

Heterogeneous paths to stability*

Edoardo Di Porto[†] and Cristina Tealdi[‡]

February 28, 2020

Abstract

In this paper we investigate how in dual labour markets the degree of flexibility of short-term contracts may affect the success of reforms which aim at decreasing the market segmentation. We design a search and matching model which investigates the dynamics of short-term and permanent contract choices, in response to an institutional shock, such as the reduction in the extension costs of temporary contracts. The model predicts that as the extension cost decreases, the conversion rate of temporary contracts into permanent ones decreases too. Empirically, using data on the universe of Italian workers provided by the Italian Social Security Institute, we use a difference in difference estimation strategy to test for the model predictions among both workers and firms. We find a negative effect of the increased flexibility on the conversion rate with interesting heterogeneous effects by sector and categories of workers.

Keywords: labour market segmentation, dual economies, flexibility.

JEL Classification: J41, J63, J64.

1 Introduction

Dual economies are characterized by labour markets consisting of two tiers. In the upper tier workers, who are often unionized, are hired on open-ended contracts, and benefit from higher wages, good benefits, and employment security. In the lower tier workers are hired on temporary contracts and experience lower wages, higher turnover, and job insecurity (Saint-Paul, 1997). Transitions between the two segments are usually difficult. In theory, by decreasing firing costs, temporary contracts can help workers accumulate human capital and job experience. Yet, there is the danger that workers may end up moving from one temporary contract to another one, leading to lower employment stability and no transition towards better jobs, with negative consequences on unemployment, human capital accumulation and innovation (Blanchard and Landier, 2001; Cahuc and Postel-Vinay, 2002). Given the discontinuity in

*We thank all the staff of the INPS research center for their help with the data and seminar participants at INPS for their valuable comments. The findings and conclusions expressed are solely those of the authors and do not represent the views of INPS. All remaining errors are our own.

[†]INPS and University of Naples Federico II.

[‡]Heriot-Watt University and IZA Institute of Labor.

EPL and lack of wage flexibility, firms may still prefer to use temporary contracts in sequence rather than converting them into open-ended contracts. In fact, in case of dismissal, the latter becomes much more expensive and wage rigidity prevents an offsetting transfer from workers to firms in exchange for being insured against job losses (Dolado, 2016). Given the pervasive effects of large EPL gaps documented in the literature and the weakness of dual labour markets during recessions, there has been a growing pressure to close the EPL gap of permanent and temporary contracts (Booth et al., 2002). In the past decade, a number of Mediterranean countries such as Spain, Portugal and Italy have implemented a number of reforms to reduce this segmentation by reforming open-ended contracts to create incentives for firms to hire workers on a permanent basis. However, if the differences in the degree of employment protection between temporary and open-ended contract are sizeable, this type of reforms may be not enough to discourage firms from using temporary contracts and therefore may be proven not to be effective. This is the first paper in the literature to look at the (excess) degree of flexibility of temporary contracts as possible obstacle to the success of open-ended contract reforms which aim at reducing labour market segmentation.

In this paper, we address this issue by investigating the case of the Italian labour market in the 00s. The Italian labour market has been heavily segmented in permanent and temporary workers since the 90s. In 2015 the *Jobs Act* reform was implemented with the aim of increasing the flexibility of open-ended contracts. The reform introduced a new type of open-ended contract with firing costs increasing with tenure, significantly reducing the cost to be paid by firms in case of unfair dismissals (Boeri and Garibaldi, 2019). This policy aimed at encouraging firms to both upgrading workers from temporary to open-ended contracts and to hiring workers directly on open-ended contracts. In addition, the 2015 Budget Law introduced a sizeable subsidy for firms hiring workers on open-ended contracts and upgrading workers from temporary contracts. However, being the regulations of temporary contracts rather lax, particularly as a consequence of a 2014 reform (Poletti Decree) which significantly increased the flexibility of temporary contracts by raising the number of possible extensions from one to five and removing the requirement for declaring the reason for using temporary, the open-ended contract reforms might have not been completely effective in achieving their objectives of reducing segmentation.

We develop a search and matching theoretical framework where temporary and open-ended contracts coexist. We show that when the the cost of extension of temporary contracts is lower, the probability of conversion to open-ended contracts is actually lower. In the empirical analysis, we test the model prediction using Social Security data on the population of Italian workers. We estimate a Difference in Difference model where the Poletti Decree is used to allocate workers and firms in treated and control groups and the 2015 Budget Law and Jobs Act are used as the treatments. We employ two identification strategies. First, we focus on individuals who stepped into the labour market for the first time and were hired on a temporary contract in the period January-May 2014. Second, we select a sample of firms which were born in the period January-May 2014 and we look at the workforce composition of temporary and permanent employees within those firms. We follow both groups until the end of 2015, which is one year after the first treatment (Budget Law).

We find that both workers in newborn firms and workers at their first work experience who were hired on more flexible temporary contracts, i.e., after the Poletti Decree was implemented, had a lower chance to be upgraded to open-ended contracts compared to similar

workers hired on more rigid temporary contracts, i.e., before the Poletti Decree was implemented. This effect is shown to be particularly strong for specific groups of workers, such as women and lower educated workers, operating in sectors such as Manufacturing, Commerce and Hotels and Restaurants. The effect is shown to be persistent over time, and for specific categories of workers it lasts throughout the period considered.

The paper is organized as follows. Section 2 summarizes the literature on the topic. Section 3 describes the institutional background and the details of the reforms, while Section 4 illustrates the theoretical framework. Section 5 describes the empirical analysis, including the identification strategy, while Section 6 describes the data and Section 7 discusses the results. Finally, Section 8 concludes the paper.

2 Literature

The literature on labour market segmentation in dual economies is abundant (Bentolila et al., 2012; Berton, 2008; Blanchard and Landier, 2001; Booth et al., 2002; Cahuc and Postel-Vinay, 2002). A large body of the empirical literature focuses on transition probabilities, with the aim of identifying the role of temporary contracts as stepping stones towards open-ended contracts or dead ends. In some countries such as Austria, Denmark, Sweden, UK and US, these jobs are shown to be used as screening devices to more stable jobs (Booth et al., 2002; Holmlund and Storrie, 2002), while in others evidence shows that they have become a source of excessive labour market volatility (Boeri and Garibaldi, 2009; de Graaf-Zijl et al., 2011; Dolado et al., 2013; Tealdi, 2019). For the case of Spain the effect of temporary contract duration on the probability of finding a permanent job has been found to be slightly increasing with tenure at the temporary contract but mainly concentrated at specific durations of the temporary contract (6, 12, 24 and 36 months) (García-Pérez and Muñoz-Bullón, 2011; Güell and Petrongolo, 2007).

This paper is also related to the literature which studies the effect of the open-ended contract reforms implemented in Italy (Jobs Act and the decontribution brought by the 2015 Budget Law) on the creation of new open-ended jobs, without considering the features of temporary contracts. Using a unique dataset covering the universe of private firms having had at least once 10 to 20 employees in the period 2013-16, Boeri and Garibaldi (2019) find evidence of a causal increase in open-ended hirings by firms with more than 15 employees relative to smaller firms, as a consequence of the Italian Jobs Act reform. They also observe an increase in the transformation from fixed-term to open ended contracts as large as 100 percent. Using microdata on hiring and firing for the Italian region Veneto, Sestito and Viviano (2018) exploit differences in the design of the two policies, i.e., the Jobs Act reform and the reduction of labour costs, to separately identify the effects of new firing costs on firm hiring. They find that around 8% of gross permanent hires occurred because of the reduction of firing costs (in addition to the positive and large effect of the hiring subsidies). The reform of firing costs contributed also to increase the monthly rate of conversion of fixed-term jobs into permanent positions. They also find that the new firing rules made firms slightly less reluctant to offer permanent job positions to yet untested workers.

Bovini et al. (2018) find that gross permanent hires and conversions of fixed-term positions have temporarily, but significantly, benefited from the 2015-2016 hiring subsidies across all

types of firms and, more smoothly, from the new regulation of dismissals introduced by the 2015 Jobs Act for medium-large firms. This latter result is clear in 2017, in the absence of subsidies to permanent hiring. Fixed-term employment has increased, likely favored by the 2014 Poletti Decree, more strongly so when permanent hiring subsidies were lifted or weakened and among smaller firms. Finally, Ardito et al. (2019) using a non-linear difference-in-differences estimation strategy, find that large firms reacted mildly to monetary hiring incentives, and only when combined with lower firing costs. Smaller firms, instead, reacted more strongly to hiring incentives and substituted temporary with open-ended employment.

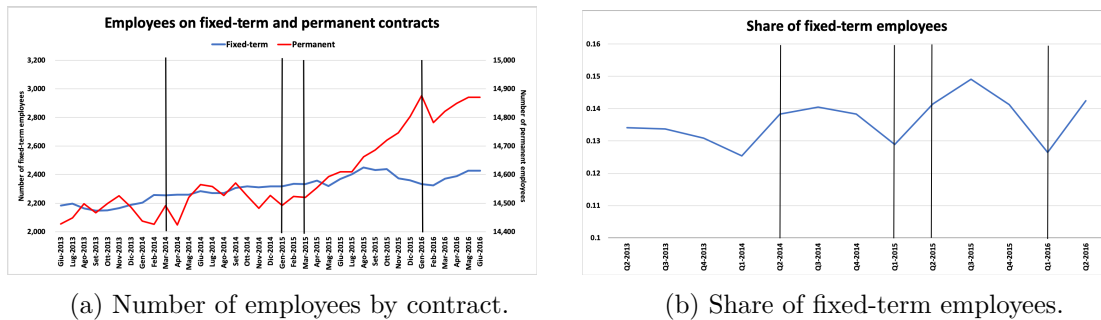
The paper which is closest to ours is the one by García-Pérez et al. (2019). Using Spanish social security data, they find that cohorts of native male high-school dropouts who entered the labor market just after the total liberalization of TC in Spain that took place in 1984, experienced worse labor market outcomes than cohorts that just preceded them. Specifically, they spent 200 days at work (i.e., a 7% drop) less than the control group whereas their wages drop by about 22% in the long run. One of the reasons why more fixed-term contract flexibility is found to have a negative impact on long-run career outcomes is that workers are more likely to work under temporary contracts well after their entrance in the labour market.

3 Institutional background

The dualism in the Italian labour market arose at the end of the nineties when the government progressively introduced different types of fixed-term contracts to increase flexibility in the use of labour, without changing the features of the permanent contracts. During the 2000s the share of fixed-term workers increased rapidly to approximately 13 per cent. More than 60 per cent of new hires were fixed-term job contracts, used not only to face labour demand uncertainty, but also as a cheap screening device before hiring workers under a permanent contract (Booth et al., 2002). Two major labour reforms have been implemented in the last few years in Italy: in 2014 the so-called "Decreto Poletti" and in 2015 the so-called "Jobs Act". The former further liberalized the utilization of short-term contracts by removing for all short-term contracts, independently on their length, the obligation for employers to declare the precise reason why they would hire a worker with a short-term contract rather than with a permanent one. Even though this might seem like a marginal change, it is quite relevant, as if not reported correctly an employee can sue the employer and eventually obtain from the labour court the conversion of the short-term contract into a permanent one. Moreover, the reform increased the possibility of extension of the contract duration from one to five times, within the maximum duration of three years within the same company.

The "Jobs Act" approved in 2015 changed the permanent contract significantly. The new labour contract for all new open-ended jobs is based on graded security, with severance payments steadily increasing with tenure. This severance payment is flat at 4 months for the first two years, and then increasing with tenure up to a maximum of 24 months wages at a 12 years tenure. The Jobs Act also introduced a new form of out-of-court procedure, according to which the employer can pay the worker an indemnity equal to 2 monthly wages in the first two years of tenure and then an additional 1 monthly wage per year of service, with a maximum amount of 18 monthly after 18 years of service. The acceptance of this transaction prevents any further dispute by the worker, that is, appealing to courts for a

Figure 1. Statistics on fixed-term and permanent employees.



Source: Italian Institute of Statistics.

dismissal to be unfair or not. Both parties have a strong incentive to settle the dispute through this procedure, since the sum paid is not subject to social contributions or taxation. The new graded security contract also replaced the worker reinstatement with a monetary compensation for economic unfair dismissals. The new dismissal rules applied to all new hires on an open ended basis, and do not involve workers continuing on permanent contracts in firms with more than 15 employees, who continued to be protected by the reinstatement clause.

In addition, the 2015 Budget Law also introduced a sizable hiring subsidy for new hires in open ended contracts. The subsidy covered all new permanent workers hired by any firm from January to December 2015, provided the worker did not have a permanent contract in the previous 6 months and did not have a permanent contract with the same firm in the previous 3 months. The subsidy was a 3-year exemption from social security contributions up to a threshold of 8,060 € per year, which was quite high compared with the average contributions typically paid by firms for workers (Sestito and Viviano, 2018). Conversions from fixed-term to permanent job contracts within a given firm were also subsidized. The hiring subsidy applied uniformly in larger and smaller firms and there was no firm size threshold associated to this policy (Boeri and Garibaldi, 2019).

Finally, the 2016 Budget Law significantly reduced the hiring subsidy for new workers hired in open-ended contracts. With this intervention, the subsidy was shrunk to 40% of contributions for 2 years and then discontinued in 2017, when it applied only to young workers and to workers living in the southern part of the country (for 1 year).

3.1 Evolution of temporary and permanent contracts in Italy

Data from the Italian Institute of Statistics (Figure 1a) show that the number of workers on temporary contracts has been smoothly increasing in the period from June 2013 to June 2016. The Poletti Decree implemented in March 2014 did not seem to affect the already increasing trend of temporary employees. On the other hand the number of workers on permanent contracts has been fluctuating around 2,200 until March 2015, the time of the implementation of the Jobs Act, when it started significantly increasing until the end of December 2015, which marks the termination of the hiring subsidy for firms hiring workers

on a permanent contract. From January 2016, date in which the subsidy has been halved the number of permanent employees remained approximately stable.

As a result, the share of workers on a temporary contract (on the total number of employees) has been fluctuating around an increasing trend which lead the percentage to move from 13% to 15%.

4 The Model

We develop a continuous time search and matching model. The economy is populated by a continuum of workers and a continuum of firms. Workers are homogenous and the mass of workers is normalized to unity. All agents are risk neutral and discount the future at the interest rate r . Risk neutrality is a standard assumption in the search literature, which is a useful feature necessary to keep the environment analytically tractable. Firms post vacancies, which are either permanent (P) or temporary (T) in nature. They differ for the duration of the contract, open-ended versus limited length, respectively. We assume that unemployed workers and unfilled vacancies are brought together via a stochastic matching technology $m(u, v)$; where u and v denote respectively the number of unemployed workers and vacancies. The matching function exhibits standard properties: it is twice continuously differentiable, increasing in its arguments, linearly homogeneous and satisfies the Inada conditions. Using the property of constant returns to scale, we can write the flow rate of a match for a worker as $m(u, v)/u = m(\theta)$ and the flow rate of a match for a vacancy as $m(u, v)/v = q(\theta)$, where $\theta \equiv v/u$ is an indicator of the labour market tightness. Also, the above mentioned assumptions on the matching function imply that $m'(\theta) > 0$ and $q'(\theta) < 0$.

The instant a vacancy and a worker make contact, they bargain over the division of the surplus. Following the matching literature, we assume that match specific wages and profits are the outcome of a Nash bargaining between the parties with workers's bargaining share equal to $\beta > 0$. Wage contracts are renegotiated each time new information about the match is revealed (the productivity shock hits the match). After an agreement has been reached, production commences immediately. The output y is produced with a linear technology. The worker starts producing output with the productivity level y . Over time, matches sealed with a temporary contract are subject to idiosyncratic productivity shocks with arrival rate $\tau > 0$. Conditional on τ striking, the value of the match is drawn from the same distribution $F(x)$ and draws are i.i.d. over time and across production units. Moreover, we assume that both permanent and temporary matches dissolve at the rate s . Following a separation, the worker and the vacancy enter the market and search for new partners. The rest of this section offers a detailed description of the model.

4.1 Workers

Each worker is either unemployed or employed as an employee. Workers are homogeneous with productivity y . The unemployed accept or reject job offers as soon as they arrive. We assume that both permanent and temporary employees are dismissed and thus become unemployed at rate s . If hired on a temporary contract, a productivity shock can hit the match and workers can be upgraded to a permanent contract at rate τ , if the withdrawn

productivity level is high enough. Alternatively, their contract get extended and they hold their position. Any unemployed worker receives utility flow z per instant (z can be interpreted as an unemployment benefit). Given the above assumptions, the expected discounted lifetime income when an individual is unemployed, W^U , can be expressed as the solution to the following Bellman's equations:

$$rW^U = z + \theta q(\theta) [\phi W^P(y) + (1 - \phi)W^T(y) - W^U], \quad (1)$$

where $\theta q(\theta)$ is the probability to find a permanent versus temporary job, respectively and ϕ is the share of permanent jobs in the economy.

Similarly, the expected lifetime income of an employee who accept a job offer solves:

$$rW^P(y) = w^P(y) + s [W^U - W^P(y)], \quad (2)$$

$$rW^T(y) = w^T(y) + s [W^U - W^T(y)] + \tau \int_0^{+\infty} [\max\{W^P(y'), W^T(y')\} - W^T(y)] dF(y'), \quad (3)$$

where s is the termination rate, while τ is the rate at which a productivity shock hits the match.

4.2 Firms

Firms post vacancies, which are for either a permanent or a temporary job. Each firm posts at most one vacancy. A vacant firm bears a recruitment cost c and it fills a vacancy at rate $q(\theta)$.

$$rV^P = -c + q(\theta) [J^P(y) - V^P], \quad (4)$$

$$rV^T = -c + q(\theta) [J^T(y) - V^T], \quad (5)$$

$$rJ^P(y) = y - w^P + s [V^P - J^P(y)], \quad (6)$$

$$rJ^T(y) = y - w^T + s [V^T - J^T(y)] +$$

$$+ \tau \left[\int_0^{+\infty} \max\{J^P(y'), J^T(y') - c^e\} dF(y') - J^T(y) \right].$$

If the firm hires a temporary worker, the match is hit by a productivity shock at rate τ and at that point the firm has to decide whether to upgrade the worker to a permanent position or to extend the temporary contract. This decision depends on the new productivity level of the worker. If the firm decides to extend the temporary contract, it will have to pay an extension cost c^e . The cost includes the administrative expense the firm has to bear in order to justify the reason for the extension. Moreover, and most importantly for this work, it is a proxy for the possibility for the firms to extend the contract. If there is no possibility of extension, the cost would be infinite, if there are unlimited extensions, the cost would be zero.

4.3 Equilibrium

As there is free entry and exit on the firm side, an additional vacancy should make expected net profit equal to zero, that is, $V^P = V^T = 0$.

Definition (Stationary Equilibrium): *A steady-state equilibrium is a set $\{\theta, w^j, U\}$ where $j \in \{P, T\}$ such that*

1. *The free entry condition in the matching market $V^P = V^T = 0$ is satisfied.*
2. *The Nash bargaining optimality conditions 8-9 hold.*
3. *The numbers of employed and unemployed workers as well as of filled and unfilled vacancies of each origin remain constant.*

The definition of equilibrium is standard. Competition among entrant firms will bid up the rental price of a match until it equals exactly the flow expected present value of holding a match, bringing the value of a vacancy V to zero. Upon meeting, a firm and a worker will agree to create a new match as long as its value is strictly positive, given that being vacant has zero value. As explained above, wages are the outcome of Nash bargaining. Finally, the labour market is in equilibrium when the outflows out of unemployment are equal to the inflows into unemployment.

Since all workers and firms are risk neutral, Nash bargaining implies that the wage rate w^j , where $j \in \{P, T\}$ must be such that:

$$\beta(J^P - V^P) = (1 - \beta)(W^P - W^U), \quad (8)$$

$$\beta(J^T - V^T) = (1 - \beta)(W^T - W^U), \quad (9)$$

where $(1 - \beta)$ is the bargaining power of the firms and β is the bargaining power of the workers.

The first step in the characterization of the equilibrium is the derivation of the wage setting conditions, which provide an explicit solution for the wage functions. The wage setting conditions are derived using equations 2-3, 6-7 and 8-9, and read as:

$$w^P = \beta y + (1 - \beta)rW^U, \quad (10)$$

$$w^T = \beta y - \beta\tau F(\hat{y})c^e + (1 - \beta)rW^U, \quad (11)$$

where

$$W^u = \frac{1}{(r + \theta q(\theta))} \left[z + \frac{\beta}{1 - \beta} c\theta \right]. \quad (12)$$

Hence, W^u is continuous and strictly increasing in θ , but independent of ϕ . Intuitively, as the tightness of the labor market, θ , increases, workers find jobs faster; thus the value of unemployment is higher.

The job creation (JC) equations are obtained from the optimal hiring conditions $J^P(y) = 0$ and $J^T(y) = 0$, from Equations 4-7 and read as:

$$\frac{c^P}{q(\theta)} = \frac{y - w^P}{r + s} \quad (13)$$

$$\frac{c^T}{q(\theta)} = \frac{y - w^T + \tau \left(\int_{\hat{y}}^{+\infty} \frac{y - w^P}{r + s}, dF(y') - F(\hat{y})c^e \right)}{r + s + \tau(1 - F(\hat{y}))} \quad (14)$$

We can compute the threshold \hat{y} by which the firm is indifferent whether to extend the temporary contract at termination by paying an extension cost or whether to upgrade it to a permanent contract, i.e., $J^P(\hat{y}) = J^T(\hat{y}) - c^e$.

$$\frac{\hat{y} - w^P}{r + s} = \frac{\hat{y} - w^T + \tau \left[\int_{\hat{y}}^{+\infty} \frac{y - w^P}{r + s}, dF(y') \right] - c^e(\tau F(\hat{y}))}{r + s + \tau(1 - F(\hat{y}))} - c^e. \quad (15)$$

Recall that the mass of workers is equal to unity. Thus, the total mass of workers in the economy is $U + E^P + E^T = 1$. By equating the flows out of and into unemployment and both permanent and temporary employment, we can find the steady-state employment and unemployment:

$$U = \frac{s}{s + \theta q(\theta)}, \quad (16)$$

$$E^T = \frac{\theta q(\theta)[(1 - \phi)s + \tau(1 - F(\hat{y}))]}{(s + \theta q(\theta))(s + \tau(1 - F(\hat{y})))}, \quad (17)$$

$$E^P = \frac{\theta q(\theta)[\phi s + \tau(1 - F(\hat{y}))]}{(s + \theta q(\theta))(s + \tau(1 - F(\hat{y})))}. \quad (18)$$

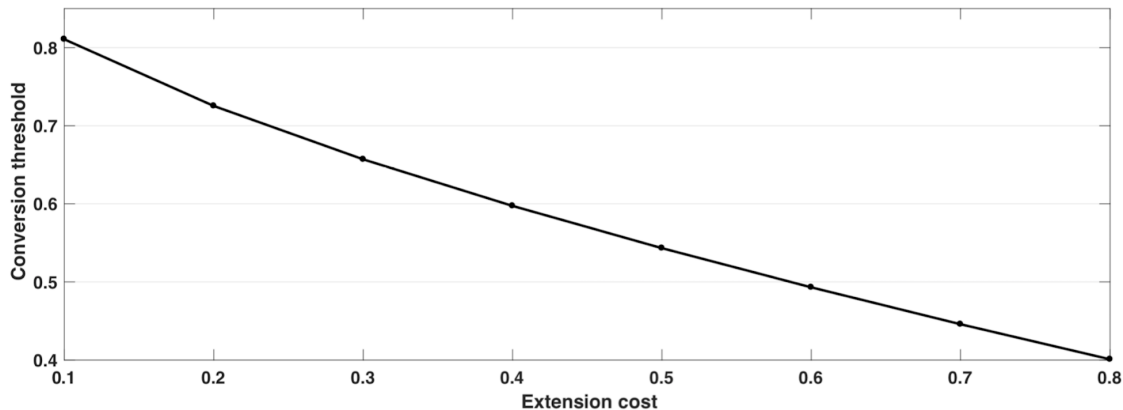
4.4 A simple calibration

By increasing the number of possible extensions to the duration of the temporary contract, we expect the probability of conversion of the short-term contract into an open-ended one to be lower. To assess the validity of our conjecture, we calibrate the model and perturb the parameter associated with the cost of extending a short-term contract. This calibration is not meant to match any specific economy, but serves the simple purpose of showing the impact of the reduction of the short-term contract extension cost on the conversion probability. Figure 2 shows the result of this experiment. As expected, whenever the cost of extending the short-term contract increases, the threshold which defines the conversion of temporary contracts into permanent ones decreases, leading to more transformations. This is quite intuitive as firms prefer to convert short-term contract into permanent ones whenever is more expensive to extend them.

Table 1. Calibration parameters.

Parameter	Description	Value
β	Bargaining power	0.5
r	Interest rate	0.01
τ	Rate at which the productivity shock hits the match	0.5
s	Rate at which the job destruction shock hits the match	0.1
c	Cost of extending the short-term contract	0.5

Figure 2. Effect of extension cost on conversion threshold.



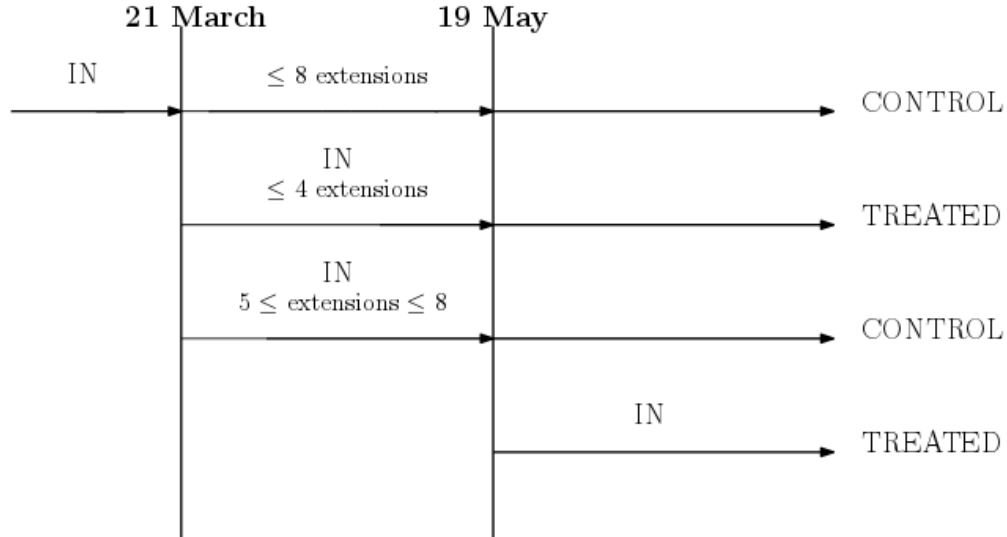
5 Empirical analysis

5.1 Identification strategies

Until the approval of the Poletti Decree, the short-term contract could be extended only once within the maximum length of 36 months. The Poletti Decree was first introduced as a Legislative Decree on March 21, 2014. This first decree introduced a maximum number of extensions within the same maximum length of 36 months equal to 8. Two months later, on May 19, 2014 the Poletti Law was approved and the number of extensions within the same maximum duration of 36 months was reduced to 5. Due to these changes and the possibility that different short-term contracts could be overlapping across these time periods, a guide was released with details on which contracts could be extended and for how many times (Figure 3). It turns out that contracts which started before March 21, 2014 and were not extended in the transitory period (21 March and 19 May) could be extended once, while those which started in the same time period but were extended once in the transitory period could not be extended anymore (group 1). Contracts which started in the transitory period (21 March and 19 May) and were extended in the transitory period less than 5 times could be extended for a maximum of 5 times after May 19 (group 2). Contracts which started in the transitory period (21 March and 19 May) and were extended in the transitory period at least 5 times could not be extended anymore after May 19 (group 3). Contracts which started after the transitory period (after May 19) could be extended for a maximum of 5

times (group 4). We define as control, workers hired on short-term contracts that could not be extended or could be extended at most once after May 19 (group 1 and 3). We define as treated, workers hired on short-term contracts that could be extended at most 5 times, as described in the Poletti Law, after May 19 (group 2 and 4). As it turns out that there are no workers in group 3, the date of March 21, 2014 becomes the date that allocates workers into the two groups.

Figure 3. Poletti decree application guide.



We identify a period of time around the date of March 21 to select our workers. Specifically we consider workers hired on a short-term contract between January 01, 2014 and March 21, 2014 as workers in the control group. Workers hired on a short-term contract between March 21, 2014 and March 31, 2014 represent our treated group.

5.1.1 Workers

We focus on workers hired for the first time in 2014 on a short-term contract with a termination date later than December 2016.

We use a difference in differences estimation strategy. We define the control group as those workers who entered the labour market for the first time in 2014 and were hired on a short-term contract, just before the Poletti decree was implemented. We define as treated those workers who entered the labour market for the first time in 2014 and were hired on a short-term contract, just after the Poletti decree was implemented. We follow these two categories of workers over time and specifically, we observe from the starting date of their contract whether they were upgraded or not to a permanent position. The dependent variable is the probability of each worker in our sample to be upgraded from a temporary to a permanent position. We expect the impact of the liberalization of fixed-term contracts to have a negative effect on the probability of conversion and we expect the effect to be stronger in the first few months of 2015. Therefore, we split the period of observation in two sub-periods, from January to March, in which only the subsidy was active, and from

March to December, when also the *Jobs Act* entered into force. Specifically, we estimate the following baseline specification:

$$\begin{aligned} \Pr(T_i = 1) &= \alpha + \beta \text{Treated}_i + \sigma \text{Post1} + \lambda \text{Post2} \\ &+ \gamma \text{Treated}_i \text{Post1} + \delta \text{Treated}_i \text{Post2} + \epsilon_i \end{aligned} \quad (19)$$

where "Treated" is a dummy variable which takes value one if the worker is in the treated group and zero otherwise. "Post1" is a dummy variable which takes value one in the period January-March 2015, while "Post2" is a dummy variable which takes value one in the period April-December 2015. Finally, ϵ_i is the error term. We cluster the standard errors at firm level. We are interested in the coefficients γ and δ of the interactions between the dummy variable "Treated" and the dummy variables "Post1" and "Post2", respectively.

Next, we split the treatment period in each month, by estimating the following model:

$$\Pr(T_{ij} = 1) = \alpha + \beta \text{Treated}_i + \sum_{j=1}^{n_i} \gamma_j \text{Month}_j + \sum_{j=1}^{n_i} \delta_j \text{Month}_j \text{Treated}_i + \epsilon_{ij} \quad (20)$$

where "Month $_j$ " is a set of j dummy variables which identify the months starting from September 2014 until the end of December 2015. In the period September 2014-December 2014, we expect the effect to be zero, as this is the pre-treatment period where the parallel trend assumption between treated and control groups should hold in order for our estimation approach to be valid.

5.1.2 Firms

In a second identification strategy, we focus on firms born for the first time in 2014. Also for the case of firms, we use a difference in differences estimation strategy. We define the control group as those firms which were born for the first time in 2014, just before the Poletti decree was implemented. We define as treated those firms which were born for the first time in 2014, just after the Poletti decree was implemented. As for new entrant workers, we follow these two categories of firms over time and specifically, we observe how the composition of temporary and permanent workers within the workforce has changed. The dependent variable "SP" $_{ij}$ is the share of permanent workers within firm i in Month j . Specifically, we estimate the following model:

$$\begin{aligned} \text{SP}_{ij} &= \alpha + \beta \text{Treated}_i + \sigma \text{Post1} + \lambda \text{Post2} \\ &+ \gamma \text{Treated}_i \text{Post1} + \delta \text{Treated}_i \text{Post2} + u_i \end{aligned} \quad (21)$$

where "Treated" is a dummy variable which takes value one if the firm is in the treated group and zero otherwise. "Post1" is a dummy variable which takes value one in the period January-March 2015, while "Post2" is a dummy variable which takes value one in the period April-December 2015. Finally, u_i is the error term. We cluster the standard errors at firm level. We are interested in the coefficients γ and δ of the interactions between the dummy variable "Treated" and the dummy variables "Post1" and "Post2", respectively.

Next, we split the treatment period in each month, by estimating the following model:

$$SP_{ij} = \alpha + \beta \text{Treated}_i + \sum_{j=1}^{n_i} \gamma_j \text{Month}_j + \sum_{j=1}^{n_i} \delta_j \text{Month}_j \text{Treated}_i + u_{ij} \quad (22)$$

In the period September 2014-December 2014, we expect the effect to be zero, for the parallel trend assumption to be satisfied.

6 Data

In this paper we use two data sources: the administrative microdata from the *Comunicazioni Obbligatorie* and the administrative data of the Italian population, provided by the Italian National Social Security Institute (INPS). In Italy employers are required to electronically file all occurrences concerning a job position to the Regional agencies in charge of active labour market policies (and to the Italian social security institute, INPS). Microdata archives, which cover only employees in the private sector and part of the public sector, are collected and organized by each Italian region. The database collects information on the opening, termination, and extension or conversion of contracts. Our dataset contains information regarding all events (hiring, firing, conversion and fixed-term contract extended duration) that occurred in Italy between January 2014 and December 2016. For each event recorded in our dataset it is possible to identify both the firm and the worker involved. On top of the relevant anonymized identifiers (firm and worker), we know the firm’s size (by size class) and sector of activity and the worker’s gender, birth-date, education level and nationality. For each event we know the type of job contract, i.e. whether permanent or fixed-term. The latter group includes: (i) short-term contracts, (ii) agency workers, (iii) apprentices, (iv) consultants (so-called *parasubordinati*, i.e. a sort of consultants employed on a temporary basis) and (v) internships (so called *tirocini-formativi*).

We select first a sample of workers who entered for the first time in the labour market in the period January 2014-May 2014 and were hired on a short-term contract. We split the workers in treated and control according to whether their initial date of work was before (control) or after March 21st (treated). We keep only workers for which their contract is still active in December 2014.

Table 2. Descriptive statistics for new workers.

	Control	Treated
Age	27.71	27.57
Female	48.11	51.34
Primary Education	32.12	38.02
Secondary Education	32.82	29.08
Tertiary Education	35.05	32.88
# Observations	1.569	1.712

In Table 2, we report descriptive statistics for the sample of selected workers. Our sample includes 3281 workers, of which 1569 are in the control group and 1712 in the treated group.

Among the two groups, the individual characteristics are similar. The average age is approximately 27, the sample is split evenly among men and women, and also in terms of education approximately one third of workers holds a primary level, one third holds a secondary level and one third holds a tertiary level.

We then select a sample of firms which were born for the first time in the period January 2014-May 2014. We split the firms in treated and control according to whether their initial starting date was before (control) or after March 21st (treated). We keep only firms still active in December 2014. In Table 3, we report descriptive statistics for the sample of selected firms. Our sample includes a total of 42727 firms, of which 35590 belong to the control group.

Table 3. Descriptive statistics for new firms.

	Controls	Treated
Mean # Employees	3.29	1.78
Mean # Permanent	2.55	1.22
Mean # Temporary	0.74	0.56
Mean # Seasonal	0	0
Mean # Full-time	3.32	2.13
Mean # Part-Time	2.40	2.03
North-West	0.26	0.20
North-Est	0.18	0.13
Center	0.22	0.22
South	0.22	0.29
Islands	0.09	0.13
Manufacturing	0.14	0.11
Constructions	0.12	0.17
Commerce	0.24	0.24
Hotels and Restaurants	0.13	0.21
# Firms	35.590	7.137

When looking at firms, the average number of employees and the average number of permanent employees is slightly higher in the control group compared to the treated group. The share of temporary workers is comparable as well as the share of full-time and part-time workers. We have removed from the sample all seasonal workers. In terms of geographical and sector allocation, the distribution is similar among the two groups.

7 Results

7.1 Workers

Results for the sample of the new workers are reported in Table 5. In Column 1 the estimates are reported for the all sample of workers. The average probability of conversion from a temporary to a permanent contract is 30.3%. We observe a negative effect of the additional flexibility brought by the *Poletti Decree* on the probability of upgrading a temporary worker to a permanent contract in period 1 (January-March 2015). The probability of conversion

Table 4. Estimation results for the sample of new workers by gender.

	Probability of conversion		
	Total	Females	Males
Treated x Post1	-0.124*** (0.007)	-0.125*** (0.011)	-0.123*** (0.010)
Treated x Post2	-0.051*** (0.006)	-0.078*** (0.009)	-0.025*** (0.008)
Constant	0.033 (0.002)	0.031 (0.003)	0.034 (0.003)
Mean	30.3%	30.0%	30.5%

is 12.4 percentage points lower among workers hired on a more flexible temporary contract. The effect is still negative and persistent in period 2 (April-December 2015), although smaller in magnitude (5.1 percentage points lower among workers hired on a more flexible temporary contract).

In order to investigate the presence of heterogeneous effects among categories of workers, we split the sample by gender (Column 2 and 3 of Table 5)). We find that for both males and females the effect is negative and significant in period 1 and the magnitude of the effect is similar across the two categories of workers. The probability of conversion is 12.4 percentage points lower among workers hired on a more flexible temporary contract. However, in period 2 the effect, although being negative and significantly different from zero for both categories, is much larger for the female group. Female workers hired on more flexible contracts experience a lower probability of upgrading of 7.8 percentage points, compared to a reduced probability of upgrading of 2.5 percentage points for males. This means that for women hired on a very flexible temporary contract (treated group) the probability to be converted into a permanent contract is much lower compared to women hired on a less flexible temporary contract (control) and compared to men hired on similar flexible contracts, even twelve months after the hiring date.

Table 5. Estimation results for the sample of new workers by education level.

	Probability of conversion		
	Primary	Secondary	Tertiary
Treated x Post1	-0.077*** (0.012)	-0.143*** (0.014)	-0.146*** (0.013)
Treated x Post2	-0.045*** (0.009)	-0.085*** (0.011)	-0.013 (0.111)
Constant	0.034*** (0.004)	0.029*** (0.005)	0.035*** (0.004)
Mean	23.8%	31.7%	35.1%

We then split the sample by education levels. The effect is negative and significant across all 3 education levels in period 1. The effect disappears in period 2 for tertiary educated workers, while it persists for primary and secondary educated workers, with the

latter experiencing a lower probability of conversion compared to the former.

7.2 Firms

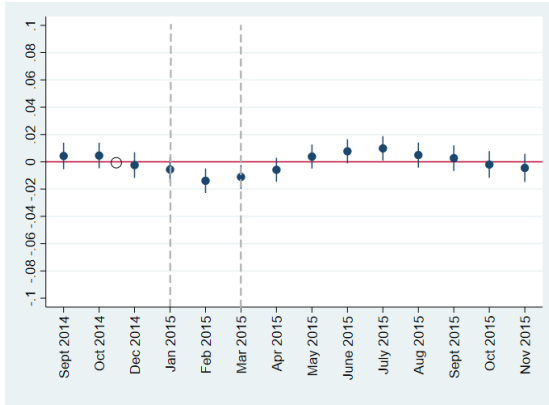
Results for the sample of the new workers are reported in Table 6. In Column 1 the estimates are reported for the all sample of firms. We observe a negative and significant effect in period 1 (January-March 2015). This means that in treated firms (subject to the new regulation) the share of permanent employees is smaller in period one compared to firms in the control group (subject to the previous regulation). Also for the case of firms, we observe that the additional flexibility had a negative effect on the percentage of workers converted to a permanent contract. Specifically, the share of permanent employees is 1 percentage point lower in treated firms compared to the group of control. As the average share of permanent employees is 61.8%, this means that the average share of permanent employees in treated firms is 2% lower in the Jan-March 2015 period. However, this effect is not persistent as in the second period, we do not find any significant effect. When breaking the sample by sector (Column 2, 3 and 4 of Table 6), we observe that in specific sectors, such as Manufacturing, Commerce and Hotels and Restaurants, the effect larger in period 1 and it is significant also from April to December 2015. As the average share of permanent employees is 65.2% in the manufacturing sector, this means that the average share of permanent employees in treated firms is 3% lower in period 1 and 2% lower in period 2. For firms operating in the Commerce the share of permanent employees is 3% lower in both periods, while for firms in the Hotels and Restaurants sector, the share is 5% lower in period 1 and 2.5% lower in the April-December 2015 period.

We then report the results of the month by month estimation (Equation ??). Figure 4 confirms that on average the effect is negative and significant for period 1 only (January-March 2015), however there is significant heterogeneity across sectors. While in the Manufacturing, Commerce and Hotel and Restaurants, the effect is negative until December 2015, in the Constructions sector the effect is not persistent.

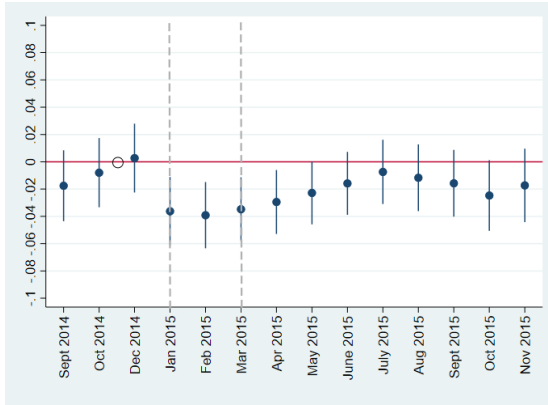
Table 6. Estimation results for the sample of new firms by sector.

	% Permanent Employees			
	Total	Manufacturing	Commerce	Hotels
Treated x Post1	-0.011*** (0.002)	-0.031*** (0.006)	-0.021*** (0.004)	-0.025*** (0.005)
Treated x Post2	0.00 (0.001)	-0.012*** (0.005)	-0.023*** (0.003)	-0.012*** (0.004)
Constant	0.6400 (0.0005)	0.670 (0.001)	0.702 (0.001)	0.480 (0.001)
Mean	61.8%	65.2%	67.9%	49.2%

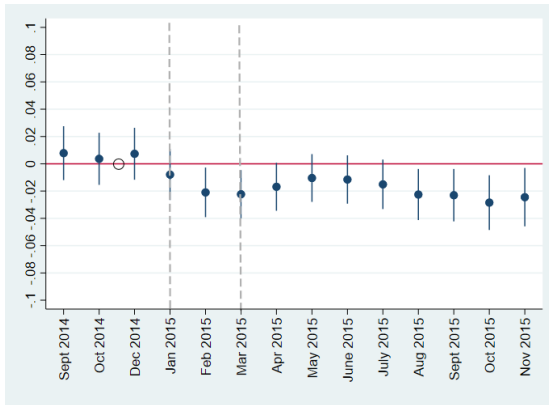
Figure 4. Share of permanent employees in treated and control firms.



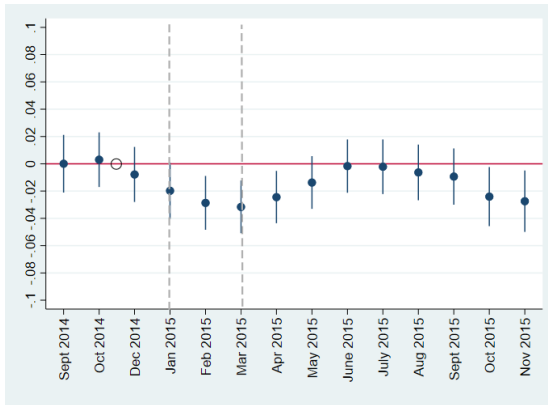
(a) Total.



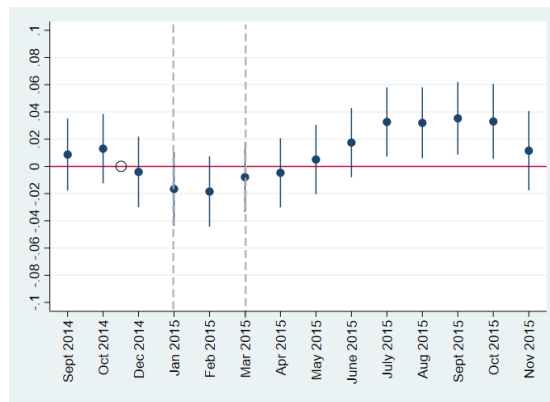
(b) Manufacturing.



(c) Commerce.



(d) Hotel and Restaurants.



(e) Constructions.

8 Conclusions

In this paper we investigate the way in which the degree of flexibility of short-term contracts in dual labour markets affects the success of reforms which aim at decreasing labour market segmentation. We find that as a result of the increased flexibility of short-term contracts the conversion rate to open-ended contracts has significantly and persistently decreased in Italy. We also report interesting heterogenous effects by sector and categories of workers, such as women and less educated workers.

9 Appendix

$$\frac{(1-\beta)(\hat{y}-rW^U)}{r+s} + c^e = \tag{23}$$

$$\frac{(1-\beta)(\hat{y}-rW^U) + \beta\tau F(\hat{y})c^e + \tau \left[\int_{\hat{y}}^{+\infty} \frac{(1-\beta)(y-rW^U)}{r+s}, dF(y') \right] - c^e(\tau F(\hat{y}))}{r+s + \tau(1-F(\hat{y}))}. \tag{24}$$

$$\begin{aligned} (1-\beta)\tau(1-F(\hat{y}))\hat{y} &= (1-\beta)\tau \left[\int_{\hat{y}}^{+\infty} (y-rW^U), dF(y') \right] \\ &- [(r+s)(r+s+\tau(1-F(\hat{y}))) + (1-\beta)(r+s)\tau F(\hat{y})]c^e \\ &+ (1-\beta)\tau(1-F(\hat{y}))rW^U. \end{aligned} \tag{25}$$

If we assume F is uniformly distributed in the range (0, 1), we get:

$$\begin{aligned} (1-\beta)\tau(1-\hat{y})\hat{y} &= (1-\beta)\tau \left[(1/2 - \hat{y}^2/2) - rW^U(1-\hat{y}) \right] \\ &- [(r+s)(r+s+\tau(1-\hat{y})) + (1-\beta)(r+s)\tau\hat{y}]c^e \\ &+ (1-\beta)\tau(1-\hat{y})rW^U. \end{aligned} \tag{26}$$

$$\begin{aligned} &- \frac{(1-\beta)\tau}{2}\hat{y}^2 + [(1-\beta)\tau - \beta(r+s)\tau c^e]\hat{y} \\ &+ [(r+s)(r+s+\tau)]c^e - \frac{(1-\beta)\tau}{2} = 0. \end{aligned}$$

References

- Ardito, C., F. Berton, and L. Pacelli (2019). The combined effects of hiring subsidies and firing costs. evidence from a natural experiment.
- Bentolila, S., P. Cahuc, J. J. Dolado, and T. Le Barbanchon (2012). Two-tier labour markets in the great recession: France versus Spain. *The Economic Journal* 122(562), F155–F187.
- Berton, F. (2008). The (long) run out of unemployment are temporary jobs the shortest way. *LABORatorio Revelli Working Paper* 76.
- Blanchard, O. and A. Landier (2001). The perverse effects of partial labour market reform: fixed-term contracts in France. *The Economic Journal* 112(480), F214–F244.
- Boeri, T. and P. Garibaldi (2009). Beyond eurosclerosis. *Economic Policy* 24, 409–461.
- Boeri, T. and P. Garibaldi (2019). A tale of comprehensive labor market reforms: Evidence from the italian jobs act. *Labour Economics* 59, 33–48.
- Booth, A. L., J. J. Dolado, and J. Frank (2002). Symposium on temporary work: Introduction. *The Economic Journal* 112(480), F181–F188.
- Booth, A. L., M. Francesconi, and J. Frank (2002). Temporary jobs: stepping stones or dead ends? *The Economic journal* 112(480), F189–F213.
- Bovini, G., E. Viviano, et al. (2018). The italian "employment-rich" recovery: a closer look. Technical report, Bank of Italy, Economic Research and International Relations Area.
- Cahuc, P. and F. Postel-Vinay (2002). Temporary jobs, employment protection and labor market performance. *Labour Economics* 9(1), 63–91.
- de Graaf-Zijl, M., G. J. Van den Berg, and A. Heyma (2011). Stepping stones for the unemployed: the effect of temporary jobs on the duration until (regular) work. *Journal of population Economics* 24(1), 107–139.
- Dolado, J. J. (2016). Eu dual labour markets: Consequences and potential reforms. *Economics without Borders. Economic Research for European Policy Challenges* (Cambridge: Cambridge University Press, 2016).
- Dolado, J. J., M. Jansen, F. Felgueroso, A. Fuentes, and A. Wöfl (2013). Youth labour market performance in spain and its determinants.
- García-Pérez, J. I., I. Marinescu, and J. Vall Castello (2019). Can fixed-term contracts put low skilled youth on a better career path? evidence from spain. *The Economic Journal* 129(620), 1693–1730.
- García-Pérez, J. I. and F. Muñoz-Bullón (2011). Transitions into permanent employment in spain: An empirical analysis for young workers. *British Journal of Industrial Relations* 49(1), 103–143.

- Güell, M. and B. Petrongolo (2007). How binding are legal limits? transitions from temporary to permanent work in Spain. *Labour Economics* 14(2), 153–183.
- Holmlund, B. and D. Storrie (2002). Temporary work in turbulent times: the swedish experience. *The economic journal* 112(480), F245–F269.
- Saint-Paul, G. (1997). Dual labor markets: A macroeconomic perspective. *The MIT Press*.
- Sestito, P. and E. Viviano (2018). Firing costs and firm hiring: evidence from an Italian reform. *Economic Policy* 33(93), 101–130.
- Tealdi, C. (2019). The adverse effects of short-term contracts on young workers: evidence from italy. *The Manchester School* 87(6), 751–793.