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Evaluating hiring incentives: Evidence from Italian firms

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CONTENTS: 1. Introduction. – 2. A literature review. – 3. Institutional framework. – 4. Data and identification strategy; 4.1 Data; 4.2 Descriptive statistics; 4.3 Econometric strategy. – 5. Results; 5.1 Robustness checks: industry vs services sector; 5.2 A further step toward causality. – 6. Conclusions. – References

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ABSTRACT

Evaluating hiring incentives: Evidence from Italian firms

Active Labor Market Policies participation has been intense in recent decades, especially during the recovery from the financial crisis. The economic literature generally concentrates on subsequent labor market performance of unemployed people that have participated to training programs or have spent a period in a subsidised job. The effects of a programme on firms' behaviour have rarely been evaluated. Based on this argument, this paper analyses the effect of hiring incentives on firms' employment. At this aim, we use micro-data drawn from *Rilevazione su Imprese Lavoro* (RIL), a survey conducted by Inapp in 2010, 2015 and 2018 on a representative sample of limited liability and partnership firms. Applying a policy evaluation framework, we demonstrate that the use of incentives causes a significant increase of the share of newly hired workers in the short-run. Moreover, we show that the overall positive effect of hiring incentives are driven by industrial sector rather than services one. Finally, these results are robust to econometric methods that controls for both firms' unobserved heterogeneity and endogeneity issues.

PAROLE CHIAVE: firms, hiring incentives, policies evaluation

JEL CODES: C52, J08, J23

1. Introduction

In the recovery period after the financial crisis there was a renewed interest in policies aiming to help alleviate a wide range of labor market problems, including youth unemployment namely in Active Labor Market Policies (ALMPs) (Martin 2015; Card *et al.* 2018). Indeed, for many European countries, ALMPs constitute a central part of their *Employment Strategy* according to which the employment is one key objective of a joint policy of European Union (Kluve 2010). Since ALMPs are important in giving access to training or to skills necessary to enter, or re-enter, the labor market, they are generally seen as useful instruments to fight cyclical and structural unemployment and to promote employment.

ALMPs can be grouped into four clusters: i) counselling and job-search assistance, ii) subsidies or private sector incentives to employers, iii) training, and iv) direct employment/job-creation public schemes. The main target group of active labor market policies are long-term unemployed and, in particular, low-skilled individuals, older workers, and young people (European Commission 2017).

This paper focuses on hiring incentives for private employers that aim at reducing part of the wage costs and thus encouraging employers to hire new workers. Hiring incentives, also known in literature as hiring subsidies, are demand-side market measures that include making available to employers wage subsidies or targeted reductions in social security contributions for employers. Hiring incentives can also be measures that point at favouring the conversion of temporary contracts into open-ended ones (see, e.g., Bovini and Viviano 2018; Sestito and Viviano 2018). The goal of this kind of active policy is to reintegrate long-term unemployed into the labour market, to stimulate the labor demand in particular areas and sectors characterized by high unemployment, or to support people at risk of labour-market exclusion such as women, older workers or the young. In light of the fact that hiring incentives are particularly significant for the young, a Council Recommendation on establishing a Youth Guarantee (COM(2012) 0729 final 2012/0351) suggests the use of "targeted and well-designed wage and recruitment subsidies to encourage employers to create new opportunities for young people, such as an apprenticeship, traineeship or job placement, particularly for those furthest from the labour market".

The design of these programs is critical for subsidies to create jobs in a cost-effective manner. They are indeed often associated with deadweight losses and they can have unintended effects such as subsidized workers replacing unsubsidized ones ("substitution" effect) or employers hiring subsidized workers and laying them off once the subsidy period ends (Betcherman *et al.* 2004). Moreover, the economic theory indicates that two programs (wage subsidies and targeted reduction of social security contributions) should have similar effects on employment, but in practice important differences can arise. Another important concern about these programs is that if they are not well administered, they might benefit groups they are not meant to benefit (Meyer 1995).

The growing interest in active labor market policies has gone hand in hand with the increasing interest on the evaluation of ALMPs leading to large number of micro-econometric program evaluations. Indeed, the statistical evaluation studies can be informative for the design of future policy, as they can tell whether a previous intervention has been successful in improving the labor market outcomes of its participants. Proven effective programs can then be implemented elsewhere and scaled up. Moreover, they can provide the base to carry out important welfare analyses.

The standard empirical evaluations of labour market policy consider the direct effects ("treatment effects") of single programmes on outcome variables like unemployment duration, re-employment rate or earnings after unemployment, related to individuals participating in the interventions (Fay 1996; Heckman 2000; Caroleo and Pastore 2001; Caliendo and Kunn 2015; Brunetti and Corsini 2017). They try to answer the key counterfactual question: "What would have happened to a programme participant if he or she had not participated in the programme?" The methods generally used in evaluating ALMPs are very sophisticated, ranging from experimental studies using random assignment to a variety of non-experimental methods using e.g. difference in difference analysis or propensity score matching to construct adequate control groups. Like in any evaluation the fundamental problem is to find a suitable control group to determine the actual (net) effect of the measure (Eichhorst and Konle-Seidl 2016). Despite the rich literature on ALMPs' evaluation, there is still limited evidence on how active labor policies influence firm's behaviours and outcomes (Lechner *et al*. 2013; Lombardi *et al*. 2018; Gautier *et al*. 2018; Bovini and Viviano 2018).

Based on these arguments, in this paper we try to fill this gap evaluating whether hiring incentives introduced in 2017 – and in particular those programmes aimed at reducing social security contributions for employers – affect firms' hiring strategies. At this aim, we use micro-data at firm level deriving from the *Rilevazione su Imprese Lavoro* (RIL) survey conducted by the National Institute for the Public Policy Analysis (Inapp) in 2010, 2015 and 2018 on a representative sample of Italian firms operating in extra-agricultural private sector.

In this context, we estimate the relationship between use of incentives and the subsequent change in the share of newly hired workers at firm level. As for the econometric strategy, we begin with Pooled OLS and Fixed Effect (FE) regressions in order to control for a rich set of observable productive characteristics as well as the role of time-invariant unobserved heterogeneity. Then a policy evaluation framework is adopted by implementing a *Difference-in-Difference* approach. Further, we perform a counterfactual analysis by exploiting a unique information contained in the RIL questionnaire 2018 that allow us to verify whether firms adopting the hiring incentives would have behaved in absence of them. In this empirical setting, we find that the introduction of hiring incentives in 2017 have exerted - in the short run - a positive impact on the share of newly hired workers over total employment at firm level, and that this is true especially for those firms operating in the industrial sector. Note that these results also hold when we consider a counterfactual scenario that, in theory, allow us to netting out self-selection and reverse causality issues.

As a consequence, our analysis contributes to the literature in two main aspects. First, it provides an updated evaluation of the effectiveness of hiring incentives in Italy by focusing on firms' hiring decisions rather than inferring their impact indirectly by focusing on the evolution of employment. Second, it identifies the casual impact of the policy intervention by using a rich set of econometric methods as well as counterfactual analysis that are supposed to control for sample selection in the policy intervention and then for reverse causality issues.

The paper is structured as follow. Section 2 reviews the main literature on ALMPs, Section 3 provides the institutional background. Section 4 introduces the data and outlines the empirical strategy while Section 5 presents the results. Finally, Section 6 concludes.

2. A literature review

ALMPs have been traditionally considered as opportunities for unemployed people who search for work and as means to increase the efficiency of the matching process between labor demand and supply of skills (Cahuc *et al.* 2014; Crépon and van de Berg 2016). However, ALMPs are inherently complex interventions and their incidence depends on a broad range of variables associated with design, context and implementation (Escudero *et al.* 2017).

Since the early 90s, despite the difficulties, a significant share of European States have adopted ALMPs and have assessed their effects (see Heckman *et al.* 1999; Martin and Grubb 2001; Kluve and Schmidt 2002). Card *et al.* (2010) and Kluve (2010) suggest that some methods are strictly more efficient than others: subsidized public sector employment programs usually have the least favourable effect and job search assistance programs are quite favourable in the short run while training may have some positive effect in the medium and long run. ILO (2016) also highlights that counselling and job-search assistance measures result to have positive effects, whereas employment public schemes seem to be ineffective. Crépon *et al.* (2013) find that a job placement assistance program in France seems to have very little net benefits on the probability to find a stable job. Andersson *et al.* (2016) evaluate a training program in the U.S considering various measures of firm's quality as outcomes. Their results suggest that the effects of new workers, formerly unemployed, on firm's performance are not so significant. Card *et al.* (2018) find suggestive evidence that human capital programmes like long-term job training measures or private employment subsidies are particularly effective during a recession period.

Examining private sector incentives, a wide range of differently targeted and designed wage and hiring subsidies exists which can increase job matching by incentivizing job search and raise labor demand by reducing employer's labor costs (see Calmfors 1994). Betcherman *et al.* (2004) point out that most evaluations of subsidies do not show positive impacts on post program employment or earnings. An evaluation study conducted in Denmark suggests that the effects of hiring incentives largely depend on whether they are applied to private or public jobs, albeit, both are associated with locking-in effects (European Employment Policy Observatory Review 2014). In Germany, several evaluations have demonstrated a positive employment effect although having little impact of firm's hiring decisions (European Employment Policy Observatory Review 2014). Kangasharju (2007) uses Finnish linked employer-employee data, and finds that employment subsidies in Finland increased the firms' payroll by more than the size of the subsidy. Sianesi (2008), measuring the effectiveness of six different programs for the Swedish labor market, demonstrates that the incentives for private sector firms have generally positive effects on employment of disadvantaged people. Evidence of the success of the employment incentives has been found also in other countries, such as Australia, the United Kingdom and U.S. For example, a study conducted for the United States shows that this type of active policy is twice as effective, in improving the employability of individuals, compared to the programs provided by the employment centers that aim to encourage the matching between job demand and job offer (Neumark 2013). Lombardi *et al.* (2018), looking at the some measures of firm's performance, show that firms recruiting through incentives outperform other firms.

Focusing on Italy, Cipollone and Guelfi (2003) and Cipollone *et al.* (2004) provide evidence that the tax credit incentive on new hirings on an open-ended contract basis does not produce a significant increase in the overall likelihood of employment. Battiloro and Mo Costabella (2011) study the effect

of an ESF-financed incentive for the conversion of temporary contracts into permanent contracts in the province of Turin in 2007. Their results show that the incentives have marginal effects on hiring intentions, reaching only firms that had already planned to stabilize a worker. Ciani and De Blasio (2015), considering a very short-term policy intervention introduced in 2013 and aimed at the conversion of fixed-term contracts into permanent jobs, find that only very few firms took advantage of the incentives. Finally, Sestito and Viviano (2018), using a *Difference-in-Difference* approach, analyse the reaction of firms to two policies introduced in the first part of 2015 by the Italian government, aimed at both reducing labour market dualism and favouring job creation. The results suggest that both measures are effective in both shifting employment towards permanent contract and raising overall employment levels.

Overall, the evidence on hiring and employment incentives is rather mixed (Card *et al.* 2010; Kluve 2010; Dar and Tzannatos 1999) but the literature suggests that they can be effective if they are carefully targeted. In this regard, wage subsidies entail huge indirect effects, especially deadweight losses, substitution and displacement. Sometimes benefits have been enjoyed by firms that would have hired workers even in the absence of subsidies (Van der Linden 1997). Thus, a weak targeting to all long-term unemployed can even be counter-effective as some unemployed might not receive a job offer before they become long-term unemployed (OECD 2015). OECD (2019) discusses that Italy allocates a lot of its financial resources to employment and hiring incentives and it covers many different interventions under these measures concerning women, older jobseekers, younger jobseekers, young parents, benefit recipients, long-term unemployed, disabled people, etc. Thus, the incentives covering the majority of jobseekers and not targeting only the most vulnerable groups, serve the purpose of helping employers to create jobs. As in Italy the targeting of these measures is quite broad, substantial deadweight losses, or substitution and displacement effects are likely to occur and the effectiveness of these measures is probably low and the likelihood to benefit from these measures may be low for the most vulnerable persons (OECD 2019).

3. Institutional framework

As many other European countries, Italy has sought to reduce high unemployment rates by providing firms with incentives consisting of contributory, regulatory and/or economic benefits recognized in relation to the hiring of specific categories of individuals.

In this paragraph we provide a summary description of the main hiring incentives established by the Italian legislation for 2017, although some of these subsidies have been introduced in previous years. In general, the Italian legislation provides very wide eligibility, basically stipulating that all firms are eligible with the only exception for one type of subsidy which is dedicated to firms located in the regions of the South of Italy and in the Islands. Hiring incentives are delivered on the basis of job-specific applications submitted by firms to the National Social Security Institution (INPS). In particular, we hereby describe the following incentive schemes: *Garanzia Giovani, Occupazione Sud, Esonero Sistema Duale.*

An answer to the critical situation of youth unemployment has been given by the European Union in 2013 through a programme, called Youth Guarantee (Y.G.), which aims to help the entry into the labour market of a specific target of young people defined as NEET (Not in Employment Education or

Training)[1]. Most European countries defined NEET as young people aged between 15 and 24 years but, in Italy the age range has been extended to those aged 29 because of the serious unemployment situation faced by the country since the outbreak of the economic crisis. The levels of unemployed youth and NEET rates are, indeed, the highest in the EU (Quintano *et al.* 2018). The Youth Guarantee scheme in Italy consists of different measures (e.g. apprenticeships or extracurricular internships) that aim at ensuring young people a qualitatively valid opportunity for work. They refer both to young people who have left studies prematurely trying to put them back into education, and to the "less young", who are in unemployment, offering them a qualitatively good job.

The *Decreto Direttoriale* n. 394/2016 supplied new funds for the Youth Guarantee program. It provides an incentive for those private employers who hire young people registered to Y.G. program. The incentive is paid as a contribution break and it is due for all hires made from 1 January 2017 to 31 December 2017 with: permanent contract; apprenticeship contract (also seasonal if provided by the collective agreement) with a duration of 12 months or more; fixed-term contract whose initial duration is equal to or greater than six months. The benefit is equal to the employer's social security contribution within the maximum limit of € 8.060 (€ 4.030 if the worker is hired under a fixed-term contract), to be used over 12 months starting from the hiring date.

To encourage employment in the "less developed" (Basilicata, Campania, Apulia, Sicily, Calabria) or "in transition" (Abruzzo, Molise and Sardinia) regions, with the Directorial Decree n. 367/16, the Ministry of Labor and Social Policies disciplined a new incentive, called *Occupazione Sud*, recognized to all private employers who hire new employees. In detail, the incentive is due for all new hirings of unemployed young people aged between 16 and 24, or unemployed workers with at least 25 years, without regularly paid employment by at least 6 months, happened between 1 January 2017 and 31 December 2017. The incentive is paid regardless of the region of residence of the worker. Unemployment status represents the only subjective requirement to access the measure. As in the case of the Youth Guarantee program, this measure consists of a contribution relief, which employers can take advantage of, for a maximum amount of € 8,060 per year for each worker hired, which is proportionally reduced for part-time contracts. The hirings can be on permanent contracts; apprenticeship contracts (also seasonal if provided by the CCNL) with a duration of 12 months or more; in case of a part-time employment arrangement and of a transformation from temporary to permanent contract.

A third incentive was introduced by the 2017 Budget Law (*Legge di Bilancio*). The measure, called *Esonero Sistema Duale*, provides the total contribution break for a maximum of 36 months for private firms that hire, within 6 months from the acquisition of the qualifications, under-30 students who have carried out alternation-school-work activities at the same employer, or apprenticeship periods for professional qualification and diploma, upper secondary education diploma and certificate of higher technical specialization or periods of apprenticeship in higher education.

As *Occupazione Sud* and Youth Guarantee bonus, this incentive is due for hirings happened between 1 January 2017 and 31 December 2017 with a permanent contract, apprenticeship and part- time

[1] The Youth Guarantee was formally adopted by the EU's Council of Ministers on 22 April 2013 and it was consequently endorsed by the European Council on June 2013 (2013/C 120/01; EUCO 104/12/13).

employment arrangements. This kind of incentive cannot be combined with other tax-related benefits, but can instead be combined with economic incentives. Finally, in 2017 other incentives, provided by previous laws, continue to be valid, including the incentive for those who hire young people aged between 15 and 29 with an apprenticeship contract (Youth and Apprenticeship), concessions for hiring women, and workers over 50, workers in disadvantaged categories or with ascertained disability status as well as recipients of NASpI and *Cassa Integrazione* (Cig).
It is important to highlight that, with the exception of the *Occupazione Sud* bonus, all the other incentives are aimed at firms located throughout the Italian territory subject to compliance with certain requirements. Contribution incentives cannot be combined with each other. Only in the case of hiring a young member enrolled in the Youth Guarantee program, and hired with an apprenticeship contract, the employer, after the first year, will be able to take advantage of the contribution already provided for this type of contract.

4. Data and identification strategy

4.1 Data

The empirical analysis is based on data drawn from the last three waves of the *Rilevazione Imprese e Lavoro* (RIL) survey conducted by Inapp for 2010, 2015 and 2018 on a representative sample of partnerships and limited liability firms. Each wave of the survey interviews over 30.000 firms operating in the non-agricultural private sector. A subsample of the included firms (over 35%) are followed over time, making the RIL dataset partially panel over the period under study[2].
The RIL data collects a rich set of information about the workforce, including its composition in terms of gender, age, education and contractual type, the amount of training investments, the asset of the industrial relations and other workplace characteristics. In particular, we have information about ownership structure, the individual management profiles which proxy for managerial practices, and the workforce characteristics. Moreover, the survey provides unique data on the total amount of training expenses and the source of its financing that may be related to other dimensions of personnel policies (such as the amount of hirings and separations, the use of flexible contractual arrangements).
The RIL questionnaire of 2018 provides data about the use or not-use of incentives to hire and each sampled firm in the RIL surveys was asked whether it adopted an incentive for the new hirings that it declared to have done as follow:
In 2017 did you hire new personnel using public incentives?[3]

1. Yes
2. No.

[2] The RIL Survey sample is stratified by size, sector, geographical area and the legal form of firms. For more details on RIL questionnaire, sample design and methodological issues see: http://www.inapp.org/it/ril.
[3] The question in Italian language is the following:

Nel corso del (2017) sono state effettuate assunzioni usufruendo di incentivi pubblici per l'occupazione?
1. Sì
2. No.

Further an additional question was inserted into the RIL 2018 questionnaire in order to identify a counterfactual situation. More precisely, the counterfactual question permits to verify how the firms that used incentives to hire employees would have behaved in their absence. In the following sections we will exploit such an information in order to perform a robust analysis on causality.
The dependent (outcome) variable of our study is the share of newly hired workers over the total employment. As for control variables, we add information about i) management and the corporate governance of companies (manager education, information on family or non-family ownership and management of the firm), ii) workforce characteristics (occupation, gender, age, education and training) and iii) other firm characteristics (size, product and process innovation, exports).
As for sample selection, we consider firms with more than 9 employees in such a way to examine only those productive units with structured internal labor market. After imposing this selection criterion and deleting observations with missing values for variables used in the analysis and firms that in 2015 have used hiring incentives, our final sample is given by a balanced panel of approximately 2,500 firms.

4.2 Descriptive statistics

Table 1 reports the descriptive statistics for the whole RIL sample over the 2010-2018 period regarding the outcome variable. In particular, table 1 contains the average and the standard deviation of the share of new hires before and after 2015 for two distinct groups: the former composed by firms that have hired using an incentive (treated group), and the latter made up of firms that have hired but with no incentives, firms that have no hired, and firms declaring that the existence of incentives did not changed their hiring programs (control group). The last row of this table shows that about 300 firms belong to the treated group. We observe a difference regarding the number of observations between the years due to missing values in the variable of interest.
No clear trend is observable before 2017 in the treated nor in the control group, but in 2017 the treated group experiences a sharp increase in new hirings, while the control group does not. This result suggests that the incentive programmes could have a positive effect on firm's hiring decisions.

Table 1. Descriptive statistics for the outcome variable. Whole sample

	Pre-Treated		Pre-Control		Post-Treated	Post-Control
	2010	**2015**	**2010**	**2015**	**2018**	**2018**
Mean	0.106	0.108	0.112	0.086	0.182	0.114
Std. Dev.	0.177	0.160	0.192	0.174	0.136	0.193
N of obs	297	302	1,699	1,645	309	1,625

Note: Sampling weights applied.
Source: Author's elaboration on the longitudinal component of RIL 2010-2015-2018 data

Table 2 reports the same descriptive statistics for the outcome variable but distinguishing between two types of private sector: industry and services. This choice is related to evidences, discussed by several studies, that identify structural sector differences in firms' hiring strategy and, moreover, in the effectiveness of incentives in generating employment opportunities (European Employment Policy

Observatory Review 2014). Table 2 makes evident that in both sectors the group of treated firms in 2017 has a higher share of newly hired whereas the control group seems to not show significant changes over time. In particular we observe that the mean share of new hires in the service sector is higher than in the industry sector confirming the facts that in Italy, during the last decade, the increase in hiring was much more pronounced in the service sector than in the industry one (Istat 2018).

Table 2. Descriptive statistics for the outcome variable by sector of activity

	Pre-Treated		Pre-Control		Post-Treated	Post-Control
	2010	**2015**	**2010**	**2015**	**2018**	**2018**
Industry						
Mean	0.080	0.096	0.085	0.073	0.172	0.085
Std. Dev.	0.149	0.131	0.146	0.147	0.132	0.137
N of obs.	194	196	1,063	1,005	201	989
Service						
Mean	0.139	0.126	0.147	0.102	0.197	0.141
Std. Dev.	0.202	0.196	0.235	0.199	0.142	0.232
N of obs.	103	106	636	640	108	636

Note: Sampling weights applied.
Source: Author's elaboration on the longitudinal component of RIL 2010-2015-2018 data

Table 3 displays the average value of the control variables in 2010, 2015 and 2018. Table 3 clearly indicates that before 2017 treated firms have, on average, a more educated and younger management than firms in the control group. Moreover, also the share of female managers is higher in firms that have used hiring incentives (about 14.5 per cent vs 11 per cent). After the treatment, the differences between treated and non-treated firms are more pronounced. The former have not only more qualified management, but they also adopt active strategies in terms of orientation to foreign markets, product and process innovation.

During 2010-2015 period, the proportion of treated firms owned or controlled by families was lower than that observed for non-treated group (84 per cent vs 86 per cent), as well as the share of firms with outside managers (instead of dynastic managers). Differently, concerning workforce characteristics, before the treatment, firms implementing an incentive to hire shows lower educated workers, lower proportion of blue collars but higher proportion of female workers. After the treatment, the share of blue collars in treated firms becomes higher than in control ones. All these differences in characteristics between treated and non-treated firms appears significant[4]. These evidences could determine some issues about the randomization with which firms adopted hiring incentives and require for econometric methods testing the robustness of results and to reduce the potential selection bias.

[4] In an extended version of the paper we will provide all the differences and the relating p-values.

Table 3. Descriptive statistics for control variables. Whole sample

	Pre-Treat				Pre-Control				Post-Treat		Post-Controls	
	2010		2015		2010		2015		2018		2018	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Management												
Tertiary Ed	0.278	0.449	0.225	0.418	0.254	0.436	0.263	0.440	0.276	0.448	0.267	0.443
Upper Second Ed	0.493	0.501	0.518	0.501	0.532	0.499	0.534	0.499	0.552	0.498	0.523	0.500
Lower Second Ed	0.229	0.421	0.257	0.438	0.214	0.410	0.203	0.402	0.172	0.378	0.210	0.407
Female	0.165	0.372	0.133	0.340	0.121	0.326	0.102	0.303	0.158	0.365	0.131	0.338
Age>49	0.305	0.461	0.307	0.462	0.316	0.465	0.359	0.480	0.295	0.457	0.304	0.460
34<Age<50	0.282	0.451	0.368	0.483	0.274	0.446	0.229	0.420	0.261	0.440	0.159	0.366
Age<34	0.078	0.269	0.015	0.122	0.062	0.242	0.038	0.191	0.021	0.144	0.033	0.180
External Man	0.021	0.144	0.027	0.163	0.037	0.190	0.039	0.194	0.031	0.173	0.038	0.192
Family Firm	0.837	0.370	0.859	0.349	0.873	0.333	0.858	0.349	0.859	0.348	0.869	0.338
Workforce Composition												
Tertiary	0.086	0.141	0.101	0.168	0.069	0.134	0.101	0.183	0.121	0.192	0.142	0.216
Upper Second Ed	0.456	0.268	0.464	0.265	0.428	0.281	0.458	0.283	0.477	0.276	0.475	0.287
Female	0.337	0.275	0.328	0.267	0.322	0.262	0.340	0.259	0.332	0.266	0.353	0.252
Age>49	0.164	0.132	0.219	0.163	0.185	0.156	0.249	0.198	0.290	0.174	0.296	0.212
34<Age<50	0.488	0.178	0.496	0.188	0.492	0.200	0.480	0.206	0.429	0.184	0.444	0.206
Executives	0.036	0.072	0.033	0.064	0.035	0.073	0.040	0.104	0.040	0.069	0.041	0.093
White Collars	0.373	0.299	0.378	0.283	0.332	0.281	0.371	0.302	0.346	0.269	0.375	0.302
Blue Collars	0.591	0.315	0.589	0.304	0.633	0.303	0.589	0.318	0.614	0.289	0.584	0.322
Firms												
Ln(Sales per emp)	11.75	1.261	11.91	0.948	11.67	1.109	11.74	1.448	12.01	1.510	11.81	1.275
Ln (N of emp)	3.395	0.941	3.264	0.916	3.006	0.739	2.924	0.728	3.235	0.928	2.937	0.705
Foreign Markets	0.392	0.489	0.487	0.501	0.328	0.470	0.358	0.479	0.489	0.501	0.355	0.479
Foreign Agreements	0.203	0.403	0.217	0.413	0.134	0.341	0.114	0.318	0.168	0.375	0.192	0.394
Employers' Ass	0.673	0.470	0.675	0.469	0.676	0.468	0.616	0.486	0.611	0.488	0.587	0.493
Product Inn	0.591	0.492	0.473	0.500	0.445	0.497	0.394	0.489	0.468	0.500	0.344	0.475
Process Inn	0.527	0.500	0.411	0.493	0.406	0.491	0.355	0.479	0.558	0.497	0.332	0.471
Firms' Age	25.45	17.75	27.87	14.84	25.34	17.23	28.03	13.88	33.28	15.71	31.63	14.483
N of Obs.	297		302		1,699		1,645		310		1,627	

Note: Sampling weights applied.
Source: Author's elaboration on the longitudinal component of RIL 2010-2015-2018 data

4.3 Econometric strategy

The econometric analysis used to evaluate the causal effect of hiring incentives begins with estimating the following simple linear relationship:

$$(1) \qquad HShare_{i,t} = \alpha + \beta \cdot HI_{i,t} + \gamma \cdot \mathrm{M_{i,t}} + \delta \cdot \mathrm{W_{i,t}} + \lambda \cdot \mathrm{F_{i,t}} + t + \mu_i + \varepsilon_{i,t} \qquad t=[2010,2015,2018]$$

where $HShare_{i,t}$ indicates the share of newly hired over the total employment, for each *i* firm at year t, while our the key explanatory variable, $HI_{i,t,}$ is a dummy equal to 1 whether the *i* firm hired by using incentives in the sample year 2017, 0 otherwise. As for other controls, the vector $M_{i,t}$ includes managerial and corporate governance characteristics, $W_{i,t}$, represents the workforce composition while $F_{i,t}$ formalizes a rich set of firms' productive characteristics, geographical location and sectorial

specialization. All these covariates have already been discussed in table 3. Furthermore, *t* is a time indicator for each sample years, μ_s are firm fixed effects capturing time invariant unobserved heterogeneity while $\varepsilon_{i,t}$ is the idiosyncratic error term.

Equation (1) is preliminarily estimated by performing standard Pooled OLS regressions. Then we use the Fixed Effect (FE) within estimators in order to control for the role of unobserved heterogeneity, i.e. those time-invariant firm-specific characteristics that might "confound" the impact of the variable $HI_{i,t}$ on our dependent variables (Wooldridge 2010).

However, the identification of an unbiased coefficient β if the FE specification of Equation (1) relies on the key hypothesis that does not exist unobserved firm-level characteristics that are time-varying in nature and, in turn, correlated with both the adoption of HI and the dependent variable $HShare_{i,t}$. In this case one could observe a positive evolution of hiring process simply because the firms experienced period-specific changes rather than they use targeted incentives.

On the other hand, we can rely the three periods structure of the RIL panel data (2010, 2015, 2018) and the circumstance that the policy change occurred in this interval (2017) to adopt a policy evaluation framework by means of the difference-in difference (*Diff-in-Diff*) estimator. In particular we identify treatment and control groups by exploiting (i) the existence of data for the pre- and post-policy change periods and (ii) the availability of a rich set of covariates that control for observable characteristics of the firms.

We assign to our treatment group those firms declaring to have used incentives in 2017 ($HI = 1$) to hire new workers while for the non-experimental control groups we consider all the firms that did not use incentive ($HI = 0$) in 2018. Thus, the *Diff-in-Diff* version of the regression equation (1) can be formalized as follows:

$$Hshare_{i,t} = \alpha + \beta_1 \cdot HI_i + \beta_2 \cdot t + \beta_3 \cdot HI_i \cdot t + \gamma \cdot \mathrm{M_{i,t}} + \delta \cdot \mathrm{W_{i,t}} + \lambda \cdot \mathrm{F_{i,t}} + \mu_i + \varepsilon_{i,t} \quad (2)$$

t=[2010, 2015, 2018]

where the causal impact of the use of incentives in 2017 on the dependent variables (HShare) is identified by parameter β_3 of the interaction term $\mathrm{HI_i} \cdot \mathrm{t}$, while other controls in the right hand side of Equation (2) are the same as those included in Equation (1).

It is worth underlying that the crucial assumption for the *Diff-in-Diff* estimate of β_3 being unbiased is the so-called *Common Trend Assumption (CTA)*, which means that we should observe parallel trends in the outcome of treated and controls firms in absence of treatment. If CTA holds, the *Diff-in-Diff* estimator has the advantage, compared to the fixed effects estimator, of removing any common period effects that influence the treatment and control group in identical ways (see Gebel and Vossemer 2014).

The second crucial assumption underlying *Diff-in-Diff* strategy is that potential biases rely on selection on observables. That is we assume that the set of covariates in Equation (2) is rich enough to include all factors determining the self-selection of firms in using incentives. Indeed adding proxies of managerial attitudes and capabilities to standard controls for firms 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 unobserved heterogeneity (Damiani *et al.* 2019; Bloom and Van Reenen 2007; 2011).

5. Results

We start by evaluating the effect of hiring incentives on firm's hiring strategies as measured by the share of new hires. The first explanatory variable used in the analysis is the dummy variable referring to the adoption of incentives: equals to 1 if the firm claims to have used an incentive, 0 otherwise. The set of control variables X_{it} contains relevant control variables: the share of female manager, manager's age (young or middle aged), manager's education (high school or college), external management dummy, quadratic in firm's age, macro-region (Center excluded), sector (Manufacturing excluded), firm's characteristics, exporting firm, international agreements, unionized firm, and workforce socio-demographic characteristics (age, education and gender distribution) of the firm *i* at time *t*. As described above, firms are observed in three different data points: 2010, 2015 and 2018. Since firms using hiring incentives could have higher share of hirings than firms that did not used them also in the pre-treatment period, we run the basic regression on the three period sample 2010-2015-2018 also testing for the common trends assumption. We have two observations in the pre-treatment period 2010-2015, while 2018 corresponds to the post-treatment period. The same structure holds for the control group.

Table 4 reports the estimates for our baseline specification of Eq. (1). The first column shows a positive cross sectional correlations in short run between the use of a hire incentive and the share of hires suggesting that the use of incentives increases the share of new hires by about 5.3%. Since results obtained from Pooled OLS regressions may be misleading when the introduction of a set of explanatory variables is not sufficient to circumvent potential omitted variable biases due to the time-invariant unobserved characteristics, we address this issue with fixed effect estimates (FE) of Eq. (1).

Table 4. Estimates for the share of new hires in 2018 and 2010-2015-2018

	2018	2010-2015-2018		
	OLS	**OLS**	**FE**	**DiD-FE**
Hire incent (HI)	0.053***	0.054***	0.054***	
	[0.004]	[0.010]	[0.009]	
Hire incent* year 2014				0.006
				[0.011]
Hire incent* year 2017				0.058***
				[0.012]
Baseline (T-C)				
Year 2014		-0.008*	-0.016***	-0.017***
		[0.005]	[0.004]	[0.005]
Other controls	Yes	Yes	Yes	Yes
Constant	0.222***	0.120***	-0.024	-0.005
	[0.021]	[0.032]	[0.067]	[0.067]
N. of Obs.	13,025	6,055	6,055	6,055
N. of groups			2,521	2,521
R2	0.21	0.204	0.034	0.033

Note: Robust standard errors in parentheses. Management characteristics: age, education, gender, family ownership, external managers. Workforce characteristics: executive, white collar, blue collar, graduates, upper secondary, lower secondary, temporary workers, female. Firms characteristics: product innovation, process innovation, foreign ownership, second level bargaining, employers association, firms' age, log of (n of employees), and log of sales per employee. All regressions include fixed effect for NUTS 2 regions and sector of activity.
*** p<0.01, ** p<0.05, * p<0.1.
Source: Author's elaboration on RIL 2010-2015-2018 data

Accounting for firms fixed effects neither reduces the size nor change the statistically significance of the estimated coefficient: we still observe a positive and significant correlation between the incentives and the share of new hires (+5.4%). Results obtained estimating the previous models might be affected by another important issue thus making further necessary controls. Using a within estimator for only three years does not guarantee sufficient variability in the data and consistent estimations. Instead, given that the changes occurs between 2014 and 2017, a *Diff-in-Diff* specification seems to be much better suited. Moreover, as discussed in Section 4.2, we know from the descriptive statistics (see table 1) that firms adopting an incentive to hire after 2015 are different with respect to those that did not. Based on the DiD estimates, controlling for the common trend assumption (confirmed by the non-significance of the coefficient of the interaction between HI and year 2014), we can confirm that the hiring incentive programs implemented in 2017 tend to increase in the short-run the share of new employees by 5.8%. Our results are consistent with the literature both on firms and individuals outcomes (Rosholm 2008; Blasco and Pertold-Gebicka 2013; Gautier *et al.* 2018).

At this point Authors' elaborations two main drawbacks of our analysis should be mentioned. First, we cannot control for possible substitution or displacement effects. Indeed, we cannot know whether the new workers hired through the incentive programs have excluded other unsubsidised job seekers who would otherwise have been hired (Crépon *et al.* 2013; Borland 2016). Second, we have no information on the quality of the new jobs (for example about the duration of the contracts or the time, full-time vs part-time) and on the new workers (their age, sex, education or profession), we only know that they have been hired as employees.

Indeed, these limitations will be tackled in an extended version of the paper. What is worth noticing here is that table 4 provides the more updated picture of the effectiveness of hiring incentives for the Italian productive system.

5.1 Robustness checks: industry vs services sector

In this section, we present results from one robustness analysis with our baseline results for the share of new hires. The results just outlined reflect, indeed, the average of what happens in the Italian economic system, but they can hide important differences due to the heterogeneity of firms. In light of the evidences detected in the descriptive statistics (see table 2), and of the sector differences identified in the effectiveness of incentives in generating employment opportunities, we run the previous regressions industry and services sector.

Generally, the effects of the hiring subsidies have been shown to depend on whether they are applied to private- or public-sector, but we can hypothesize that relevant differences in the effectiveness of incentives can also arise between different private sectors. Tables 5 and 6 show the coefficients estimated for the industrial and services sector respectively. They suggest that, regarding the sign and the statistical significance, our results are in line with the estimates obtained for the whole sample. Looking at the magnitude of the coefficients, however, we observe that the highest advantage, measured in terms of the increase of the share of new hirings, is obtained within the industry sector: in the short-run, indeed, the share of new hirings raises of about 6.5% whereas the growth within the services sector is about 4%.

Table 5. Estimates for the share of new hires 2010-2015-2018 for Industry sector

	2018	2010-2015-2018		
	OLS	**OLS**	**FE**	**DiD-FE**
Hire incent (HI)	0.060***	0.067***	0.063***	
	[0.005]	[0.012]	[0.011]	
Hire incent* year 2014				0.003
				[0.013]
Hire incent* year 2017				0.065***
				[0.014]
Baseline (T-C)		0.006	0.011**	0.012**
		[0.005]	[0.005]	[0.006]
Year 2014		0.011*	0.002	0.002
		[0.006]	[0.007]	[0.007]
Other controls	Yes	Yes	Yes	Yes
Constant	0.189***	0.101***	0.004	0.003
	[0.025]	[0.033]	[0.087]	[0.087]
N. of Obs.	7,286	3,751	3,751	3,751
N. of groups			1,559	1,559
R2	0.107	0.116	0.032	0.032

Note: Robust standard errors in parentheses. Management characteristics: age, education, gender, family ownership, external managers. Workforce characteristics: executive, white collar, blue collar, graduates, upper secondary, lower secondary, temporary workers, female. Firms characteristics: product innovation, process innovation, foreign ownership, second level bargaining, employers association, firms' age, log of (n of employees), and log of sales per employee. All regressions include fixed effect for NUTS 2 regions and sector of activity.
*** p<0.01, ** p<0.05, * p<0.1.
Source: Author's elaboration on RIL 2010-2015-2018 data

Table 6. Estimates for the share of new hires 2010-2015-2018 for Services sector

	2018	2010-2015-2018		
	OLS	**OLS**	**FE**	**DiD-FE**
Hire_incent	0.044***	0.037**	0.036**	
	[0.007]	[0.019]	[0.017]	
Hire_incent* year 2017				0.043**
				[0.022]
Hire_incent* year 2014				0.014
				[0.020]
Year 2018		0.014	-0.014	-0.015
		[0.010]	[0.010]	[0.010]
Year 2014		-0.012	-0.025***	-0.027***
		[0.009]	[0.008]	[0.009]
Other controls	Yes	Yes	Yes	Yes
Constant	0.219***	0.173***	0.022	0.02
	[0.036]	[0.062]	[0.096]	[0.096]
N of Obs	5739	2304	2304	2304
N of groups			992	992
R2	0.251	0.253	0.032	0.032

Note: Robust standard errors in parentheses. Management characteristics: age, education, gender, family ownership, external managers. Workforce characteristics: executive, white collar, blue collar, graduates, upper secondary, lower secondary, temporary workers, female. Firms characteristics: product innovation, process innovation, foreign ownership, second level bargaining, employers association, firms' age, log of (n of employees), and log of sales per employee. All regressions include fixed effect for NUTS 2 regions and sector of activity.
*** p<0.01, ** p<0.05, * p<0.1.
Source: Author's elaboration on RIL 2010-2015-2018 data

The descriptive statistics reported that in the period under study, the share of newly hired workers has grown less in the industry than in the services sector. This evidence only apparently contradicts

the results stemming out from the heterogeneity analysis. Indeed, the new estimates suggest that the use of incentives was more effective in increasing new hirings in the industry rather than in the services sector. However, the size of the incentives or their strength was not enough to compensate a better cycle for the services sector. Given that, one may link the results displayed in Tabels 5 and 6 to the differences in the organizational capabilities and personnel polices that characterize industrial sectors with respect to the services ones (Dosi *et al.* 2019). This implication of our study will be investigated in a further version of the paper.

5.2 A further step toward causality

One of the main tasks involved in understanding the causes of firms' behaviour is to compare the observed results to those you would expect if the intervention/policy had not been implemented - this is known as the "counterfactual". However, several studies argue that it is generally impossible to develop an accurate estimate of what would have happened in the absence of an intervention suggesting different approaches to develop the counterfactual scenario (Rubin 1978; Imbens and Rubin 2015).

In our analysis, adopting an innovative question reported in RIL questionnaire for 2018, we can develop the hypothetical prediction of what would have happened in the absence of the intervention using a particular question and thus we can manage to control for bias due to unobservable characteristics inducing a firm to use hiring incentives.

In more detail, as discussed in Section 4.1, RIL survey 2018 contains a question, reported below, regarding the hiring behaviour of all the firms that have hired using the incentives in the event that the incentives had not been implemented.

In the absence of hiring incentives, your firm[5]:

1. would have hired the same amount of people
2. would have hired less people
3. would not have hired.

Thanks to this question, we can distinguish several groups of firms according to their hypothetical behaviour in the absence of the incentives. First, we know that all the firms that chose not to hire despite the availability of the incentives, would have most certainly not hired even in their absence. Second, we can identify the group of hiring firms whose behaviour was not affected by the incentives, as those firms answering (1) to the survey question. Finally, we have the group of firms whose behaviour was positively affected by the presence of incentives and would have hired less, or not hired at all, in their absence (those firms who answered (2) or (3) to the survey question). We want to compare this group of firms with the previous two in order to estimate the impact of the incentives.

[5] The question in Italian language is the following:

In assenza di questi incentivi l'impresa avrebbe:

1. effettuato comunque le assunzioni, per lo stesso ammontare
2. effettuato comunque le assunzioni, per un ammontare minore
3. non avrebbe effettuato le assunzioni.

Notice that, in this specification, we do not need to rely on sophisticated econometric techniques, as we assume that we know how firms would have behaved in the relevant counterfactual scenario. However, we need to strongly rely on the truthfulness of the firms' answers to the questionnaire. On the other hand, the diff-in-diff specification relies on the crucial common trend assumption that we can only test in a three-period setting. Thus, we prefer to present both results from a "standard" econometric analysis and from this "counterfactual" specification: if both analyses provided qualitatively and quantitatively similar estimates, this would significantly strengthen the reliability of our results.

Table 7 shows that, for all the specifications results are stable and our conclusions do not change: the adoption of incentive positively affect the amount of newly hires even if the size of the increase is slightly lower with respect to the one detected by Table 4 (first column). In particular, performing the cross section estimate, the share of new hires increase of about 4% while, according to the Pooled OLS regressions, the growth is equal to 5.6%. Controlling for sector differences, we observe that, as for the baseline results, the estimated coefficients is higher for the industry sector: hiring incentives imply a rise of the share of newly hires equals to 4.7% for 2018 and a rise of 8% for the Pooled OLS.

Table 7. Estimates for the share of new hires 2010-2015-2018 - Counterfactual analysis

	Whole sample		**Industry**		**Service**	
	2018	**2010-2015-2018**	**2018**	**2010-2015-2018**	**2018**	**2010-2015-2018**
Counterfactual	0.041***	0.056***	0.047***	0.080***	0.031***	0.017
	[0.007]	[0.017]	[0.008]	[0.021]	[0.011]	[0.027]
Year 2014		-0.015**		-0.012		-0.017
		[0.007]		[0.008]		[0.012]
Year 2017		0.020***		0.020***		0.022**
		[0.006]		[0.006]		[0.01]
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.218***	0.107***	0.191***	0.072**	0.210***	0.184***
	[0.022]	[0.035]	[0.025]	[0.036]	[0.037]	[0.066]
N of Obs	12,951	4,900	7,257	3,012	5,694	1,888
R2	0.205	0.201	0.097	0.112	0.249	0.252

Note: Robust standard errors in parentheses. Management characteristics: age, education, gender, family ownership, external managers. Workforce characteristics: executive, white collar, blue collar, graduates, upper secondary, lower secondary, temporary workers, female. Firms characteristics: product innovation, process innovation, foreign ownership, second level bargaining, employers association, firms' age, log of (n of employees), and log of sales per employee. All regressions include fixed effect for NUTS 2 regions and sector of activity.
*** p<0.01, ** p<0.05, * p<0.1.
Source: Author's elaboration on RIL 2010-2015-2018 data

6. Conclusions

In this paper we have performed an evaluation analysis of the ALMPs and, in particular, of the hiring incentives for the Italian productive system. Taking advantage of a unique source of firm-level information, we have found that the introduction of hiring incentives in 2017 caused a significant increase of the share of newly hired workers, especially for those firms operating in the industrial sector.

To the best of our knowledge, our paper provides the more updated evidence of the effectiveness of employment incentives on firms' hiring decisions in the short run. On the other hand, our analysis did not allow us to infer any result about the long run impact of hiring incentives on employment evolution and on productivity growth.

These features will be examined in our future research where a specific focus will be devoted to the complementarities of public policies for labor market and industrial organization (i.e Industry 4.0 and Youth Guarantee Programmes) and, as a consequence, on the impact of policies on the structural change of the Italian economy (Inapp 2018).

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