

Job Security, Labour Market Reforms and Demand for Skilled and Unskilled Labour*

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Abstract

Duality is an important feature of some Mediterranean labour markets. In this paper we use a differences-in-differences research design in order to evaluate the impact of a reform, introduced in Italy in 2012, which aimed to tackle duality by reducing the level of employment protection legislation (EPL) for permanent workers and by introducing more stringent criteria for the use of fixed-term contracts. We show that the reform reduced the hirings of low skilled workers with temporary contracts and increased layoffs of low skilled workers with permanent positions, with limited effects on the demand for high skilled employees. These results suggest that the reform has favored a downsizing of the treated firms. Indeed, we also see that, in the firms more affected by the reform, there was a reduction in sales and labour costs, but an increase in both sales and labour costs per worker, probably because of a composition effect due to a larger share of skilled labour within those firms.

JEL codes: J42, J63, J65, M53.

Keywords: employment protection, temporary work, skills, job security

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1 Introduction

OECD (2020) reports that “...from 2013 to 2019 12 OECD countries reformed job dismissal regulations for regular workers, while 17 OECD countries reformed hiring regulations for temporary workers. Some reforms had as objective to reduce the stringency of employment protection against dismissals (as in France, Italy, Lithuania and Slovenia). A second category of reforms focused specifically on hiring regulations for temporary workers.”

In the case of Italy, Hijzen et al. (2017) show that firms above the 15 employees threshold made excessive use of temporary workers to escape firing costs on permanent workers (as dictated by the Art. 18 of the Workers’ Statute). In 2012, a reform was introduced with the aim of reducing duality between temporary and permanent workers in the labour market. In particular, the Fornero (labour market) (FLMR) reform in Italy had three main pillars: 1) reduction of EPL for regular workers; 2) increasing constraints to using fixed term contracts; 3) push apprenticeships.¹

Before the Fornero Law, employees in firms with more than 15 employees had the right, in the case of a dismissal declared unfair by a court of law, to ask for reinstatement (and receive all foregone wages plus health and social security contributions) or receive a monetary compensation. By way of contrast, in firms below the threshold, it was (and still is) up to the employer to decide whether to reinstate the worker (without paying foregone wages) or pay a smaller monetary compensation. While we refer to Bratti et al. (2021) for an exhaustive explanation of the details of the reform, here we note that the Fornero Law limited the possibility for workers of firms with more than 15 employees to opt between reinstatement and a monetary compensation to a set of well-defined cases; moreover, it reduced the amount of the monetary compensation and eased the uncertainty surrounding the duration and costs of litigation, which used to be non-negligible, especially in certain areas of the country (Gianfreda and Vallanti 2017). A second aspect of the Reform concerned the restrictions on the use of temporary contracts.

In this paper we analyse the effects of the Fornero Law on firms’ labour demand, in particular on hirings and separations by skill and type of contract (permanent versus temporary).² Using Italian administrative data from INPS, we are able to obtain detailed information on hirings and (types of) separations by skill level and type of contract for workers at the firm level. In the econometric analysis, we identify the impact of the reduction of firing costs for permanent workers on hirings and separations by exploiting the reduction in firing costs entailed by the Fornero law using a difference-in-differences (DID) research design using a balanced sample of firms between 2010 and 2014. Moreover, as noted above, before the Fornero Reform, firms above the 15 employees threshold tended to employ a larger share of workers on fixed-term contracts in order to escape the more stringent regulation on permanent contracts; therefore, firms above the threshold were also more exposed to the part of the Fornero Reform which increased the costs of employing temporary workers. Therefore, we are able to identify the effect of the Reform on firms’ propensity to hire and fire workers on different contract types.

In our results, the two components of the reform seem to produce no effect on skilled workers (or “jobs”, according to our cell definition). By contrast, for low skilled workers (jobs), the reform produces fewer hirings in temporary jobs, which are however not compensated by an increase in hirings of permanent workers. For low skilled workers, we also detect an increase in separations above the threshold, which is mostly driven by layoffs and not by voluntary quits or contract terminations.

¹At the end of 2011 another Fornero reform for pensions was approved. While we will discuss this point in more detail below, it is important to note that the temporary work, apprenticeship and pension reforms did not bind at the 15 employees threshold, which matters for the reform of firing costs for permanent.

²Additional results concern other firm outcomes as labour productivity and the cost of labour.

To the best of our knowledge, there is no theoretical model that features both skill heterogeneity and different use of temporary/permanent contracts and the incidence of EPL by skill. In future work, we plan to provide a theoretical model that helps to explain what are the reasons for using temporary/permanent contracts by skill level in an environment with firing costs for permanent and temporary employees.

The rest of the paper is structured as follows. In Section 2 we review the literature, in Section 3 we illustrate the reform and the institutional background, in Section 4 we illustrate the data and the merge procedure, in Section 6 we provide our results, and in Section 7 we conclude.

2 Previous literature

Previous work has analysed the effects of EPL on many different outcomes, both at the firm and worker level. In particular, various papers have estimated the effect of firing costs on jobs flows, labour and total factor productivity, physical and intangible capital investment, firms' propensity to grow, firms' entry and exit; (un)employment levels, worker flows and turnover, training, wages. In what follows we just focus on the most relevant ones for the purposes of this paper, with a particular emphasis on studies that analyse Italy (and its recent reforms).

[Kugler and Pica \(2008\)](#) study the effect of the 1990 reform that tightened firing costs for firms below the 15 employees threshold in Italy. Using a diff-in-diff identification strategy, they do find that higher EPL reduced job and workers flows with a negative effect on firm entry. [Schivardi and Torrini \(2008\)](#) adopt a regression discontinuity design around the 15 employees threshold and find a smaller probability of growing at the 15 employees cutoff. Interestingly, they do find an excessive use of flexible contracts at the cutoff.³ Similar results are obtained by [Hijzen et al. \(2017\)](#), that study the effect of firing costs in a regression discontinuity setting on firm turnover and labour productivity. They detect a lower probability of growing for firms just below the threshold, even if the effect is not precisely estimated and insignificant at conventional levels. Interestingly, they do find evidence of excessive worker reallocation of workers at the threshold, mostly driven by the excessive use of temporary workers, with negative effects on labour productivity.⁴

[Cingano et al. \(2016\)](#) use the 1990 reform in Italy in a difference-in-regression-discontinuity framework to identify the effect of EPL on various firm outcomes. The results show a lower propensity to grow just below the threshold and an increase in this propensity (i.e. a less negative propensity) after the reform, although the statistical significance of the coefficients is not at conventional levels. On the other hand, they find higher capital labor ratios and decline in TFP. In a similar environment, [Leonardi and Pica \(2013\)](#) look at the effects of firing costs on wages. First, they do find a smaller propensity to growth at the threshold of about 3%, but not statistically significant. Interestingly, they instrument for actual size with size before the reform. Second, they find a (small) negative effect on wages.

More recently, a series of papers have considered the effects of the Jobs Act and the Fornero reform on workers and firms. [Sestito and Viviano \(2018\)](#) use data from the Veneto region and find that the Jobs Act reform had a positive effect on hirings and higher conversion of temporary contracts. Similarly, [Boeri and Garibaldi \(2019\)](#), in their analysis of threshold-passing, find a positive effect of the reform on the probability of passing the 15 employees threshold. This effect starts already with the hiring subsidy, and accelerates with the

³[Boeri and Jimeno \(2005\)](#) consider the effect of the 1990 reform in Italy to look at the size distribution of firms. They find that EPL mildly affects firm persistence but not the growth of firms.

⁴Similarly, [Bjuggren \(2018\)](#) uses Swedish data in a difference-in-difference framework and finds that a decrease in EPL increased labour productivity, the study does not detect any effect on human capital of workers.

reduction in EPL related to the Jobs Act. In the regression analysis they find increased open ended hirings, and an increase in transformations of fixed-term into open ended contracts. They detect small and negligible effects on firings.⁵

Bratti et al. (2021) leverage the Fornero reform to identify the effect of EPL on firm training in a diff-in-disc setting. The authors find that, after the reform, training increases in treated firms. Mechanism related to excessive use of temp contracts at the threshold, which was reduced after the reform. In a similar vein, O’Higgins and Pica (2020) in a DID setting find that the Fornero Reform increased permanent hires particularly amongst the young. However, they stress the importance of other policy interactions.⁶ Finally, Daruich et al. (2017) exploit an Italian reform that lifted constraints on the employment of temporary contracts and show that after the introduction of the incentives for using temporary work, firms increased the use of temporary contracts and experienced lower labour costs and higher profitability.

In general, little is known on the effect of labour market reforms aiming at reducing dualism on firm’s workforce skill composition. An exception is the paper by Ardito et al. (2022). They investigate the effect of the Jobs Act using employer-employees data for the Piedmont region. In a difference-in-difference setting, the authors find a positive effect of the reform on net changes in worker flows, especially of low-educated, low-skilled workers or workers performing basic manual tasks; an increase in new open-ended contracts, mainly through conversion of temporary contracts (benefiting from social contribution rebates), again mainly targeting low-skilled workers. The authors interpret these effects as firms using “defensive strategies”, i.e. competing by reducing costs, rather than investing in innovation.

3 The Fornero reform

This section heavily borrows from Bratti et al. (2021). Before the Fornero Reform, employees in firms with more than 15 employees had the right, in the case of a dismissal declared unfair by a court of law, to ask for reinstatement (and receive all foregone wages plus health and social security contributions) or receive a monetary compensation. In firms below the threshold, it was (and still is) up to the employer to decide whether to reinstate the worker (without paying foregone wages) or pay a smaller monetary compensation.

The Fornero Reform (passed in July 2012) limited the possibility for workers of firms with more than 15 employees to opt between reinstatement and a monetary compensation to a set of well-defined cases. It reduced the amount of the monetary compensation and (presumably) eased the uncertainty surrounding the duration and costs of litigation, which used to be non-negligible, especially in certain areas of the country (Gianfreda and Vallanti 2017).

A second aspect of the Reform concerned the restrictions on the use of temporary contracts. In the scheme reported below, we summarize the main components of the reform and highlight the expected effects on the costs of labour.

⁵Pigini and Staffolani (2021) consider effects of the JA in a DID: lower EPL does not reduce job stability.

⁶There are other relevant papers on the Fornero reforms (both labour and pension reforms) that are broadly related to this paper: Bovini and Paradisi (unpublished) Bianchi et al (2020, REStud), Boeri, Garibaldi and Moen (2021, JPopEcon); Carta, D’Amuri and von Wachter (2021, NBER); Berton et al (2017).

<i>Permanent contracts</i>		<i>"Temporary" contracts</i>	
Changes introduced by Fornero Law	Effect on labor costs Sign	Changes introduced by Fornero Law	Effect on labor costs Sign
EPL: Reintegration limited to specific cases, court's discretionality (reform of Article 18)*	(-)	No "causal close" for first contract below 12 months	(-)
Validation of worker resignations (to fight blank resignations)	(+)	Longer interval after expiration before automatic conversion into permanent	(-)
		Longer interval between temporary contracts	(+)
		Higher social security contributions (partly rebated in case of conversion into permanent contract)	(+)
		Stricter regulation of other atypical work	(+)
		Validation of worker resignations (to fight blank resignations)	(+)

*Only firms above 15 employees. Greater EPL (art. 18) produced a larger incentive for "large" firms of using temporary contracts

Finally, another component of the Fornero Law concerns incentives introduced for apprenticeship. This part of the reform mostly concerns younger workers (more precisely for individuals aged between 15–25 the Reform concerned the vocational education and training, while for the 18–29 category the Reform affected both the vocational apprenticeship and the higher education and research apprenticeship). For this group of workers the Reform entailed at least six months of training, with a maximum duration of 36 months.

In particular, the Fornero reform changed the apprentices to employees ratio, the latter increased from 1:1 to 3:2 for firms above 10 employees, it remains 1:1 for smaller firms. Moreover, the Reform introduced a cap on hiring apprentices in the absence of workers in the same occupation (or less than 3). “Employers with more than ten employees cannot hire more than one new apprentice at a time if they retained fewer than 50% of the apprentices hired over the previous 36 months (30% for the first 36 months following the reform). These percentages exclude apprentices who were fairly dismissed, resigned, or failed to pass the trial period.”(Maida and Sonedda 2021)

4 Data

Data used in this paper is made available from INPS (Italian National Institute of Social Security) through the VisitINPS Scholars program B. We use data from different sources at the worker and firm level, that are subsequently merged using anonymized fiscal codes (for both workers and firms). In what follows we briefly describe each source of data; then, we provide details on the entire procedure carried out in order to create the final dataset, and details on the sample selection process.

4.1 INPS data on hirings and separations, UniLav-ISCO

We use this data for two purposes. First, we use hiring episodes in order to derive the skill content of jobs using information on the education level (or specific occupation) of workers (see more below). Second, we use hirings and separations in order to calculate the number of hirings and separations at the firm level for each year.

INPS provides information on hirings and separations episodes for each individual. In particular, the "UniLav" module (Unificato Lav) is compiled by the employer, who has the duty of communicating compulsory information on different aspects of the employment relationship. First, information is available on the type of episode, the main ones being hires, renewals, transformations, and separations.⁷

Additional information is provided on the timing of the event (exact date of beginning and termination of the employment relationship), the type of contract (permanent or temporary), the working arrangements (full-time or part-time), the level of earnings and the national collective contract applied (the latter are not available in our specific case). Moreover, for each event, INPS provides information on the level of education of the worker and details

⁷Note that the Italian Ministry of Labour provides similar data through the system of comunicazioni obbligatorie.

on her specific occupation for each single employment episode. The former classification for schooling levels is standard: no education, primary, secondary, tertiary and above. The latter, uses the ISTAT classification of occupations (Classificazione delle professioni 2011) and it is available at the 5 digit level.⁸

This initial dataset (UniLav-ISCO) comprises 191,282,086 observations for the period 2010-2019. We first drop observations with missing individual (about 1,208,264) or firm identifier (22,782,021 observations). We also dropped information for years from 2016 to 2019 (71,793,092 obs). In the case of hiring episodes, we also dropped separations (21,689,762), renewals (11,847,258) and transformations (8,334,133). In order to construct our skill level indicator, for each firm-worker pair, we only consider only one episode per day (dropping 701,109 observations) and per year (dropping 15,485,447 observations). This leaves us with 37,441,000 observations.

As mentioned above, we aggregate into three education levels, corresponding to primary or no education (22,539,845 obs), secondary (10,382,346 obs) and tertiary (4,518,809 obs). In percentage terms 59% (22% observations report zero level of education.), 20% and 11%, respectively. As far as occupation is concerned, we aggregate at 1, 2 and 3 digit levels, resulting in 9, 42 and 145 occupations respectively. As we explain in more detail below, we use different methods to classify jobs (or occupations) as skilled ones.

In line with the over-education literature we use cell level data to address some potential measurement error in workers' education. The cell methodology allows us to achieve two goals: 1) use employees/firms for which data on education is missing; 2) it is more in line with the definition of skilled/unskilled jobs (in terms of the level of education they require) compared to that of educated/uneducated workers, as workers in certain jobs may be over-educated or under-educated. We present nonetheless results using the original variable.

In order to minimize measurement errors and to use all COs, including those with missing education data, we employed the following criteria to classify workers in high-skilled vs. low-skilled jobs:

- Education: Reported level of education. We consider high skill workers that have a laurea degree.
- Qualification: Jobs are high skill if the 3 digit occupation corresponds to intellectual, scientific and highly specialized occupations. This corresponds to about 5 millions observations (out of 37millions).
- Mean: Jobs at the 3 digit occupation with an average level of tertiary educated individuals higher than the mean (corresponding to about 30% of observations).
- Median: Jobs at the 3 digit occupation where the median level of education of individuals is tertiary (corresponding to about 6% of observations).
- Mode: Jobs at the 3 digit occupation where the mode level of education is tertiary (corresponding to about 8% of observations).

This procedure has some similarities with that used to classify over-educated or under-educated workers, in which individual education is put in relation with the educational level prevailing in a given job. An example is the use of deviations from the median educational level in a given job, as a proxy of being under- or over-educated vs. matched with a given job, in terms of education. Similarly, we define as skilled-jobs those in which workers with

⁸Note that this classification is based on the logic of the ISCO (International Standard Classification of Occupations). See <https://www.istat.it/en/archivio/18421> for additional details.

a tertiary degree are prevalent, according to the criteria above. Moreover, in order to compute the qualification, mean, media, mode we used all hiring episodes (carefully describe the procedure).

As far as hirings are concerned, we recover information on hiring episodes from UniLav-ISCO. Unfortunately, from this dataset we can only recover information on level of education and occupation of the individual, but no information is available concerning the type of contract or the occupational category (blue and white collars, managers, apprentices). Moreover, since for each worker-firm match there are multiple observations, we proceed to drop multiple observations.

In order to recover additional information on each hiring episode, using the individual identifier, we merge the UniLav data with data on *Rapporti di lavoro annuali* (Uniemens).

4.2 INPS workers' data, *Rapporti di lavoro-Uniemens*

Another source of information is the dataset called *Rapporti di lavoro annuali* (Uniemens). The latter comprises information on the universe of employment episodes each year for private sector workers (excluding agriculture), hence includes information on the total number of employment episodes for each worker/firm, including both stocks (workers already employed) and flows (new hires and separations).⁹ Moreover, we use information on the total number of employment episodes (selecting only one per worker-firm) in order to calculate an additional measure of total employment at the firm level.¹⁰

For the year 2010 this is the selection procedure (for hirings). We begin with 18,173,852 observations. We drop observations if reasons for hiring are not clear cut (see more in the documentation): this amounts to 330,687 observations. We then drop seasonal workers (see more documentation): this amounts to 229,744 observations. We then check for duplicates at *impresa-azienda-lavoratore* (also *tipo rapporto* and *qualifica*): this check leads us to loose 567,818 observations. Second step, drops 303,529 obs; third step drops 265,191 obs; fourth step (*impresa-lavoratore-anno*) drops 529,674 obs. After additional checks, we are left with 15,947,209 observations.

INPS also provides detailed information on a limited number of workers' characteristics. From the *Anagrafica* section, comprising 110,096,880 observations, we derive information on the age of workers. This is subsequently merged with other data from INPS using the anonymized social security code.

4.2.1 Note on separations

For the year 2012, we use RL with 18,275,994 observations. After some cleaning and drop of seasonal workers, we tabulate separations. We obtain 13,715,973 observations (78%) with empty reason (ongoing jobs), about 5% firings (*giustificato motivo oggettivo o collettivo*), 7% quits, 10% contract termination, while the rest is residual (0.5% firings (*giustificato motivo soggettivo o giusta causa*)). After additional commands (see do file), and not considering ongoing jobs, we obtain similar tabulations. 22.30% firings, 32.21% quits, 43.13% contract terminations.

⁹We exclude workers in regulated professions (*casce professionali*), in agriculture, domestic workers and collaborators. Just to give an idea of the number of observations, in 2010 there were more than 18 millions observations while, in 2018, there were about 20 millions observations. In order to merge with UniLav-ISCO data, we first use information on hires and separations.

¹⁰We calculate correlations between total employment calculated using this data with the one available from INPS firms' data. Results indicate the correlation is above .9. We run a similar check considering the total number of hires and separations as calculated from *Rapporti di lavoro* (Uniemens) and the one calculated from the UniLav, with similar results.

4.3 INPS firms' data, Imprese

INPS also provides information on firms (INPS aziende annuali). In particular, the dataset comprises information on the different establishments for each firm, the sector of activity, the age of the firm (entry and exit date), the location (region and province level) and a large set of employment related information. In particular, information on the number of employees in the payroll is available also by type of contract (permanent versus temporary), working arrangements (full versus part time). Moreover, INPS provides information on the monthly variable *forza aziendale* (from which we build an yearly average), that has been previously used in the literature in order to identify the correct firm size, see [Boeri and Garibaldi \(2019\)](#) for example.¹¹

4.4 Balance sheet data, CERVED

Additional source of information at the firm level is provided by the CERVED dataset, which includes incorporated firms in Italy (we select the period 2008 to 2017). The data reports information on balance sheets and income statements but no information on firm size. The sample is slightly unbalanced towards large firms, with small firms somewhat less represented. Self-employed are also excluded. We use information on (per worker) sales and (per worker) labour costs as measures of firm performance.

4.5 Procedure, sample selection and discussion

In what follows we illustrate in detail the construction of the dataset. We select years from 2008 to 2017; however, since information on education and occupation of hires and separations is available only after 2010, we limit our attention to the period 2010-2014. We exclude 2015 onwards as a second important reform took place in Italy, the Jobs Act.

- We start from INPS' firm level data. For each firm we identify only one observation per year; i.e. we exclude firms that had multiple social security positions. We select firms in the range 2 to 100 employees.
- We use UniLav-ISCO data to identify hirings and separations at the firm level. We use only one observation per year for each firm-worker.
- We use the INPS workers' data, Rapporti di lavoro Uniemens. In particular we identify for each firm both current stocks of employees and hirings and separations.
- We merge Rapporti di Lavoro Uniemens with firms data and then with UniLavISCO using the firm and worker identifier (we keep only observations that are merged).¹²

¹¹To get an idea of the numbers involved in the selection procedure we briefly discuss the sample selection for 2010. We begin with 1,811,178 observations. After dropping duplicates for *impresa-azienda* pair, we select firms in the range 2 to 100 employees, dropping 558,157 and 15,403 observations respectively. We calculate the number of observations for the same firm in the same year, and keep only one observation for each firm (drop 64,926 obs). We then drop firms with more than 100 employees (again 2,023 obs). We are left with 1,171,029 observations.

¹²To get a sense of the merge procedure, we report numbers for 2010. We merge RL with *impres*: 8,959,654 merged, 6,995,918 are RL not merged, 8,363 are firms not merged. We merge with UniLav-ISCO: 3,786,240 merged, 14,706,213 are RL not merged (12,169,332 are RL that are in place, they are not new hires or separations; 2,536,881 are new hires and separations that are not merged). We drop 9,532,799 observations, remaining with 8,959,654. To get an idea of the distribution of these observations across contracts: 7 millions are permanent, about 2 millions are temporary; 6.8 millions are full-time, 2.1 millions are part-time. We do this separately for hirings and separations.

- We collapse this dataset at the firm/year level.
- We merge this dataset with INPS' firm level data using the firm identifier.¹³
- We merge this firm level dataset with CERVED data on financials. From Cerved we drop years before 2010 (9,449,442 observations) and after 2015 (2,247,317 observations). Merge between INPS firm and CERVED: merged 2,476,292 (all years); not merged from CERVED: 2,293,360; not merged from INPS: 4,315,555.
- We also merge with legal size and with forza aziendale in 2010.
- Final dataset for the years 2010-2015: about 11,485,319 observations, around 1.9 millions observations per year. Note that not all of them are merged with CERVED.

Some comments are in order. First, we use a balanced 5 years panel that considers only non-agriculture and single establishment firms. Moreover, we focus on firms with 10 to 20 employees in the main specification and in the 6-25 employees range as a robustness check (not reported). We also focus a balanced panel in order to avoid that our results are not driven by sample composition effects; however, we also run some robustness checks by using the unbalanced panel. As firm size is concerned, following [Boeri and Garibaldi \(2019\)](#), we use the variable *forza aziendale* (ready available in the RL) and we keep fixed the firm size at the pre-reform period (namely, at January 2010, predetermined).

We use cell level data to address some potential measurement error as mentioned above. The cell methodology allows us to achieve two goals: 1) use employees/firms for which data on education is missing; 2) it is more in line with the definition of skilled/unskilled jobs (in terms of the level of education they require) compared to that of educated/uneducated workers, as workers in certain jobs may be overeducated or undereducated. Our results are however generally robust to the alternative use of the original variable. See [Tables 1 and 2](#) for correlations.'

5 Empirical strategy

In order to identify the effect of the Fornero Reform, we use a difference-in-differences (DID) design:

$$y_{it} = \gamma_0 + \gamma_1 above_{i0} + \gamma_2 post_t + \gamma_3 (above_{i0} \times post_t) + \gamma_4 \mathbf{X}_{it} + \gamma_5 (x_{it} - 15) + \varepsilon_{it}. \quad (1)$$

Where firm size is fixed at time 0 (January 2010) ([Boeri and Garibaldi 2019](#)), to make it predetermined with respect to the reform; $above_{i0}$ is an indicator for firm size (legal size) being above 15 employees; $post_t$ is a post 2011 indicator; $(above_{i0} \times post_t)$ is the DID variable of interest, whose coefficient γ_3 , under the usual assumptions, captures the average treatment effect of the reform. The variable $(x_{it} - 15)$ is a linear polynomial in firm size which varies over time. The vector \mathbf{X}_{it} captures a full set of region-by-year and industry-by-year fixed effects.

As we have already noted, previous literature suggests that firms above the 15 employees threshold used temporary contracts relatively more in order to escape the steep increase in firing costs of permanent employees. We show in [Table 3](#) that, also in our sample, before the Fornero Reform (i.e. for the years 2010 and 2011), firms above the 15 employees threshold

¹³With collapsed data, these are the number when merging hirings and separations data at the firm level: 1,156,600 merged, 7,804 not merged, 5,706 from hirings and 2,098 for separations.

exhibit both a larger share of hirings using temporary contracts and a higher stock of employees on temporary contracts. This result confirms previous literature and suggests that firms above the 15 employees threshold were more exposed to both pillars of the Fornero Reform, namely the reduction in firing costs for permanent employees and the increased labour costs associated to the reform in the regulation about the use of temporary workers.

We tested the common trend assumption in the pre-reform period using an event-study DID. Graphs (not reported) generally show common trends in the pre-reform period.

6 Results

In Tables 4 and 5 we report our main results for hirings and separations for the balanced panel of firms with a predetermined firm size in the range of 10-20 employees. In both Tables, we report results for different types of contracts and by skill, using different measures of skills as discussed in Section 4.

Focusing on hirings in Table 4, estimates suggest a statistically significant reduction in the number of hirings of low skilled workers across different definitions of skills. In particular, our estimates (column 2) suggest that the Reform entailed a reduction of about 0.15 hirings of low skilled workers, which is equivalent to an about 9 per cent fall in the average number of low skilled hirings. Moreover, our estimates show that this finding is mainly driven by a lower propensity to hire low skilled workers with a temporary contract; in particular, we find after the Reform a 9.2 per cent contraction in the average number of low skilled hirings on a temporary contract. By way of contrast, we do not find any effect of the Reform on the hirings of high skilled workers. The empirical estimates in Table 4 suggest that these results are broadly stable across definitions of skills.

Turning to separations in Table 5, our estimates suggest that the Reform caused an increase in the number of separations of low skilled workers, independently on the way we define out skill measure. In particular, the estimates (column 2) show an increased of 0.04 separations of permanent low skilled employees, that is equivalent to an about 12 per cent increase in the average number of separations of low skilled workers on a permanent contract. By way of contrast, we find a statistically significant reductions in the number of separations of low skilled workers with a temporary contract of a similar magnitude. In order to better understand the nature of such results, we have run regressions for different types of separations, namely layoffs, quits and terminations. The estimates reported in Table 6 suggest that, in the case of low skilled workers on a permanent contract, the increase in separations is entirely due to an increase in layoffs; by way of contrast, for low skilled workers on temporary contracts, we observe a reduction in quits following the Reform. Also in the case of separations, we do not find any significant impact of the Reform on high skilled workers.

These findings are broadly confirmed when we consider a larger firm size bandwidth which includes firms in the 6 – 25 employees range; moreover, the use of an unbalanced panel does not affect overall results. Finally, as already discussed above, the main effects of the Reform do not depend on the alternative measures of skill workers definitions.¹⁴

Taken together, these results imply that the Reform may have induced a small reduction in the size of affected firms since it has caused an increase in layoffs and a reduction in the hiring of low skilled workers; furthermore, because the impact of the Reform is limited to the case of low skilled workers, the Reform may have generated a change in the composition of the workforce towards more skilled labour.

¹⁴In some robustness checks, we also calculate the legal size of the firm, i.e. the precise way the Law computes firm size as far as it concerns the application of Art.18 which foresees an increase in firing costs above 15 employees.

Indeed, this interpretation of our results is consistent with additional analysis that we have carried out on firm level outcomes, such as sales and labour costs. Interestingly, the empirical results reported in Table 7 show that, above the 15-employees threshold, after the Reform both sales and labour costs remained unchanged, respectively; by way of contrast, when we consider sales per employee (a proxy of labour productivity) and labour costs per employee, we observe a statistically significant increase of about 1 per cent. These findings are consistent with a decline in the size of the affected firms which, in a period of recession (GDP growth rates were negative during the 2012-2014 period in Italy), reduced hiring of temporary low skilled workers (which had become more expensive) and increased layoffs of permanent low skilled employees (which had been made easier by the Reform). The restructuring process that ensued in the affected firms entailed both an increase in labour costs per employee (through an increase in the relative importance of high-skilled employees in the workforce and/or through an increase of extra time, which tends to cost more, but also of sales per employee, which can be explained by the fact that firms exploited the Reform to fire some permanent low-skilled workers for which the surplus from the match had become negative.

7 Concluding Remarks

In this paper we evaluate the impact of a comprehensive reform (Fornero Law) of the labour market introduced in Italy in 2012 and that reduced firing costs for permanent workers in the case of firms above 15 employees and that increased regulation of temporary contracts across the board.

In order to estimate the effect of the Reform, we use a Differences-in-Differences strategy, with firms above the threshold of 15 employees constituting the "treatment group" and those below 15 the "control group." The existence of a difference between the performance in the variable of interest before and after the Fornero Reform between the treatment group and the control group identifies the possible effect of the Reform. Indeed, firms above the 15 threshold are also likely to have been more exposed to the part of the reform concerning the regulation of temporary contracts given that, before the Reform, they used to employ a larger share of temporary workers to circumvent the larger firing costs for permanent workers. We consider a balanced panel of firms (over the period 2010-2014) and measure firm size at the beginning of the period (2010) so that it can be considered as predetermined. The analysis is conducted on the sample of firms with between 10 and 20 employees in 2010 and repeated as a robustness check on the sample of firms between 6 and 25 employees.

Limiting the discussion to the most robust results among the different estimated specifications, a statistically significant increase in separations (largely driven by layoffs) emerges in the case of permanent workers, as economic theory predicts. In particular, firms above the threshold appear to have increased layoffs of low-skilled permanent workers. With regard to hiring, a robust effect that emerges is that related to the reduction in hiring of low-skilled workers, driven by a lower propensity to hire fixed-term workers. This result is consistent with those changes in the Fornero Law that made it more costly and difficult to employ fixed-term workers; conversely, there is no evidence that the reduction in firing costs incentivized firms to hire more permanent workers.

Our results suggest a significant reduction in net worker flows: this result is consistent with a reduction in employment by treated firms. Moreover, we find that after the Reform both sales and labour costs remained unchanged, while both turnover and labor costs per worker increased in the treated firms: this may be due either to a composition effect, associated with a decrease in low-skilled workers (paid less and less productive), or to a more intensive use of overtime (more expensive), with an increase in hours worked per worker.

Figures and Tables

Table 1: Correlation between different hirings by skills measures

	LS-QUAL	HS-QUAL	LS-MEAN	HS-MEAN	LS-MED	HS-MED	LS-MODE	HS-MODE	LE	HE
LS-QUAL	1.00	-0.01	0.94	0.18	0.99	-0.01	0.99	0.01	0.98	0.04
HS-QUAL	-0.01	1.00	0.00	0.63	0.02	0.92	0.02	0.89	0.03	0.79
LS-MEAN	0.94	0.00	1.00	-0.02	0.94	-0.01	0.94	-0.01	0.94	0.00
HS-MEAN	0.18	0.63	-0.02	1.00	0.20	0.59	0.18	0.63	0.16	0.61
LS-MED	0.99	0.02	0.94	0.20	1.00	-0.01	1.00	0.01	0.98	0.04
HS-MED	-0.01	0.92	-0.01	0.59	-0.01	1.00	-0.01	0.95	0.01	0.82
LS-MODE	0.99	0.02	0.94	0.18	1.00	-0.01	1.00	-0.01	0.98	0.03
HS-MODE	0.01	0.89	-0.01	0.63	0.01	0.95	-0.01	1.00	0.02	0.81
LE	0.98	0.03	0.94	0.16	0.98	0.01	0.98	0.02	1.00	-0.01
HE	0.04	0.79	0.00	0.61	0.04	0.82	0.03	0.81	-0.01	1.00

Table 2: Correlation between different separations by skills measures

	LS-QUAL	HS-QUAL	LS-MEAN	HS-MEAN	LS-MED	HS-MED	LS-MODE	HS-MODE	LE	HE
LS-QUAL	1.00	-0.01	0.93	0.22	0.99	0.00	0.99	0.02	0.98	0.05
HS-QUAL	-0.01	1.00	0.00	0.54	0.03	0.90	0.02	0.86	0.04	0.70
LS-MEAN	0.93	0.00	1.00	-0.02	0.92	-0.01	0.93	-0.01	0.93	0.01
HS-MEAN	0.22	0.54	-0.02	1.00	0.24	0.50	0.22	0.55	0.21	0.52
LS-MED	0.99	0.03	0.92	0.24	1.00	-0.01	0.99	0.02	0.98	0.05
HS-MED	0.00	0.90	-0.01	0.50	-0.01	1.00	-0.01	0.92	0.01	0.74
LS-MODE	0.99	0.02	0.93	0.22	0.99	-0.01	1.00	-0.01	0.98	0.04
HS-MODE	0.02	0.86	-0.01	0.55	0.02	0.92	-0.01	1.00	0.03	0.74
LE	0.98	0.04	0.93	0.21	0.98	0.01	0.98	0.03	1.00	-0.01
HE	0.05	0.70	0.01	0.52	0.05	0.74	0.04	0.74	-0.01	1.00

Table 3: Temporary workers around the 15 employees cutoff

VARIABLES	(1)	(2)	(3)	(4)
	No. of temporary hirings	% temporary on total hirings	No. of temporary employees (stock)	% temporary on total employees (stock)
above 15	0.090** (0.036)	0.519*** (0.099)	0.283*** (0.062)	0.745*** (0.190)
normalized firm size	0.037*** (0.003)	-0.053*** (0.008)	0.214*** (0.004)	0.047*** (0.015)
Observations	337,599	337,599	337,599	337,599
R-squared	0.062	0.065	0.157	0.135
Mean dep var ≤ 15	0.529	2.833	2.194	14.60
% Effect	16.91	18.31	12.88	5.099

- Estimated on the 2010-2011 period (i.e. before the reform). Includes province-year and industry-year fixed effects.

Table 4: Results: Hirings

	Skill definition				
	Education	Qualification	Mean	Median	Mode
low skilled	-0.128***	-0.147***	-0.119***	-0.159***	-0.157***
high skilled	-0.005	-0.002	-0.029***	0.000	-0.002
permanent low skilled	-0.004	-0.008	-0.009	-0.009	-0.007
permanent high skilled	-0.003	-0.003	-0.004	-0.004**	-0.004
temporary low skilled	-0.080***	-0.092***	-0.077***	-0.101***	-0.101***
temporary high skilled	-0.005	-0.001	-0.022***	0.003	0.000

- We report only the *post* \times *above* coefficients for our DID.
- Bandwidth is 10 to 20 employees.
- Regressions run on 275,668 observations and include a linear polynomial for normalized firm size, sector-by-year and province-by-year FEs. Robust standard errors.

Table 5: Results: Separations

	Skill definition				
	Education	Qualification	Mean	Median	Mode
low skilled	-0.005	-0.013	-0.021	-0.015	-0.033*
high skilled	-0.003	0.001	-0.002	0.002	0.006*
permanent low skilled	0.047***	0.042***	0.029***	0.043***	0.060***
permanent high skilled	-0.000	0.002	0.007	0.002	0.004*
temporary low skilled	-0.026*	-0.027**	-0.025***	-0.029***	-0.056***
temporary high skilled	-0.003	-0.002	-0.001***	-0.001	0.001

- We report only the *post* \times *above* coefficients for our DID.
- Bandwidth is 10 to 20 employees.
- Regressions run on 275,668 observations and include a linear polynomial for normalized firm size, sector-by-year and province-by-year FEs. Robust standard errors.

Table 6: Results: Different Types of Separations

type of separation	
layoffs perm low skill	0.043***
layoffs perm high skill	0.001
layoffs temp low skill	-0.002
layoffs temp high skill	0.000
quits perm low skill	-0.001
quits perm high skill	0.002
quits temp low skill	-0.001
quits temp high skill	0.000
terminations perm low skill	-0.001*
terminations perm skill	0.000
terminations temp low skill	0.003
terminations temp high skill	-0.001*

- We report only the *post* \times *above* coefficients for our DID.
- Bandwidth is 10 to 20 employees.
- Skill definition is Qualification. Regressions run on 275,668 observations and include a linear polynomial for normalized firm size, sector-by-year and province-by-year FEs. Robust standard errors.

Table 7: Results: Firm Performance

dep. var.	<i>post</i> × <i>above</i>
Revenues (Ln)	-0.001
Cost of labour (Ln)	-0.003
Revenues per capita (Ln)	0.011**
Unit labour costs (Ln)	0.009***

- We report only the *post* × *above* coefficients.
- Bandwidth is 10 to 20 employees.
- Regressions run on about 192k obs (with non-missing balance sheet data) and include a linear polynomial

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