' clients, and PRP likely operates less efficiently. We thus expect higher productivity gains in manufacturing from tax cuts on PRP.

H4b. We conjecture that the macroregional environment and network activities positively influence efforts that firms in general, and specifically family-owned firms, make in implementing an efficient PRP system (Naldi et al., 2013; Pompei et al., 2019). We expect that in northern and central areas, family firms obtain more benefits from tax cuts on PRP.

3 | DATA AND DESCRIPTIVE STATISTICS

3.1 | Data

The empirical analysis is based on the last three waves of the RIL conducted by INAPP (reference periods 2010, 2014 and 2018) on a representative sample of partnerships and limited liability firms.[2] Each wave of the survey covers over 25,000 firms operating in the non-agricultural private sector. A subsample of approximately 10,000 companies (40 per cent) 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, firms' productive specialization and strategies. This dataset offers the great advantage of controlling for important sources of firm behaviour and heterogeneity, as emphasized in the previous literature (Bloom & van Reenen, 2011). The RIL survey adds detailed information on the main features of industrial relations. In particular, each firm is asked whether a PRP scheme has been adopted, although the dataset does not provide statistics on how many workers in the firm receive these forms of payments. 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. Again, we have not the quantitative information about the firm-level PRP bonus for which the tax relief applies, but only a dummy variable (1/0) indicating the compliance with the law. In any case, this limitation does not prevent us to set an array of difference in difference techniques attempting to capture the causal effects of this policy on the firm's performance.

To investigate the impact of this policy on labour productivity and wages, we merge RIL data with the ORBIS archive provided by Moody's for the same sample years. The ORBIS 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)[3]and fixed capital (the total amount of physical assets per employee).

To deflate our monetary variables, we relied on sectoral deflators (NACE 2 digit) based on industrial production prices for labour productivity and on a harmonized index of consumer prices for wages. These deflators are provided by the National Statistical Institute (base year 2010).

The complete set of variables and their brief description are reported in Table C.1 (see online Appendix C).

For sample selection, we excluded firms with fewer than five employees from the RIL-ORBIS merged dataset. After excluding firms with missing information for the key variables, the longitudinal dataset consists of 2291 firm-year observations analysed over the period 2010–2014–2018. The RIL-ORBIS merged sample is obtained by integrating a large (cross-sectional and longitudinal) representative sample of (limited liability and partnership) firms operating in the extra-agricultural private sector (RIL) with an archive of limited liability firms (ORBIS). This procedure is done through the tax code and legal form, which is a variable of stratification of the RIL sample. As the RIL-ORBIS data are expected to reflect the sample design of RIL in the subgroup of limited liability firms found in the ORBIS archive, we argue that the impact of attrition on the results is limited.

Eventually, to verify H4a and H4b (see Section 2.3), we split the sample into subsamples according to sectors of the market economy (manufacturing vs. services) and macroareas of Italy (central-northern vs. southern regions). This split sample analysis relies on the sample design, as RIL is stratified by macroarea and industry, in addition to size.

3.2 | Descriptive statistics

Table 1 shows the descriptive statistics for treated and non-treated firms, referring to 2010 and 2014 (before treatment) and 2018 (after treatment). In the 2018 RIL survey, there were 2291 companies reporting non-missing information concomitantly on PRP tax reliefs, dependent and control variables; of these firms, 244 reported having applied for the PRP tax cuts (treated firms). Descriptive statistics are, therefore, computed by retaining 2047 control firms and 244 treated firms for the years 2010 and 2014.

Overall, average labour productivity and wages within the treated and control groups remain quite stable over time, especially in firms in the control group between 2014 and 2018. However, treated firms recorded higher performance than non-treated firms before treatment; for instance, the natural logarithm of labour productivity in 2014 was 11.19 versus 10.80, respectively. This might indicate a problem of self-selection because the best performers and structured enterprises are systematically (and non-randomly) selected in the treated group (which features tax breaks on PRP)

TABLE 1 Descriptive statistics

	Treatment						Control					
	2010		2014		2018		2010		2014		2018	
	mean	*std dev*	mean	*std dev*	mean	*std dev*	mean	*std dev*	mean	*std dev*	mean	*std dev*
Labour productivity	11.16	*0.45*	11.19	*0.56*	11.20	*0.46*	10.87	*0.51*	10.80	*0.62*	10.80	*0.61*
Average wages	10.72	*0.31*	10.75	*0.28*	10.79	*0.29*	10.42	*0.48*	10.35	*0.56*	10.38	*0.58*
Management												
Tertiary education	0.48	*0.50*	0.50	*0.50*	0.66	*0.48*	0.20	*0.40*	0.20	*0.40*	0.22	*0.42*
Upper secondary ed.	0.40	*0.49*	0.43	*0.50*	0.29	*0.45*	0.57	*0.49*	0.60	*0.49*	0.58	*0.49*
Females	0.15	*0.36*	0.16	*0.30*	0.23	*0.42*	0.16	*0.37*	0.13	*0.34*	0.15	*0.36*
Age > 50	0.26	*0.44*	0.43	*0.50*	0.48	*0.50*	0.25	*0.43*	0.40	*0.49*	0.35	*0.48*
34 < Age < 49	0.30	*0.46*	0.29	*0.45*	0.17	*0.38*	0.33	*0.47*	0.24	*0.43*	0.23	*0.42*
External management	0.15	*0.36*	0.20	*0.49*	0.23	*0.42*	0.02	*0.15*	0.02	*0.15*	0.03	*0.16*
Family ownership	0.55	*0.50*	0.54	*0.49*	0.53	*0.50*	0.93	*0.26*	0.94	*0.24*	0.93	*0.26*
Workforce												
Tertiary education	0.16	*0.20*	0.16	*0.21*	0.19	*0.35*	0.09	*0.19*	0.10	*0.21*	0.12	*0.23*
Upper secondary	0.41	*0.19*	0.42	*0.25*	0.40	*0.29*	0.52	*0.35*	0.54	*0.34*	0.58	*0.34*
and lower secondary	0.43	*0.26*	0.42	*0.26*	0.41	*0.29*	0.39	*0.37*	0.35	*0.35*	0.30	*0.34*
Females	0.31	*0.22*	0.30	*0.21*	0.23	*0.18*	0.37	*0.32*	0.41	*0.33*	0.42	*0.34*
Age > 50	0.25	*0.14*	0.31	*0.16*	0.34	*0.18*	0.16	*0.22*	0.25	*0.26*	0.33	*0.30*
34 < Age < 49	0.50	*0.19*	0.47	*0.15*	0.40	*0.19*	0.52	*0.33*	0.48	*0.31*	0.46	*0.30*
Executives	0.05	*0.07*	0.06	*0.06*	0.05	*0.07*	0.05	*0.16*	0.04	*0.11*	0.04	*0.11*
White collars	0.43	*0.27*	0.44	*0.29*	0.45	*0.30*	0.38	*0.35*	0.40	*0.36*	0.48	*0.36*
Blue collars	0.52	*0.29*	0.50	*0.29*	0.50	*0.33*	0.57	*0.38*	0.55	*0.37*	0.48	*0.37*
Temporary contracts	0.07	*0.10*	0.07	*0.10*	0.09	*0.13*	0.11	*0.21*	0.07	*0.17*	0.10	*0.20*
Hiring (0/1)	0.73	*0.45*	0.82	*0.39*	0.84	*0.37*	0.36	*0.48*	0.36	*0.48*	0.40	*0.49*
Firm characteristics												
Export	0.60	*0.49*	0.38	*0.49*	0.49	*0.50*	0.24	*0.43*	0.31	*0.46*	0.27	*0.44*
Multinational	0.07	*0.26*	0.09	*0.28*	0.09	*0.29*	0.01	*0.10*	0.01	*0.08*	0.01	*0.10*
Employers' association	0.82	*0.38*	0.87	*0.34*	0.77	*0.42*	0.47	*0.50*	0.48	*0.50*	0.42	*0.49*
Prod innov.	0.54	*0.50*	0.34	*0.48*	0.47	*0.50*	0.35	*0.48*	0.34	*0.47*	0.26	*0.44*
Proc innov.	0.54	*0.50*	0.35	*0.48*	0.48	*0.50*	0.28	*0.45*	0.26	*0.44*	0.22	*0.42*
Irap tax cut	0.00	*0.00*	0.03	*0.16*	0.06	*0.23*	0.00	*0.00*	0.03	*0.17*	0.03	*0.17*
Pension reform	0.00	*0.00*	0.12	*0.32*	0.16	*0.39*	0.00	*0.00*	0.03	*0.17*	0.04	*0.19*
Firm age (in years)	29.93	*16.10*	34.50	*20.69*	38.32	*21.73*	21.55	*13.72*	25.59	*16.99*	29.44	*12.50*
N. empl. < 10	0.06	*0.23*	0.02	*0.15*	0.04	*0.20*	0.65	*0.48*	0.69	*0.46*	0.66	*0.47*
9 < N. empl. < 50	0.38	*0.49*	0.37	*0.48*	0.53	*0.50*	0.31	*0.46*	0.28	*0.45*	0.31	*0.46*
49 < N. empl < 100	0.18	*0.39*	0.18	*0.33*	0.11	*0.31*	0.03	*0.17*	0.02	*0.13*	0.02	*0.14*
99 < N. empl. < 250	0.26	*0.44*	0.30	*0.48*	0.16	*0.36*	0.01	*0.10*	0.01	*0.08*	0.01	*0.08*
N. empl > 249	0.12	*0.33*	0.12	*0.33*	0.16	*0.37*	0.00	*0.07*	0.00	*0.05*	0.00	*0.05*
ln (phys. capital)	10.54	*1.65*	11.14	*1.52*	10.44	*1.50*	9.82	*1.55*	9.64	*1.86*	9.84	*2.12*
North West	0.55	*0.50*	0.55	*0.50*	0.55	*0.50*	0.35	*0.49*	0.38	*0.49*	0.38	*0.49*

(Continues)

TABLE 1 (Continued)

	Treatment						Control					
	2010		2014		2018		2010		2014		2018	
North East	0.25	*0.43*	0.25	*0.43*	0.25	*0.43*	0.27	*0.45*	0.28	*0.45*	0.28	*0.45*
Centre	0.16	*0.37*	0.16	*0.37*	0.16	*0.37*	0.23	*0.40*	0.20	*0.40*	0.20	*0.40*
South	0.04	*0.20*	0.04	*0.20*	0.04	*0.20*	0.15	*0.35*	0.14	*0.35*	0.14	*0.35*
*N*of obs.	244						2047					

Note: Sampling weights applied. The italic values given in Table 1 report Standard Deviation (std dev).
Source: RIL-ORBIS dataset.

for the reasons explained in Section 2.1. Note also that differences in performance are mirrored in average wages that fluctuated around 10.76 and 10.36 log points in the treated and control groups, respectively.

For the covariates, Table 1 makes it evident that the treated and non-treated enterprises 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 and localization).

Data on the human capital of firm managers, *proxied* by their educational degree, reveal more companies run by management with tertiary education in the group of treated firms compared to the control group (in 2014, higher educated management was 50 per cent vs. 20 per cent, respectively, in the two groups); note also that differentials become slightly larger after treatment.

This evidence is consistent with disparities found in corporate governance traits across firms and signals the higher frequency of more structured companies among firms that applied for tax cuts on PRP. Indeed, the strong prevalence of family enterprises among the non-treated firms (more than 90 per cent) is remarkable (among treated firms, family-owned companies are just slightly above 50 per cent). Furthermore, in the non-treated group, only 2–3 per cent of firms were run by external management (in the treated group, the incidence of external management was approximately 20 per cent in 2014 and 2018).

These differentials are accompanied by the presence of large firms, with more than 250 employees, in the subsample of treated firms (they range between 12 per cent and 16 per cent), whereas in the control group, large enterprises represent a very small minority (less than 1 per cent), in line with values reported on average for the whole Italian economy. Furthermore, 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 amplified after treatment.

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

Finally, only 4 per cent of treated firms are located in southern regions, compared to the 14 per cent of companies in the control group, perfectly in line with descriptive evidence on the heterogeneous geographical distribution of enterprises applying for tax cuts on PRP (Resce & Paliotta, 2019, p. 131).

In summary, the overall portrait of treated firms shows that they were more successful in terms of per capita value added, paid higher wages, were run more frequently by professional managers

and were less frequently family owned. These firms, which were more internationalized and more active in hiring policies, were also more frequently affiliated with employer associations.

All these features that differentiate treated from control firms, on the other hand, may indicate benefits *associated* with fiscal tax breaks after the policy change occurred in 2015 but not necessarily a *causal relationship* between the treatment and the outcome variables. To better identify the causal effects induced by Law n.208/2015 and reduce the influence of unobserved confounding factors, we will make use of the rich set of covariates discussed above and apply an array of *diff-in-diff* approaches.[4]

4 | ECONOMETRIC ANALYSIS

4.1 | Method

To evaluate the effects of Law n.208/2015 on labour productivity and wages and specifically verify hypotheses H1–H4, we rely first on a *diff-in-diff fixed effects (FE) model* that allows us to exploit the longitudinal structure of the three-period RIL-ORBIS data. In particular, we observe the same firms before and after the policy change occurred in late 2015: the availability of data for two periods before the introduction of the law (2010 and 2014) allows us to test the common trends assumption (CTA). After a pooled OLS, we specify a *diff-in-diff FE model* as follows:

$$\begin{aligned} Y_{i,t} = {} & \alpha_i + \lambda_t + \beta_1 tax\_prp_i + \beta_2 (tax\_prp_i \times year\_2018) \\ & + \beta_3 (tax\_prp_i \times year\_2014) + \gamma M_{i,t} + \delta W_{i,t} \\ & + \vartheta F_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{1}$$

where $Y_{i,t}$ alternatively indicates the (log of) labour productivity and the (log of) average wages for each firm i in year $t = 2010$, 2014 and 2018; λ_t are year dummies; tax_prp_i is a dummy equal to 1 whether the firm used *tax-cut on performance-related pay* in 2015 (treated group) and 0 otherwise (control group). The interaction $tax\_prp_i \times year\_2018$ identifies the *diff-in-diff* impact (see the technical online Appendix A for more details), while the interaction $tax\_prp_i \times year\_2014$ allows us to test the CTA (see below). Regarding the other controls, the vector $M_{i,t}$ includes managerial characteristics, $W_{i,t}$ represents the workforce composition, and $F_{i,t}$ accounts for a rich set of firms' productive characteristics. In the pooled OLS specification, we also include geographical location and sectors of economic activity, that is, specific time-invariant characteristics that partially control for heterogeneity related to these dimensions. All these covariates have already been discussed in the descriptive section (Table 1); finally, $\varepsilon_{i,t}$ is the idiosyncratic error term.

The crucial assumption for the *diff-in-diff* estimate of β_2 to be unbiased is the so-called CTA, which means that in the absence of the policy change adopted in 2015, we should observe parallel trends in the outcome of treated and untreated firms. If CTA holds, the diff-in-diff FE estimator has the advantage of removing any common-period effects that influence the treated and control groups in identical ways. Given the specification above, the CTA is simply tested by verifying that the estimates of the coefficient β_3 associated with the interaction term $tax\_prp_i \times year\_2014$ are not significantly different from zero; this tells us that nothing was altering the difference between treated firms and control firms in the pre-treatment period.

In a second step, we investigate whether important confounding factors, simultaneously correlated with tax incentives and dependent variables, hinder the correct identification of the β_2 coefficient. For example, as noted above, it is plausible to expect a self-selection of most structured, managerial, large and medium enterprises in using tax incentives. All these traits are well represented in the group of non-family firms. In contrast, family-owned firms may be less prone than managerial units to apply for PRP tax incentives, especially when the application procedures are complex and require a more structured organization and stable relationships with trade unions. Indeed, as discussed in the previous section, the frequency of family firms in the treatment group is almost half that found in the control group (Table 1). To take into account this concern, we follow Wooldridge (2010) and apply a *triple diff-in-diff FE model*, where the coefficient of interest of a triple interaction $\text{tax\_prp}_i \times \text{FF}_{i,t} \times \text{year\_2018}$ is expected to measure the impact of tax breaks corrected for potential self-selection of non-family firms (see online Appendix A for more details). In addition, this triple interaction term identifies whether tax breaks on PRP revert the trend in the outcomes of family-owned firms that normally perform worse than their peers (non-family and large firms).

Finally, an additional robustness check was performed by combining the *diff-in-diff models* with propensity score matching (PSM). Applying PSM techniques may help us to further mitigate self-selection biases; it means identifying treatment and control groups with similar probabilities (propensity scores) of being selected into the treatment (see online Appendix A for more details).

4.2 | Results

To verify working hypotheses H1–H4 (see Section 2.3), we use the econometric methods explained above according to the following strategy. As a first step, we run standard OLS regressions on the pooled sample to explore the direction of the impact of tax breaks on labour productivity and the average wages of Italian companies.

Second, we verify the causality of these relations, as explained above (*diff-in-diff-* and *triple diff-in-diff-FE models*). Third, we split the whole sample into subsamples to detect whether heterogeneities across macroregions and sectors of the Italian economy affect the results obtained for the whole sample. Finally, we implement a robustness check where *diff-in-*diff is combined with PSM estimates, as explained in the previous section.

To improve the readability of the following tables, we report only estimated coefficients of the key variables (full results are available upon request).

4.2.1 | PRP tax breaks, productivity and wages (full sample)

The pooled OLS estimates reported in column 1 of Table 2 show that the firms that applied for PRP tax bonuses benefited by an approximately +9.1 per cent increase in their productivity with respect to those firms that did not apply. However, a number of confounding factors could bias these results. To address this potential problem, we compare the two groups (firms that *did* and *did not* apply) before and after the introduction of Law 208/2015 and control for time-invariant unobserved heterogeneity.

The results obtained for the *diff-in-diff* FE regression show that tax breaks on PRP lead to an increase of 6.6 per cent in labour productivity (see column 2). Furthermore, the test for the CTA tells us that movements in labour productivity before treatment were not dissimilar between the

TABLE 2 Effects of PRP tax break on productivity and wages (whole sample)

	Labour productivity			Average wages		
	[1]	[2]	[3]	[4]	[5]	[6]
	Pooled OLS	Diff FE	3 Diff FE	Pooled OLS	Diff FE	3 Diff FE
Tax prp	0.091***			0.054***		
	[0.030]			[0.017]		
tax prp × 2018		0.066**	−0.023		0.040**	0.001
		[0.031]	[0.055]		[0.016]	[0.029]
tax prp × 2014		0.012	−0.047		0.046***	0.036
		[0.047]	[0.093]		[0.015]	[0.027]
tax prp × fam firm × 2018			0.151**			0.064*
			[0.073]			[0.036]
tax prp × fam firm × 2014			0.116			0.021
			[0.101]			[0.034]
year 2018	−0.020	0.026*	0.061**	−0.036***	0.041***	0.061***
	[0.014]	[0.014]	[0.029]	[0.011]	[0.011]	[0.019]
year 2014	−0.036***	−0.014	−0.012	−0.046***	−0.009	−0.012
	[0.012]	[0.012]	[0.026]	[0.009]	[0.009]	[0.017]
Family firm	−0.096***	−0.023	−0.035	−0.095***	−0.029**	−0.033*
	[0.021]	[0.025]	[0.031]	[0.013]	[0.013]	[0.020]
Manag. characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Workforce compositionFirm characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Nuts 2 regions FE	*Yes*	–	–	*Yes*	–	–
Industry FE	*Yes*	–	–	*Yes*	–	–
Constant	9.771***	9.767***	9.777***	10.075***	9.976***	9.981***
	[0.094]	[0.203]	[0.202]	[0.065]	[0.163]	[0.162]
Obs	6873	6873	6873	6873	6873	6873
R^2	0.328	0.111	0.113	0.371	0.160	0.161

Note: Managerial characteristics include level of education, age and gender of managers/entrepreneurs who run a firm and the occurrence of an external management; workforce composition includes share of workers by education, age, professional status, gender and contractual arrangements; firms' characteristics indicate product and process innovations, multinational enterprises, export and membership to an employers' association. For more detail on definition and statistics of all covariates we use in the regressions, see Table 1 and Table A.1 in the online Appendix. In OLS regressions, we control for two-digit sectors of activity and Nuts 2 regions fixed effects. Firm-level clustered standard errors in parentheses.

*Statistical significance at 10%.

**at 5%.

***at 1%.

Source: Longitudinal sample RIL-Orbis, reference years 2010–2014–2018.

two groups of firms, that is the coefficient associated with tax_prp × 2014 is not significantly different from zero. These findings provide initial confirmation that compliance with Law 208/2015 improved the labour productivity of Italian firms. However, as noted above, the potential self-selection of more structured companies, such as non-family and larger firms, may influence the relationship between tax cuts and productivity. This means that, independent of these incentives,

non-family and managerial firms may perform differently from family firms, a circumstance that could affect the results for productivity (and wages).

This issue is considered in column 3. In this case, our estimates indicate that family firms that applied for the PRP tax cuts experienced an increase in labour productivity of 15.1 per cent compared to family firms that did not apply (see the coefficient of the triple interaction term *tax_prp* × *fam_firm* × *2018)*. Note that our results confirm that this positive deviation in favour of family firms is *due* to fiscal relief and that the trends before the treatment were not dissimilar (tax_prp × fam_firm × 2014 is not significantly different from zero).

In sum, the estimates shown in Table 2 (columns 1–3) signal that a tax break on PRP leads to a significant increase in labour productivity. As reviewed in Section 2, the role of PRP schemes is highly debated in the incentive literature due to the positive and negative impacts of incentive schemes, as summarized in Hypothesis 1. Our results suggest that in the Italian context, positive impacts prevail and that PRP schemes likely stimulate commitment and firm-specific human capital investments from incumbent workers and/or attract more productive employees. These channels are strategic for boosting labour productivity. Furthermore, in keeping with Hypothesis 3, this fiscal measure 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. In these firms, featuring a high degree of trust and strong social ties, it is likely that subjective evaluations complement objective measures established by the Law 208/2015 in awarding bonuses and are more effective because workers accept judgments of family managers and do not oppose compensation schemes that involve discretion of their evaluators, as hypothesized in a general theoretical framework by Gibbs et al. (2004).

For average wages, the pooled OLS estimates (column 4, Table 2) show that the tax break is positively correlated with the average wages paid by firms, although the magnitude of the coefficient (+5.4 per cent) is lower than that found for labour productivity (9.1 per cent; see column 1). However, this result is less clear cut. The wage increase of +4 per cent paid by treated firms (see the *diff-in-diff* FE estimate reported in column 5, Table 2) is not supported by the common trend assumption, and we cannot conclude that the wage increase is *caused* by Law 208/2015. A tentative explanation for this outcome is that fiscal incentives on PRP might be associated with a partial substitution for the fixed wage components, as discussed in Hypothesis 2 (Weitzman, 1983; Delahaie & Duhautois, 2019).

However, the results obtained at this step for family-owned firms show significant causal effects for wages (6.4 per cent, column 6); these results are also supported by the CTA, as the coefficient associated with the term tax_prp × fam_firm × 2014 (i.e. 2.1 per cent, column 6) is not statistically significant.

In summary, our estimates obtained while addressing the issue of potential self-selection show that fiscal relief for PRP reveals an appropriate way to achieve a higher, but partial, alignment of productivity and wages. Second, this fiscal relief seems to be especially effective for family firms.

This seems at first sight contradictory if we look at the low propensity of family firms to adopt PRP schemes. As explained in Section 2.1, the recourse to high-level technical competences for implementing incentive systems is often too expensive for family firms. In contrast, when they benefit from financial subsidies allowed by Law 208/2015, the introduction of PRP may trigger changes in family firm priorities towards aims requiring more commitment from incumbent workers and the attraction of more capable employees. The better relational context and the main characteristics of implicit contracts exhibited by family firms probably contribute to alleviating the behavioural distortions and malfunctioning that normally plague collective and individual PRP schemes.

TABLE 3 Effects of PRP tax break on productivity and wages (industry)

	Labour productivity			Average wages		
	[1]	[2]	[3]	[4]	[5]	[6]
	Pooled OLS	Diff FE	3 Diff FE	Pooled OLS	Diff FE	3 Diff FE
Tax prp	0.103***			0.052***		
	[0.032]			[0.017		
tax prp × 2018		0.062*	0.006		0.028*	−0.010
		[0.036]	[0.065]		[0.015]	[0.027]
tax prp × 2014		−0.021	−0.091		0.021	0.025
		[0.061]	[0.125]		[0.015]	[0.026]
tax prp × fam firm × 2018			0.106			0.051
			[0.086]			[0.034]
tax prp × fam firm × 2014			0.145			−0.001
			[0.134]			[0.032]
year 2018	0.002	0.049***	0.045	−0.019*	0.055***	0.083***
	[0.017]	[0.018]	[0.038]	[0.011]	[0.012]	[0.021]
year 2014	−0.015	0.013	−0.005	−0.026***	0.012	0.003
	[0.015]	[0.014]	[0.036]	[0.010]	[0.010]	[0.018]
Family firm	−0.057**	0.001	−0.048	−0.059***	−0.008	−0.005
	[0.025]	[0.036]	[0.041]	[0.014]	[0.016]	[0.022]
Manag. characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Workforce compositionFirm characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Nuts 2 regions FE	*Yes*	–	–	*Yes*	–	–
Industry FE	*Yes*	–	–	*Yes*	–	–
Constant	9.866***	10.118***	10.144***	10.169***	10.195***	10.202***
	[0.106]	[0.228]	[0.240]	[0.073]	[0.182]	[0.182]
Obs	4323	4323	4323	4323	4323	4323
R^2	0.302	0.069	0.072	0.359	0.120	0.120

Note: Managerial characteristics include level of education, age and gender of managers/entrepreneurs who run a firm and the occurrence of an external management; workforce composition includes share of workers by education, age, professional status, gender and contractual arrangements; firms' characteristics indicate product and process innovations, multinational enterprises, export and membership to an employers' association. For more detail on definition and statistics of all covariates we use in the regressions, see Table 1 and Table A.1 in the online Appendix. In OLS regressions, we control for two-digit sectors of activity and Nuts 2 regions fixed effects. Firm-level clustered standard errors in parentheses.

*Statistical significance at 10%.

**at 5%.

***at 1%.

Source: Longitudinal sample RIL-Orbis, reference years 2010–2014–2018.

4.2.2 | PRP tax breaks, productivity and wages across sectors and macroregions

We present additional results obtained for the subsamples of industry and services (see Tables 3 and 4, respectively). Overall, our findings show a weaker significance level of the coefficients, although the CTA is confirmed.

TABLE 4 Effects of PRP tax break on productivity and wages (service sectors)

	Labour productivity			Average wages		
	[1]	[2]	[3]	[4]	[5]	[6]
	Pooled OLS	Diff FE	3 Diff FE	Pooled OLS	Diff FE	3 Diff FE
Tax prp	0.040			0.031		
	[0.067]			[0.044]		
tax prp × 2018		0.071	−0.046		0.064	0.016
		[0.061]	[0.095]		[0.040]	[0.062]
tax prp × 2014		0.094	0.058		0.091***	0.051
		[0.062]	[0.103]		[0.033]	[0.057]
tax prp × fam firm × 2018			0.174			0.098
			[0.123]			[0.084]
tax prp × fam firm × 2014			0.031			0.067
			[0.132]			[0.081]
year 2018	−0.063***	−0.030	0.077*	−0.067***	0.015	0.04
	[0.024]	[0.026]	[0.046]	[0.019]	[0.026]	[0.036]
year 2014	−0.074***	−0.064***	−0.011	−0.083***	−0.046***	0.020
	[0.020]	[0.019]	[0.040]	[0.016]	[0.016]	[0.031]
Family firm	−0.147***	−0.038	0.030	−0.142***	−0.047**	−0.033
	[0.039]	[0.032]	[0.045]	[0.026]	[0.022]	[0.034]
Manag. characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Workforce compositionFirm characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Nuts 2 regions FE	*Yes*	–	–	*Yes*	–	–
Industry FE	*Yes*	–	–	*Yes*	–	–
Constant	9.469***	9.512***	9.436***	9.679***	9.398***	9.375***
	[0.135]	[0.242]	[0.241]	[0.093]	[0.209]	[0.209]
Obs	2550	2550	2550	2550	2550	2550
R^2	0.368	0.209	0.213	0.386	0.228	0.227

Note: Managerial characteristics include level of education, age and gender of managers/entrepreneurs who run a firm and the occurrence of an external management; workforce composition includes share of workers by education, age, professional status, gender and contractual arrangements; firms' characteristics indicate product and process innovations, multinational enterprises, export and membership to an employers' association. For more detail on definition and statistics of all covariates we use in the regressions, see Table 1 and Table A.1 in the online Appendix. In OLS regressions, we control for two-digit sectors of activity and Nuts 2 regions fixed effects. Firm-level clustered standard errors in parentheses.

*Statistical significance at 10%.

**at 5%.

***at 1%.

Source: Longitudinal sample RIL-Orbis, reference years 2010–2014–2018.

In industrial sectors, where manufacturing represents the majority of economic activities, we find weak significant results (10 per cent statistical significance) for the impact of the policy provision on productivity (+6.2 per cent) and wages (+2.8 per cent) (Table 3, columns 2 and 5). Instead, for the service sector, we do not find significant results for productivity or average wages (Table 4). The significant coefficient obtained for the term *tax_prp* × *2014* (see Table 4, column 5) indicates

that wages had different trends before the introduction of Law 208/2015, so that the coefficient estimated for the term *tax_prp* × *2018* (i.e. 6.4 per cent, column 5) could be biased.

However, even for the productivity case, we cannot conclude that tax breaks show significant results only in manufacturing sectors; thus, H4a is not confirmed. Indeed, according to Gelman and Stern (2006), one should look at the statistical significance of the difference between the magnitude of the coefficients (rather than the difference between their significance levels). The results for the test reported in online Appendix B tell us that in our case, the difference between 6.2 per cent in the manufacturing sector and 7.1 per cent in the service sector is not significant.

Finally, 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, obtained when we control for potential self-selection of non-family firms, are significant only for those firms located in the central and northern Italian regions (see Tables 5 and 6, columns 3 and 6), as hypothesized in H4b. Additionally, the results for this macroarea appear to be the main drivers of the overall results reported in Table 2 (the differences between coefficients of *tax prp* × *fam firm* × *2018* calculated according to Gelman and Stern's suggestion are significant this time, see online Appendix B). Thus, it is plausible that in these regions, interactions with other firms provide information related to the incentive design (for instance, the choice of the set of targets and monitoring technologies). Cooperation among firms fosters the sharing of legal information and reduces bargaining costs. It is also plausible that these collaborative relations are more frequent in the central and northern regions, where the bulk of Italian industrial districts are concentrated (121 out of 141 total Italian industrial districts, as documented by Schilirò, 2017). Furthermore, sorting effects might be more pronounced 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.

4.2.3 | Robustness check: diff-in-diff with PSM

At this point, it would be possible to argue that an econometric strategy based on the *diff-in-diff* models presented above is not enough to infer a causal impact of the policy under study. This is because too many characteristics (in addition to family ownership) are systematically different between the firms belonging to the treated and control groups, as discussed in Section 3.2 (Table 1). To attenuate this problem, we perform a *diff-in-diff* with PSM, as explained in the previous section and in online Appendix A.

Table 7 displays the *diff-in-diff* and *triple diff-in-diff* estimates of Equation (2) after applying the PSM matching procedure (see online Appendix A).

For labour productivity, it is straightforward that the estimates found in the *matched sample* (see columns 1–3 of Table 7) are consistent with those presented in Table 3 in terms of the direction and statistical significance of the impact of tax breaks on PRP.

In particular, the estimates in column 1 show that the use of tax bonuses for PRP is associated with a rise of labour productivity of +13.8 per cent, while the *diff-in-diff* results in column 2 indicate that this benefit is equal to +10.4 per cent. Again, our results confirm that compliance with Law 208/2015 truly 'causes' and does not simply correlate with labour productivity (the test for the CTA is not significantly different from zero). Analogously, our findings confirm for the matched sample that family firms taking advantage of the PRP tax cuts experienced a significant increase in labour productivity (+27.2 per cent) compared to family firms that did not (see the *triple diff-in-diff regression* in column 3 of Table 7). This result suggests a causal relation, as the

TABLE 5 Effects of PRP tax break on productivity and wages (north-centre regions)

	Labour productivity			Average wages		
	[1]	[2]	[3]	[4]	[5]	[6]
	Pooled OLS	Diff FE	3 Diff FE	Pooled OLS	Diff FE	3 Diff FE
Tax prp	0.081**			0.050***		
	[0.032]			[0.017]		
tax prp × 2018		0.042	−0.074		0.035**	−0.010
		[0.031]	[0.051]		[0.016]	[0.029]
tax prp × 2014		−0.003	−0.081		0.043***	0.034
		[0.048]	[0.092]		[0.014]	[0.028]
tax prp × fam firm × 2018			0.197***			0.074**
			[0.072]			[0.036]
tax prp × fam firm × 2014			0.148			0.020
			[0.100]			[0.034]
year 2018	−0.013	0.029*	0.079***	−0.042***	0.031***	0.054***
	[0.016]	[0.016]	[0.031]	[0.010]	[0.010]	[0.019]
year 2014	−0.034***	−0.016	−0.005	−0.048***	−0.015**	−0.018
	[0.013	[0.012	[0.026	[0.008]	[0.008]	[0.018]
Family firm	−0.080***	−0.012	−0.019	−0.082***	−0.025*	−0.030
	[0.020]	[0.027]	[0.032]	[0.012]	[0.013]	[0.020]
Manag. characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Workforce compositionFirm characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Nuts 2 regions FE	*Yes*	–	–	*Yes*	–	–
Industry FE	*Yes*	–	–	*Yes*	–	–
Constant	9.814***	9.834***	9.836***	10.085***	10.127***	10.133***
	[0.103]	[0.235]	[0.232]	[0.068]	[0.176]	[0.175]
Obs	5748	5748	5748	5748	5748	5748
R^2	0.340	0.106	0.11	0.427	0.182	0.183

Note: Managerial characteristics include level of education, age and gender of managers/entrepreneurs who run a firm and the occurrence of an external management; workforce composition includes share of workers by education, age, professional status, gender and contractual arrangements; firms' characteristics indicate product and process innovations, multinational enterprises, export and membership to an employers' association. For more detail on definition and statistics of all covariates we use in the regressions, see Table 1 and Table A.1 in the online Appendix. In OLS regressions, we control for two-digit sectors of activity and Nuts 2 regions fixed effects. Firm-level clustered standard errors in parentheses.

*Statistical significance at 10%.

**at 5%.

***at 1%.

Source: Longitudinal sample RIL-Orbis, reference years 2010–2014–2018.

estimated coefficient for the variable tax_prp × fam_firm × 2014 is not significantly different from zero.

The results obtained for wages in the matched sample are shown in columns 4–6 of Table 7. The positive effect, revealed by the estimates in column 4, is not confirmed by the *diff-in-diff* estimates obtained by implementing PSM (see Table 7, columns 5 and 6). This means that we must be

TABLE 6 Effects of PRP tax break on productivity and wages (southern regions)

	Labour productivity			Average wages		
	[1]	[2]	[3]	[4]	[5]	[6]
	Pooled OLS	Diff FE	3 Diff FE	Pooled OLS	Diff FE	3 Diff FE
Tax prp	0.216***			0.069		
	[0.078]			[0.065]		
tax prp × 2018		0.328**	0.537*		0.067	0.112
		[0.148]	[0.293]		[0.073]	[0.122]
tax prp × 2014		0.249	0.502		0.090	0.178*
		[0.186]	[0.413]		[0.069]	[0.097]
tax prp × fam firm × 2018			−0.286			−0.035
			[0.325]			[0.170]
tax prp × fam firm × 2014			−0.357			−0.119
			[0.435]			[0.122]
year 2018	−0.063	0.031	−0.075	−0.008	0.070	0.042
	[0.040]	[0.049]	[0.101]	[0.040]	[0.045]	[0.061]
year 2014	−0.044	−0.004	−0.090	−0.038	0.004	−0.017
	[0.037	[0.039	[0.127]	[0.034]	[0.034]	[0.062]
Family firm	−0.293***	−0.079	−0.111	−0.221***	−0.004	0.004
	[0.090]	[0.093	[0.122]	[0.064]	[0.066]	[0.081]
Manag. characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Workforce compositionFirm characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Nuts 2 regions FE	*Yes*	–	–	*Yes*	–	–
Industry FE	*Yes*	–	–	*Yes*	–	–
Constant	9.540***	9.716***	9.777***	9.862***	9.669***	9.671***
	[0.217]	[0.390]	[0.406]	[0.178]	[0.381]	[0.385]
Obs	1125	1125	1125	1125	1125	1125
R^2	0.332	0.183	0.184	0.320	0.183	0.181

Note: Managerial characteristics include level of education, age and gender of managers/entrepreneurs who run a firm and the occurrence of an external management; workforce composition includes share of workers by education, age, professional status, gender and contractual arrangements; firms' characteristics indicate product and process innovations, multinational enterprises, export and membership to an employers' association. For more detail on definition and statistics of all covariates we use in the regressions, see Table 1 and Table A.1 in the online Appendix. In OLS regressions, we control for two-digit sectors of activity and Nuts 2 regions fixed effects. Firm-level clustered standard errors in parentheses.

*Statistical significance at 10%.

**at 5%.

***at 1%.

Source: Longitudinal sample RIL-Orbis, reference years 2010–2014–2018.

cautious in interpreting the effects on wages, even in the case of family firms, as we hypothesized in H2. The theoretical explanation for these results is that variable wages might substitute for part of the base wage, so that in this case, this policy has no significant effects in terms of higher compensations. A second explanation addresses the role of other measures included in Law 208/2015 and concerns tax incentives for supplementary welfare services. As stated above

TABLE 7 Diff and diff with propensity score matching estimates (whole sample)

	Labour productivity			ln wage per employee		
	[1]	[2]	[3]	[4]	[5]	[6]
tax prp	0.138***	0.033	0.137**	0.088***	0.061***	0.064*
	[0.045]	[0.038]	[0.057]	[0.026]	[0.022]	[0.033]
tax prp × 2018		0.104**	−0.030		0.026	0.002
		[0.052]	[0.081]		[0.030]	[0.042]
tax prp × 2014		−0.003	−0.055		0.021	0.041
		[0.057]	[0.096		[0.029]	[0.042]
tax prp × fam firm × 2018			0.272**			0.058
			[0.111]			[0.066]
tax prp × fam firm × 2014			0.091			−0.047
			[0.126]			[0.063]
year 2018	−0.071	−0.053	0.028	−0.071***	−0.037	−0.052
	[0.046]	[0.048]	[0.072]	[0.027]	[0.029]	[0.036]
year 2014	−0.023	−0.022	−0.023	−0.029*	−0.040	−0.090***
	[0.035]	[0.042]	[0.062]	[0.016]	[0.025]	[0.033]
Family firm	−0.025	−0.023	0.068	−0.041**	−0.042**	−0.084**
	[0.034]	[0.034]	[0.062]	[0.018]	[0.018]	[0.035]
Manag. characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Workforce compositionFirm characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Nuts 2 regions FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Constant	9.811***	9.785***	9.793***	9.950***	9.911***	9.947***
	[0.292]	[0.296]	[0.296]	[0.230]	[0.229]	[0.228]
*N*of Obs	1494	1494	1494	1494	1494	1494
R^2	0.394	0.394	0.396	0.542	0.548	0.550

Note: Other controls include managerial characteristics, such as level of education, age and gender of managers/entrepreneurs who run a firm and occurrence of an external management; workforce composition by education, age, professional status, gender, contractual arrangements and citizenship; firms' characteristics as product innovation, process innovation, international trade, foreign trade agreement and membership to an employers' association. *Diff and diff* regressions use a weight (frequency) for the observations in the control group identified by the propensity score. Only control firms with non-missing weight have been used. This explains the lower number of observations in the whole sample. Since the logit estimations for PSM have been performed on the pooled sample and frequency weights are time invariant, all regressions rely on pooled OLS estimator. Firm-level clustered standard errors in parentheses.

*Statistical significance at 10%.

**at 5%.

***at 1%.

Source: Longitudinal sample RIL-Orbis.

(see Subsection 2.2), in recent years, companies have started to extend the range of services they offer, such as childcare centres or worker assistance for domestic and administrative/legal tasks (Ciarini & Lucciarini, 2017). The 2015 law under study and the 2016 Stability Law also introduced tax incentives for both social partners (firms and workers) to these welfare measures (Resce & Paliotta, 2019). Then, it is likely that this form of remuneration has substituted for part of the

company cash compensation, thus explaining the weak effect of the tax incentives on PRP on average wages.

5 | CONCLUSIONS

This study has evaluated the role of a legislative reform introduced in the Italian economy with the main aim of providing tax incentives for the implementation of pay for performance schemes.

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 is likely because tax concessions for the promotion of PRP may induce more motivation and effort, a higher degree of loyalty and likely the selection of high-quality workers. These positive effects on labour productivity show a significant level of robustness.

A second important result is that family businesses seem to benefit more by applying for the tax bonus on PRP than family businesses that do not apply. We suggest that family firms, which are often smaller in size and less structured than non-family firms, are also less prone to implement PRP schemes requiring expensive monitoring processes. Most likely, the tax relief offered by the reform provides them with the right incentives. Furthermore, the higher degree of trust and social ties observed within family enterprises reduce the side effects of contingent incentives and mitigate dysfunctional behavioural responses to incentive contracts.

The effects of Law 208/2015 on workers' remuneration are less clear cut. Our results signal that variable bonuses have probably replaced part of fixed base wages. As noted in the related literature when companies take the opportunity to transform part of the fixed remuneration into variable remuneration, the overall effects of fiscal relief on wages, such as those analysed in our study, might be weak. An additional explanation is tied to the peculiar characteristics of Law 208/2015 and the 2016 Stability Law that, in addition to fiscal incentives on PRP, introduced tax breaks for welfare services offered to employees. Hence, it is plausible that welfare provisions have likely substituted for part of cash compensation, with limited impacts on overall levels of wages.

The scenario depicted thus far, emerging for the whole economy, turns out to be much more heterogeneous when estimates are differentiated by region. Specifically, the results found for the whole Italian economy have been confirmed only for the central/northern regions. As hypothesized for geographic heterogeneity, it is likely that the specific and more advanced socioeconomic context that frames the northern industrial districts also fosters the circulation of information for applying 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 play a limited role.

If this initial evidence is confirmed by additional investigations, a revision of the policy measures would be necessary to address the stagnant productivity and wage growth in Southern Italy. In this paper, we have shown that political measures to promote more efficient and inclusive managerial practices may be efficacious and reverse the disappointing trends of some firms (such as family-owned firms) that normally perform worse than their non-family 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.

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

political strategy could represent a potential pathway going forward capable of accompanying and complementing more comprehensive managerial practices and not limited to offering pecuniary incentives.

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DATA AVAILABILITY STATEMENT

Restrictions imposed by the National Institute for Public Policy Innovation (INAPP) apply to the availability of these data, which were used under license for this study.

ORCID

Fabrizio Pompei https://orcid.org/0000-0002-3867-8904

ENDNOTES

[1] Specifically, we take into account potential self-selection-based endogeneity. For example, it is possible that tax breaks boost productivity because the propensity to comply with this provision is higher among non-family and large- or medium-sized enterprises. To mitigate these problems, we underpin the simple difference-in-differences model with triple difference-in-differences, test for common trends and use a hybrid method combining difference-in-differences with propensity score matching.

[2] The RIL Survey sample is stratified by size, industry, geographical area and the legal form of firms. Inclusion depends on firm size measured by the total number of employees. This choice required the construction of a 'direct estimator' to consider the different probabilities of inclusion of firms belonging to specific strata. By using this estimator, the RIL sample reproduces all active firms for each stratum and, simultaneously, the total number of employees in a given stratum (size, sector, geographic area and the legal form). For more details on the RIL questionnaire, sample design and methodological issues, see: https://inapp.org/sites/default/files/RIL%202015%20Nota%20Metodologica.pdf

[3] 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 non-wage costs and social contributions paid by the employers after the introduction of Law 208/2015. By contrast, no effects on labour costs may signal that part of personal income taxes and social contributions payable by employees are converted in net wage component in their favour. If this was the case, the total amount of labour costs does not change.

[4] There are substantial advantages in using a large set of covariates as we do in our analysis. Enlarging the number of controls for firm-level characteristics allows us to attenuate the omitted variable bias and the problem of confounding factors (Wooldridge, 2010; Angrist and Pischke, 2009). We are aware that this could be in some cases a sensitive issue, for example when a high number of covariates might increase the possibility of including bad controls. However, we think that this is not our case as many variables we use are measured before the treatment variable was determined.

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