

Does Employment Protection Affect Educational Mismatch?*

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April 5, 2017

Abstract

The objective of this paper is to provide new evidence on the effect of employment protection on educational mismatch using a novel matched employer-employee flows dataset. To achieve this goal, we evaluate the way mismatch within firms has changed after the implementation of two important labour market reforms approved in Italy in the early 2000s, which reduced the EPL associated with temporary contracts. We find that both the absolute flows of mismatched workers and over-educated workers and the relative flows to the total employment flow decreased as a result of the implementation of the short-term contract reform, particularly among women. The apprenticeship reform instead had a significant impact on the mismatch flow, by increasing the flow of under-educated workers.

Keywords: temporary contracts, labour market reforms, educational mismatch.

JEL Classification: J24, J62, J63.

1 Introduction

Currently, mismatched workers in OECD countries account for approximately 25 percent of the total workforce. Over-skilling is generally more common than under-skilling, with being over-skilled on average roughly two and a half times more widespread than being under-skilled (McGowan & Andrews, 2015). Educational mismatch, particularly in the form of over-education, is potentially quite costly not only for the society as a whole, but also for firms and individuals. It represents a waste in tax revenues for the economy due to the financing of excessive levels of education;

*We thank Pierre Cahuc, Juan Dolado, Andrey Launov, Fabiano Schivardi, Andrea Weber and seminar participants at SaM conference 2014, AIEL 2015, EARIE 2015, ESPE 2015 and 2016, IAAE 2016 and SIE 2016 for useful comments. We acknowledge funding from the Einaudi Institute for Economics and Finance (EIEF).

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it implies a loss in efficiency for firms if over-educated workers are less productive than their adequately educated colleagues. Finally, it is a cost for individuals, as over-educated workers may earn less than their former classmates doing jobs that match their education.

A recent institutional document (European Commission, 2013) reported that educational mismatch is particularly severe in Mediterranean countries, characterized by more segmented labour markets. Moreover, younger male workers hired on non-standard contracts, which are typically associated with lower employment protection are predominantly affected. In the literature most of the empirical studies on over-education investigate whether mismatch is more severe within particular groups, according to gender, age and race. Dekker *et al.* (2002) find that young workers are more likely to be over-educated: in their Dutch sample the proportion falls from more than 40% for the 15-19 age group to 27% for the 30-44 age group to 18% for the 49-64 age group. Renes & Ridder (1995) find that women need to have almost six month more work experience than men to be hired on the same job, which makes them over-qualified. Along the same line, Groot & Maassen Van Den Brink (2000) show that over-education is more frequent among women than among men, but the opposite is true for under-education. However, the likelihood of being over-educated is approximately the same for men and women. Finally ethnic minorities may also be more over-educated compared to ethnic majorities. Duncan & Hoffman (1981) find that 49% of black males are over-educated compared to 42% of the US male workforce. Similarly, Alpin *et al.* (1998) find that 30% of non-white graduates in the UK were over-educated compared to 27% of white graduates. While in the literature the evidence that certain groups of workers defined according to gender, age and race are more exposed to the mismatch phenomenon is rather robust, studies that focus on the relationship between mismatch and employment protection (EPL) provide ambiguous results. In an influential work, Lazear (1998) show that when firms face barriers to laying off due to legal or other institutional impediments (e.g., powerful trade unions), the quality of the workers is compromised and they can eventually be displaced. Brunello *et al.* (2007) also argue that employment protection legislation might increase the extent of skill mismatch by making it harder for individuals to obtain their first job and for firms to reduce staff due to hiring restrictions. Finally, Di Pietro (2002) finds that firing restrictions may prevent firms from immediately taking advantage of upward changes in skilled workforce availability, discouraging them from adopting new technologies and reducing the number of vacancies that can be filled with high-skilled workers. Moreover, a high degree of employment protection may also tend to lock highly educated workers into relatively poor matches by making it more difficult for them to obtain a new position and may indirectly lead to a higher incidence of over-education by pushing the economy towards a "low-skill, low-technology trap". However, Daly *et al.* (2000) find that schooling mismatch is not correlated with institutional issues such as labour market flexibility, in line with a universalistic view of labour markets. Finally, Verhaest & van der Velden (2013) fail to find a significant correlation between employment protection legislation and the incidence of over-qualification.

Given the ambiguity of the results in the existing literature, there is a clear need for further research in the area. The purpose of this paper is therefore to shed some light on the effect of employment protection on educational mismatch, both in terms of total mismatch and in terms of its components (over- and under-education), by taking advantage of a number of labour market reforms, which reduced the strictness of the regulation associated with temporary contracts.

We focus our study on Italy for two main reasons. First, Italy is a particularly suitable country

since the implementation of several labour market reforms (1997, 2001 and 2003) reduced the strictness of the employment protection legislation (EPL) associated with temporary contracts (Figure 1a).¹ As these reforms created important incentives for firms to substitute permanent with temporary employment (Tealdi, 2011a), the share of temporary contracts increased significantly (Figure 1b). Second, the magnitude of educational mismatch in Italy is one of the highest among OECD countries (McGowan & Andrews, 2015; Verhaest & van der Velden, 2013). The incidence of mismatch ranges from around one-third in Italy, Spain and the Czech Republic, to less than one-fifth in a diverse set of countries, including Sweden and the United States. Even in terms of under-skilling, Italy ranks as the country with the highest rate among OECD countries (McGowan & Andrews, 2015). Looking at workers who just step into the labour market, McGuinness & Sloane (2011) find that at the time of their first job the share of over-educated workers is approximately 23%, while it is approximately 13% five years after graduation.

To pursue our objective, we match a longitudinal dataset for workers in the Italian region Veneto (PLANET), which provides information on the universe of workers' flows in the private sector over the period 1998-2011, with the AIDA dataset, which contains firms' balance sheets information, and we focus on the matched corporate firms. We propose a difference in differences model, in which we take advantage of two institutional reforms occurred in 2001 and 2003 to study the way educational mismatch among temporary workers has changed before and after the reforms. The 2001 reform liberalized the utilization of short-term contracts, by expanding the circumstances in which short-term contracts could be utilized. However, the actual implementation had to wait for the approval of collective bargaining, which took place in different sectors at different times. The 2003 reform further deregulated the use of the apprenticeship contract. The law required regional governments or industry-specific collective agreements to issue implementation guidelines, and therefore the actual implementation happened in different regions and sectors at different times. We follow the identification strategy of Cappellari *et al.* (2012), and take advantage of the variation in the implementation of the two reforms to identify their effects on workers mismatch. It is important to keep in mind that the two types of contracts directly affected by the reforms significantly differ for their training content: while the short-term contract does not involve any type of training for the worker, with apprenticeship the employer is obliged to provide on the job training at its own expenses. This difference might have had a strong impact on the scope these contracts are used for and therefore might have had an effect on the workers' career within the firm.

We find that both reforms had a significant impact on the share of educationally mismatched workers flows. Specifically, the short-term contract reform had a negative impact on the absolute and relative flows of over-educated workers, while had no effect on the flows of under-educated workers. Instead, the apprenticeship reform is found to have no impact on the flows of over-educated workers, but a positive and significant impact on the absolute flow of under-educated workers. These results seem to suggest that by enabling workers to escape from relatively poor matches and by providing flexibility to the firms to substitute workers with different skills level, the liberalization of short-term contracts in Italy helped decrease the workers' mismatch phenomenon

¹The OECD indicator for temporary employment that measures the strictness of regulation only refers to the use of fixed-term and temporary work agency contracts. This is the reason why the indicator does not reflect the effects of the 2003 apprenticeship reform.

in terms of over-education. However, we also find evidence of an increase in under-education after the implementation of the apprenticeship reform, potentially due to the newly introduced possibility to combine schooling with work experience.

Our paper is organized as follows. Section 2 presents an overview of the Italian institutional background and describes in details the content of the two labour market reforms. Section 3 describes the data and the descriptive statistics and Section 4 presents the methodology. Section 5 illustrates the results. Finally, Section 6 concludes the paper.

2 Institutional background

In Italy, since 1942 open ended contracts associated with quite rigid EPL and high firing costs represented the traditional legal instrument to hire workers. These contracts are also characterized by the highest wedge between gross salary and labour costs, due to high labour taxes and social security contributions. Since the early 60s, short-term contracts were regulated. They share the same characteristics as the open-ended contracts, but for the limited duration established at stipulation (only one possibility of renewal, for a total maximum length of 3 years). Due to strict rules for adoption, which limited significantly the scope for utilization, their percentage was small until the nineties. Two other types of quasi substitute fixed-term contracts were available since the 70s: apprenticeship and *Contratto di Formazione Lavoro* (vocational training contract). They were meant to train individuals to learn a profession and therefore, were specifically designed for young workers.² They differed in the maximum length of the contract, however both required training to be provided by the employer. The apprenticeship contract was in general longer and demanded more training, compared to the vocational training contract. However, firms were entitled to a reduction in the social security fees for the workers hired with an apprenticeship contract. Moreover, controls for training were much stricter for apprenticeship and were organized at both national and local levels.

On the wave of liberalization of the European labour markets, in the past two decades many reforms have been approved in Italy to relax the rules for the utilization of fixed-term contracts and several new types of employment contracts (with fixed duration) have been legislated.³ The objectives of these interventions, in accordance with the European guidelines, were the reduction of unemployment, particularly among young people, the increase of labour force participation, and the boosting of employment. Indeed, employment, unemployment, and labour force participation in the nineties in Italy were significantly worse compared to other European countries. Young and long term unemployment rates were higher than the EU average (respectively 31% and 70% compared to 16% and 44%),⁴ labour force participation and employment were among the lowest in Europe, particularly among women (44% and 36% compared to the average 54% and 49% among the EU countries).⁵ In order to promote the utilization of these new forms of employment contracts,

²Together they represented less than 10% of the total number of contracts.

³See Tealdi (2011b) for an extensive description of these reforms.

⁴Average rate across 19 European countries. 15-24 years old cohort. Unemployment duration longer than 1 year. Year: 1990. Source: OECD.

⁵Average rate across 19 European countries. Year: 1990. Source: OECD.

new government subsidies were provided to reduce the relative cost of fixed-term contracts (social security fees) compared to open-ended contracts. Moreover, the shorter and flexible length of fixed-term contracts and the possibility to dismiss the worker at expiration at no cost created additional incentives for their adoption by firms. The combination of more flexible and cheaper hiring/firing decisions, and the lower labour cost burden, was the recipe adopted to trigger a more competitive labour market.

Specifically, in the time period we consider (1998-2007) two were the major reforms implemented with the objectives of improving labour market flexibility. The first reform was approved in 2001. With Law-368/2001, the Italian legal system by implementing a 1999 EU Directive removed the strict rules for adoption of short-term contracts and allowed firms to use short-term contracts under many different circumstances according to organizational, productive and technical needs. The second reform was approved in 2003. With Law-30/2003, known as Legge Biagi, new additional forms of atypical contracts (such as job on call and job sharing) were introduced and several modifications to the vocational training contract were legislated. However, the main novelty was the relaxation of the rules for the utilisation of apprenticeship contracts. Specifically, the age eligibility was extended and the possibility to perform on the job training within the firm (instead of outsourcing it to specific external institutions) was introduced. These changes were made in order to make the apprenticeship contract more flexible and therefore more appealing for firms, promoting their utilisation.

2.1 The short-term contract reform

The regulations of short-term contracts were heavily modified by the Legislative Decree no. 368/2001. The main novelty is in the circumstances in which short-term contracts could be utilized. Before the reforms short-term contracts could only be used under specific circumstances, which were specifically listed by the law, such as the replacement of workers on leave or a sudden increase in production. After 2001 short-term contracts could be utilized for any reason of a technical, organisational, production or replacement nature, broadening the scope for utilization.

While this modification was introduced in order to increase the flexibility associated with the short-term contract, allowing firms to use more of them to quickly adapt to changes in economic conditions (Tiraboschi, 2004), in reality the relaxation of these rules and the liberalization of short-term contracts created a sort of confusion among employers regarding the actual requirements for adoption (Aimo, 2006). Specifically, it was not clear whether employers could use short-term contract also for activities which are not of temporary nature. Moreover, in case of court disputes, the applicability relied too much on the interpretations of the judges, causing delays and high uncertainty on the potential outcome. The risk incurred by firms of being obliged to convert short-term contracts in permanent contracts after a court appeal created important disincentives for their adoption (Venn, 2009). There is not much evidence in the literature of the effect of this reform on the actual utilization of short-term contracts. The only study is the paper by Cappellari *et al.* (2012) who show that the reform had a positive effect on short-term contracts turnover, but no effect on the employment growth of short-term contracts. In this paper we will provide some more evidence on this issue.

A second modification introduced by the law is the abolishment of the possibility for unions

to add a list of specific reasons for the use of fixed-term contracts over and above those contained in the national legislation, through collective bargaining agreements at industry level. According to the new legislation, however, collective bargaining was responsible for setting the maximum percentage of fixed-term employees in firms' total employment. For this reason, in order to be effective in a given industry the new law had to wait for the renewal of the specific collective agreements. In practice, all collective agreements confirmed the maximum share of fixed-term contracts set in the previous bargaining rounds, so no differences were introduced by the reform on employment flexibility across industries.

Nevertheless, only industries with contracts negotiated after the law was implemented could utilize the new short-term contract. After 2001, the renegotiation of collective bargaining agreements at sectoral level only occurred in some industries such as Textiles, Wood Products, Chemicals, Construction, Transportation, Retail Trade, Food Products and Telecommunication, with contracts signed mostly in 2005 and 2006. Other important sectors of the economy such as Metal Manufacturing and Banking renewed the collective agreements during the period but decided to postpone the implementation of the "new" short-term contract to a later agreement which took place after the period covered by this study. We are going to take advantage of this variation across sectors in our identification strategy.

2.2 The apprenticeship reform

Apprenticeship is a type of temporary employment contract, which targets young workers (below the age of 25). The employer is required to provide the apprentice with training, which must be performed during working hours by local authorities or accredited training institutions. At the end of the training period, the acquired qualifications are asserted by a formal certification. The labour costs associated with the apprenticeship are lower than regular contracts' to compensate for the training costs incurred by the firms. Specifically, social security contributions amount to one third of permanent and other forms of temporary contracts' (fixed-term and temporary help agency contracts) and to one half of col labouration contracts'.

The "Biagi Law" simplified the regulations of the contract, by significantly modifying a number of features, specifically in terms of eligibility and training content. First, the limit for eligibility was raised from 25 to 29 years old; and second, the new legislation introduced the option for firms to supply training at the workplace as a substitute for external training courses. On one hand, the possibility to provide training at the workplace makes it harder the monitoring of compliance. On the other hand, this innovation can also be seen as attempt to tackle the inefficiencies of local authorities in providing training, when insufficient public funding and lack of infrastructures could hinder the regular provision of training.

The new apprenticeship has been modified also in response to some educational reforms which increased the years of compulsory schooling in order to guarantee the right for individuals to combine and accumulate at the same time schooling and work experience. Students between the age of 15 and 18 can indeed absolve their obligation in regular schools, by participating to full-time vocational courses, or through apprenticeships. Moreover, in order to reduce the number of dropouts, the law allows young individuals between the age of 18 and 29 to obtain a second level educational qualification or tertiary education degree through the apprenticeship, in agreement

with regional employer associations, universities, technical and professional institutes and other research institutes. Hence, by allowing for the interconnection between schooling and working, the new law might have lowered the average education level of workers hired on an apprenticeship contract.

The national law was enacted in 2003 and it required regional governments to issue the necessary regulations concerning the training content of the new apprenticeship contract. Overall, the regions acted quite slowly: no region enacted any regulations in 2003 and 2004, while only 11 out of 20 regions adopted the new directive in the time period 2005-2008. Veneto was not among those which issued the regulations in this time frame.⁶ However, Veneto is among the regions which enacted pilot projects for the new apprenticeship contract in 2005 in some specific sectors, such as Retail Trade, Banking and Hotel and Restaurants.

Additional institutional variation in the adoption of the new apprenticeship contract is offered by Law no. 80/2005. This law provided that in the absence of regional regulations, industry-specific collective agreements could rule on behalf of the regions; in particular, industry-specific collective agreements could define the rules for the training content of the apprenticeship contract whenever the regional legislation were lacking. Collective agreements were signed in the following sectors: Banking, Chemicals, Construction, Energy, Food Products, Metals, Retail Trade, Textile, Transportation, Wood products, Telecommunication, which were able to use the new job contract. We take advantage of this variation across sectors in our identification strategy.

3 Data and Descriptive Statistics

We use employer-employee data from the Italian region Veneto (PLANET). The dataset includes all workers who experienced a mobility episode, i.e., hiring, firing or job mobility. Once entered in the panel each worker is followed for the entire career, unless she moves outside the region Veneto. For each worker we have information on gender, age, place of birth and seniority within the firm. A valuable feature of this dataset is that it includes detailed information on occupation (categorized by 4 digit code), education (8 categories) and different types of labour contracts. The presence of detailed information on occupation and education allows us to identify skill mismatches by quantifying to what extent the characteristics of the workers, in particular their schooling level, deviate from the one required to properly perform the tasks of the job. The dataset includes also information on firms' characteristics, such as industry, sector, and location; however the stock of workers is not observable. We use the firms' national tax number (*codice fiscale*) to merge this dataset with the dataset AIDA, which provides balance sheets information derived by the standardized reports that firms are required to file annually with the Chamber of Commerce⁷ and we restrict our analysis to observations for which the correlation between the flows of workers as

⁶Among the regions which first implemented the new rules Emilia-Romagna, Toscana, Friuli Venezia Giulia and Marche acted in 2005, Puglia, Sardegna and the province of Bolzano in 2006, Lazio in 2007 and Piemonte, the province of Trento and Umbria in 2008.

⁷These data are distributed by Bureau van Dijk, and are available from 1995 onward for all (non-financial) firms with annual sales above 500,000 euros. The dataset includes information on sales, value added, total wage bill, the book value of capital (broken into a number of subcategories), industry (categorized by five-digit code), total wage cost and total number of employees.

computed in AIDA and the flows of workers as computed in PLANET is approximately 90%. The richness of information of this novel dataset allows us to investigate, in a companion paper (Maida & Tealdi, 2016) the joint effect of mismatch and EPL on firm productivity, while the main purpose of this paper, remains to investigate the direct effect of EPL on educational mismatch.

Since we are aware of the issues related to the reliability of the information regarding the education of foreign workers, we remove from our sample those firms whose average flows of foreign workers during the entire period considered is above 3% (which corresponds approximately to 10% of the firms). We also cut the tails of the flows distribution below 1% and above 99% to avoid extreme values. We focus our analysis on individuals in the labour force, i.e., aged 15 to 64 years old. Finally, we limit our time series to the period 1998-2007 since the effects of the 2008 economic crises is outside the scope of this paper and may provide confounding effects.

To get a flavour of the characteristics of the workers at entry level, we report in Table 1 descriptive statistics for the whole sample of workers and for our selected sample. The distributions of characteristics such as age, education and educational mismatch are quite similar between the two groups. The only exception being the share of females, who are slightly more represented in the whole sample compared to ours (approximately 40% in the whole sample compared to 35% in our sample). It is interesting to notice that 50% of individuals in our sample have a junior-high school degree and more than 30% have a high-school degree, with only 6% of individuals having a bachelor's degree. Approximately 30% of workers are hired on a short-term contract, while approximately 8% are hired on an apprenticeship contract. Short-term contracts are more common among women (37% compared to 25%) and older workers. Over-education affects 23% of our sampled individuals, while approximately 13% of the workers are under-educated. It is interesting to notice that over-education affects mostly young individuals in the 15-24 age old and 25-34 age old cohorts and males, while under-education is more common among females and older workers (particularly those in the 45-54 age group).

We build two dummy variables which identify the treated and the control groups per each treatment, i.e., per each reform. We define exposure to the treatment, based on the sector each firm belongs. Treated firms with respect to the short-term contract reform are those firms which operate in sectors whose collective agreements, signed after the implementation of the 2001 law, passed the new legislation. National collective agreements of sectors such as Textiles, Wood Products, Chemicals, Construction, Transportation, Retail Trade, Food Products passed the legislation in 2005, while collective agreements of Telecommunication passed it in 2006.

In a similar fashion, we define treated firms with respect to the apprenticeship contract reform as those firms which operate in sectors where experimental regulations were introduced in 2005, such as Retail Trade, Banking and Hotels and Restaurants. In addition, treated firms are also those firms which operate in sectors, whose industry-specific collective agreements defined the rules for the training content of the apprenticeship contract, such as Banking, Chemicals, Construction, Energy, Food Products, Metals, Retail Trade, Textile, Transportation, Wood Products, Telecommunication.

By analysing the dataset described above, we report some descriptive statistics in Table 2.⁸ In

⁸The same descriptive statistics are reported for the whole sample in Table 3, but no major differences are observed.

the first column we report the characteristics of the full sample, in the second column we show the features of firms which were not affected by any reform, in the third and fourth columns, we outline the characteristics of the firms exposed to only one of the two reforms, the short-term contract and the apprenticeship, respectively. In the second to last column, we report the features of firms exposed to both reforms. Finally, the last column describes the characteristics of the whole sample of firms, before dropping any observation. Obviously, no firms was subject to any treatment between 1998 and 2004. It is interesting to notice that most firms exposed to the first reform are treated in 2005, while most firms exposed to the apprenticeship contract reform are treated in 2006. The characteristics of the firms are quite similar across groups. Most of the firms operate in the manufacturing sector, followed by commerce. Those firms exposed to the short-term contract reform or the apprenticeship reform or both reforms are concentrated in few sectors as both reforms were implemented only in specific sectors. The employment flow is slightly lower in firms exposed to the short-term contract reform, while the share of short-term contracts flow is slightly higher.⁹ Finally, in terms of mismatch, all the variables reported are similar across groups.

We also report the evolution of skill mismatch over the time period 1998-2007 (Figure 2). Note that we observe the flows of workers who enter and leave the firms and therefore each feature considered refers to the flows (difference between entry and exit) and not to the workers' stock. We can notice that the mismatch flow and its components (over- and under-education) show a declining trend until 2004. Between 2004 and 2006 mismatch picks up, particularly due to the increase in over-education. After 2006, while over-education shows a declining trend, under-education increases.

4 Methodology

Three different measures of educational mismatch, based on the degree of the adjustment between job requirements and workers' qualifications have been proposed in the literature: objective, subjective, and statistical measures (Hartog, 2010; Kampelman & Rycx, 2012). The objective measure quantifies the level of educational mismatch by comparing the level of education attained by each worker with an independent scale of requirements for each occupation (Lassibille *et al.*, 2001; Rumberger, 1987).¹⁰ The subjective measure determines the level of educational mismatch by comparing the level of education attained by each worker with the worker's opinion regarding the qualification required to perform the job properly (Alba-Ramirez, 1993; Allen & van der Velden, 2001; Battu & Sloane, 2000; Dorn & Sousa-Poza, 2005).¹¹ Finally, the statistical measure estimates the level of mismatching by comparing the level of education attained with the mean or the

⁹The average firm size is larger in the whole sample compared to our sample even though the median is the same since we drop observations at the tails of the flows distribution.

¹⁰One way to follow this approach is to compare the qualification level of a worker according to the International Standard Classification of Education (ISCED) level and the required qualification level corresponding to his/her occupation code according to the International Standard Classification of Occupations (ISCO), as in Chevalier (2003).

¹¹This type of self-reported measures can be subject to biases due to the wording of the question or the impact of external variables, some of which may be country-specific (Dumont & Monso, 2007). However, they have the advantage of being job-specific rather than suffering from the caveats associated with the other measures.

mode value of the level of education within each occupational category. This third method has been applied by Verdugo & Verdugo (1989) using the mean approach and by Kiker *et al.* (1997), Mendes de Oliveira & Kiker (2000), and Bauer (2002) using the modal approach.

In this paper, educational mismatch is computed using a modal-based statistical measure. Workers are perfectly matched if their education level is the same as the mode of workers within the same occupation entering the market in a specific year. Workers are mismatched whether they are over- (under-) educated, i.e., their level of education is higher (lower) compared to the mode of workers within the same occupation entering the market in a specific year. This definition based on flows rather than on stocks allows us to capture the fact that the skill requirement for a specific type of job evolves and increases over time.

Our goal is to estimate the impact of the short-term contract reform and the apprenticeship reform on a number of outcome variables at firm level, such as temporary contracts flows and the flow of educational mismatch. The staggered implementation of the two reforms gives rise to a quasi-experimental setting in which adopting and non-adopting sectors within the Veneto region are observed over a sufficient time frame and the timing of implementation is demonstrated to be exogenous. In this paper, we take advantage of these time and sector variations to identify the causal effect of the new short-term and apprenticeship contracts on the share of mismatched workers within a DiD framework. The identification strategy borrows from Cappellari *et al.* (2012) although they look at different outcomes, e.g., employment, skill composition, productivity, hours worked.

The model is specified as follow:

$$Y_{j,s,t} = c + \alpha(S_{Reform})_{j,s,t} + \beta(A_{Reform})_{j,s,t} + \gamma(SA_{Reform})_{j,s,t} + \mu_s + \zeta_t + \epsilon_{j,s,t} \quad (1)$$

where j the firm, s the sector and t the time. We have four groups of firms: those which are unaffected by the reforms, those affected only by the first reform, those affected only by the second reform and those affected by both. Therefore, we include $(S_{Reform})_{j,s,t}$, which is the dummy variable which takes value one for firms with an active business in years and sectors affected by the short-term contract reform, $(A_{Reform})_{j,s,t}$ which is the dummy variable which takes value one for firms with an active business in years and sectors affected by the apprenticeship reform, and the interaction between the two reforms, $(SA_{Reform})_{j,s,t}$. All estimates include a vector of sector dummies, μ_s , that takes into account mean differences across sectors, and year dummies, ζ_t , that controls for shift in the dependent variable common to all sectors. Since all of our outcomes of interest are measured in differencing levels, we do not include firms' fixed effects, as in Cappellari *et al.* (2012).¹² In some specifications we also include a set of workers' and firms' characteristics such as workers age and gender, and firm size. We run this equation using ordinary least squares, so the estimated coefficients are readily interpretable as marginal effects. Data are clustered at firm level and standard errors are corrected for heteroskedasticity.

As a first step, we compute the effect of the short-term contract and apprenticeship reforms on total employment, short-term contract and apprenticeship flows in firm j at time t to investigate whether the reforms had an impact on the size of the employment flow (difference between entry

¹²Regressions estimated using firms' fixed effects provide similar results. Estimations available upon request.

and exit):

$$\text{Employment-flow}_{j,t} = (\text{Employment}_{\text{entry}})_{j,t} - (\text{Employment}_{\text{exit}})_{j,t}, \quad (2)$$

and

$$\text{St-flow}_{j,t} = (\text{Short-term}_{\text{entry}})_{j,t} - (\text{Short-term}_{\text{exit}})_{j,t}, \quad (3)$$

and

$$\text{App-flow}_{j,t} = (\text{Apprentices}_{\text{entry}})_{j,t} - (\text{Apprentices}_{\text{exit}})_{j,t}. \quad (4)$$

Second, we compute the effect of the two reforms on the contribution of the flow of each contract type to the total employment flow in firm j at time t . We reach this objective by estimating Equation 1, using as outcomes both the flow of short-term contracts as well as the flow of apprenticeships as a share of total employment flow:

$$\text{St-share}_{j,t} = \frac{(\text{Short-term}_{\text{flow}})_{j,t}}{(\text{Employment}_{\text{flow}})_{j,t}}, \quad (5)$$

and

$$\text{App-share}_{j,t} = \frac{(\text{Apprentices}_{\text{flow}})_{j,t}}{(\text{Employment}_{\text{flow}})_{j,t}}. \quad (6)$$

We interpret the coefficients of interest, α , β and γ , as the change of the temporary contracts flows relative to the total employment flow, due to the implementation of the two reforms, which reduced EPL.

Next, we include as outcomes of interest three measures of mismatch: total mismatch, over-education and under-education. These measures are computed as the flow of workers in firm j at time t who are mismatched, over-educated, and under-educated respectively, per se and as a share of total employment flow:

$$\text{Mismatch}_{j,t} = \frac{(\text{Mismatched}_{\text{flow}})_{j,t}}{(\text{Employment}_{\text{flow}})_{j,t}}, \quad (7)$$

$$\text{Over-education}_{j,t} = \frac{(\text{Over-educated}_{\text{flow}})_{j,t}}{(\text{Employment}_{\text{flow}})_{j,t}}, \quad (8)$$

$$\text{Under-education}_{j,t} = \frac{(\text{Under-educated}_{\text{flow}})_{j,t}}{(\text{Employment}_{\text{flow}})_{j,t}}. \quad (9)$$

The parameters of interest, α , β and γ respectively, inform us about the causal effect of the two reforms on the absolute and relative flows of educationally mismatched, over-educated and under-educated workers.

4.1 Identification strategy

This Difference-in-Differences analysis assumes that the evolution of the outcomes of interest for the adopting and non-adopting sectors would not be systematically different in the absence of the intervention. The main concern is indeed that sectors which adopted first the new contracts are those in which the flows of temporary workers and the flows of mismatched workers were already higher, violating the assumption of exogeneity of the treatment. Although there is no formal procedure to test the validity of this assumption, we provide some evidence that supports it.

First, we compare the flows of short-term workers, apprentices and educational mismatch from 1998 to 2007 in sectors affected and non-affected by the short-term contract reform (Figure 3) and by the apprenticeship reform (Figure 4). Panels 3a and Panel 3b compare how the share of short-term workers and apprentices flows evolve in treated and control sectors with respect to the short-term contract reform (2001). Panel 3c depicts the time series of over-education in adopting and non-adopting sectors, while, panel 3d shows the evolution of the relative flow of under-educated workers. Then, we replicate the same exercise for firms in treated and control sectors with respect to the apprenticeship reform (2003). Figure 4 reports the outcome of this exercise. All the Figures reveal a noticeable similarity in the movements of the two series no matter what the outcome is, reassuring on the validity of the Difference-in-Differences identifying assumption.

To further demonstrate the exogenous nature of the reforms, we follow the approach of Cappellari *et al.* (2012) and regress the two reforms dummies on leads and lags of employment flows in short-term contracts and apprenticeships (Table 4).¹³ The employment flows are averaged across 2-digit sectors and provinces. If the coefficients of the lag variables happen to be systematically statistically significant, this may reveal the presence of a causal relationship between the flows of employment in temporary contracts and the adoption of the reformed contracts. Our results show that past employment flows had no significant effects neither on the adoption of the first reform, nor on the adoption of the second one, confirming the validity of our identifying assumption. In Table 5, we instead regress the two reforms dummies on leads and lags of flows of over-education and under-education, computed as averages across sectors and provinces. Even in this exercise, our results show no systematic relationship between the adoption of the reforms and the lags of educational mismatch.

Finally, we perform a test of causality in the spirit of Granger (1969) to find out whether causes happen before consequences and not vice versa. Specifically, we estimate an alternative version of our model, which is augmented with two leads and two lags of the dummies of the two reforms and their interaction.¹⁴ This test is also useful to verify whether causal effects grow or fade as time passes (Autor, 2003). Results are reported in Tables 6 and 7 and a set of plots of the most relevant outcomes are presented in Figure 5. We observe that the coefficients of the dummies before the implementation of the reforms are never systematically statistically significant and in fact the vast majority of the coefficients is not significantly different from zero, in line with our hypothesis of no reverse causality. Interestingly, we also observe that the persistence is quite limited as most of the effects did not last in the period following the implementation of the reform.

In summary, we can conclude that given the evidence provided, we are confident about the

¹³We also include a trend variable and the female flow as controls.

¹⁴Unfortunately we have data until 2007 and cannot consider a longer period of time.

exogenous nature of the two reforms against measures of employment flows and flows of educational mismatch.

5 Results

In Tables 8-10 we report our main findings. Each odd column reports a regression of the outcome variable on sector, province and year dummies and the reforms dummies, which are equal to one in adopting sectors and zero otherwise per each of the two reforms, as explained in Section 4. In even columns we repeat the same regression by adding a set of workers and firms characteristics, such as firms' size, workers' age and gender.

First, we focus on the effect of the reforms on the total size of employment flows and on the flows composition. Results presented in Table 8 show that the short-term contract reform had a negative but not significant effect on the total employment flow, while the apprenticeship reform was quite successful in increasing the total employment flow (plus 56 percentage points). When we look specifically at the type of flows, we find that both reforms had a positive effect on short-term and apprenticeship contracts, however only the effects of the apprenticeship reform are significantly different from zero. Overall, the short-term contracts flow increased by 16.2 percentage points, while the apprenticeships flow increased by 7 percentage points, as a result of the implementation of the apprenticeship reform. In those firms exposed to both reforms, the apprenticeship flow decreased by 13.4 percentage points. Then, we focus on the effect of the two reforms on our measure of turnover, which is built as the relative flow (hirings minus dismissals) of workers in temporary contracts over the total employment flow. If the reforms promoted the utilization of certain types of temporary contracts we should expect a change in the relative flow of workers hired on those contracts on the total employment flow. The last two columns of Table 8 illustrate the results. We find that the contribution of short-term contracts to the total flow of employment is higher by 10 percentage points due to the implementation of the short-term contract reform, which also had a negative (non significant) effect on the apprenticeship flow. The apprenticeship reform on the other hand had a positive, but not significant effect on the relative flow of apprentices.¹⁵

Combining the information above, we conclude that the short-term contract reform had a positive (non significant) effect on the short-term contracts flow and a negative (non significant) effect on the total employment flow; the effect on the ratio between the two flows turns out to be positive and significant (plus 10 percentage points). That is, the short-term contract reform promoted the utilization of short-term contracts by significantly increasing the relative flow of short-term contracts. On the other hand, the apprenticeship reform significantly increased the total employment flow (plus 56 percentage points), and the short-term and the apprenticeship flows (plus 16.2 and 7 percentage points, respectively); the final effect on the relative flows of temporary contracts turns out not to be significantly different from zero. That is, the second reform promoted the utilization of apprenticeships and short-term contracts by increasing the total employment flow as well as the flows of both temporary contracts. Our results are in line with the findings of Cappellari *et al.* (2012). Indeed, they also find that the first reform had a negative

¹⁵These results are in line with the statistics provided by Veneto Lavoro, which show that the 2003 reform did not have a significant impact on the relative number of workers hired on an apprenticeship contract.

effect on total employment turnover and a positive effect on the turnover of short-term contracts. On the other hand, they show that the second reform had a positive impact on the apprenticeship turnover, but no effect on total employment turnover. Nevertheless, a direct comparison with their results is not possible since we use data representative of a single Italian region, Veneto, while their results refer to the whole Italian firms population. Moreover, our identification strategy is slightly different as for obvious reasons we cannot take advantage of the variation in the implementation of the apprenticeship reform at regional level. Finally, the magnitude of the effects is not directly comparable, as we investigate the effects of the reforms on flows, whose magnitude is much smaller compared to the magnitude of the variables used in the paper by Cappellari *et al.* (2012).¹⁶

Next, we turn to educational mismatch. As before, we look at mismatch, over-education and under-education flows (Table 9) and at the share of mismatch flows over the flow of total employment (Table 10). As emphasized by Di Pietro (2002), a lower degree of employment protection is supposed to increase labour market flexibility, encourage firms to substitute low-skilled workers with high-skilled workers, unlock high-skilled workers trapped in bad matches, and expand the overall employment opportunities of outsiders compared to insiders. Therefore, we expect a positive impact of the lower employment protection, due to the implementation of the short-term contract and apprenticeship reforms, on the probability of a good match and a negative effect on the probability of mismatch.

In line with our expectations, we find that the short-term contract reform had a significant negative effect on the mismatch flow, as well as on the relative share of mismatch. Specifically, the reform had a negative impact on the absolute and relative flows of over-educated workers (minus 24.1 and minus 6.95 percentage points, respectively). When we look at under-education as an outcome, our findings suggest that the short-term contract reform did not have any significant effect. On the other hand, the apprenticeship reform had a significant impact on the total mismatch flow, by increasing the flow of under-educated workers by 12.4 percentage points. The same reform however had no effect on the flow of over-educated workers. Due to the positive contribution of the reform to the total employment flow, when we consider the relative flow of mismatch and under-education, we find no significant effect. This last result can be explained thinking that the apprenticeship contract targets young workers and provides training in order to increase the qualifications of individuals. Specifically, with the 2003 reform the vocational or professional qualification obtained through the apprenticeship contract counts as a credit towards an educational or vocational degree. Therefore, by allowing students to work as apprentices to improve their qualifications, the apprenticeship reform also raises the share of individuals with a lower level of education. Hence, even though the relative share of apprentices flow was not affected by the reforms, the effect on mismatch may still be due to the composition effect.

Since in the literature evidence shows that specific groups of individuals are more exposed to mismatch, we perform a triple difference-in-differences estimation accounting for gender (Tables 11-13) and age (Tables 14-16). It is interesting to notice that the two reforms had quite important asymmetric effects among specific groups. Interestingly, the short-term contract reform significantly reduced the total female employment flow (minus 92.6 percentage points) while at the same

¹⁶While our dependent variables on average take values which range from 0.07 to 0.63 (with the exception of total employment flow which is on average equal to 2.27), the average value of job turnover used in the paper by Cappellari *et al.* (2012) is equal to 11.33.

time it increased the female short-term flow (plus 13.6 percentage points). The effects among men have the same sign, but are not significantly different from zero. However, it turns out that the effect of the reform on the share of short-term flow is positive and significant for both groups (plus 11.5 percentage points). The apprenticeship reform instead increased the apprenticeship flow for both men and women by 8.2 percentage points, but it had no significant effect on the share of apprenticeship flow. In those firms exposed to both reforms, the short-term contracts and the apprenticeships flows declined equally among men and women by 14.6 and 16.8 percentage points, respectively.

In terms of mismatch, the first reform significantly reduced the flow of over-education for both men and women by approximately 20 percentage points. When looking at the share, we find that on one hand this reform decreased the relative flow of over-educated female workers by 20 percentage points, on the other hand it reduced the share of under-educated male workers by 8 percentage points and it increased the share of under-educated female workers by 26 percentage points. The apprenticeship reform instead had the effect of increasing the flow of over-educated female workers by 10 percentage points. Therefore, it seems that while the first reform significantly affected the flow of employment among women, it was equally effective in reducing educational mismatch for both groups. The second reform instead had a major impact by increasing apprenticeship employment among both men and women, however it also increased over-education among the female group.

When looking at age groups, we focus on the categories of workers between 15 and 24 years old (Tables 14-16).¹⁷ On the one hand, our results show that the first reform did not have any major effect on the flow of employment of any type, but it increased the share of short-term contracts across all age groups by 10 percentage points. In terms of mismatch, the flow of over-educated workers decreased as a result of the adoption of the first reform across all age groups by approximately 18 percentage points. We also find that the apprenticeship reform increased the employment flow of young workers by 22 percentage points and the apprenticeship flow across all age groups by 9 percentage points. In terms of mismatch, our findings suggest that the under-education flow increased across all ages by 10 percentage points, while the over-education flow increased among workers below the age of 24 by 13.6 percentage points. In summary, as a result of the implementation of the apprenticeship reform, young workers are worse off, particularly the very young ones, as both under- and over-education have increased significantly.

Overall, our findings seem to suggest that, in line with our expectations, the labour market reform which lowered the EPL associated with short-term contracts was effective in reducing the flow of mismatched workers, particularly those who are over-educated. Specifically for the case of women, by increasing the relative flow of short-term workers, the short-term contract reform was successful in reducing the absolute and relative flows of over-education. We attribute this result to the fact that the increased flexibility of the labour market allows for the reallocation of workers away from bad matches and enables workers to change jobs more easily, increasing the probability to find a good match. The apprenticeship reform instead had a positive impact on the flow of temporary contracts, particularly apprenticeship, but contributed also to increase

¹⁷Results for other age groups are available upon request, but they are relevant only for short-term contracts as the maximum eligible age for apprenticeship is 29 years old.

the flow of under-educated workers, potentially due to the possibility for individuals to combine schooling with work. Notably, the problem of educational mismatch has deteriorated for young workers, as the latter reform had the effect of increasing mismatch, both over- and under-education, particularly among workers below the age of 24.

6 Conclusions

The share of temporary contracts which are associated with lower degrees of employment protection has increased significantly in the past decades. The aim of this paper is to shed some light on the relationship between educational mismatch and employment protection in economies characterized by dual labour markets. We focus on two types of temporary contracts which were significantly modified by two important labour market reforms approved in Italy in 2001 and 2003: short-term contract and apprenticeship. By simplifying the rules for the utilization of both contracts, these reforms further reduced the associated degree of employment protection. It is worth emphasizing that the two contracts differ significantly in their training content: while the former does not involve any training, with the latter the employer is obliged to provide on the job training at its own expenses, potentially affecting the working careers of individuals within the firm.

To study the relationship between educational mismatch and employment protection, we propose an econometric model, which aims to relate the net flows of temporary workers and the net flows of educationally mismatched workers. Within a Difference-in-Differences framework - having information only on the flows of workers - we are able to evaluate the impact of the two labour market reforms on absolute and relative mismatch flows.

We find that on one hand the short-term contract reform had no significant effect on any type of employment flows, but a significant and positive effect on the relative flow of short-term contracts. On the other hand, the apprenticeship reform had a positive and significant effect on the absolute flows of total employment, apprenticeship and short-term contract, but no significant impact on the relative flow of short-term contracts and apprenticeships.

When looking at mismatch as an outcome, we find that both reforms had an impact on the flows of educational mismatch. Specifically, in line with our expectations, our results show that the short-term contract reform had a negative effect on the absolute and relative mismatch flows by significantly reducing both the absolute and the relative flows of over-educated workers. We argue that this result may be due to the fact that the increased flexibility of the labour market has promoted the reallocation of workers from bad to good matches and has allowed firms to replace low-skilled workers with high-skilled workers to keep up with the technological change, as suggested by Di Pietro (2002).

The apprenticeship reform instead had a positive and significant effect on the mismatch flow, by increasing the flow of under-educated workers. We interpret these results in light of the fact that, by allowing individuals to accumulate at the same time work experience and schooling, the apprenticeship reform decreased the education level of the flow of entrants.

We look deeper into this issue, by investigating whether the effects have been stronger among specific categories of workers. We find that the flow of over-education has decreased significantly for both men and women, after the implementation of the first reform. This result is also evident

in the relative flow of over-education among women as the relative share of short-term contracts has increased particularly among females. Our results also point at the fact that the situation of young workers in terms of educational mismatch has deteriorated as a result of the implementation of the apprenticeship reform. Specifically among the youngest cohort (15-24 years old), both flows of over- and under-educated workers have increased significantly.

Overall, we conclude that the short-term contract reform was successful in reducing the share of mismatch flow, particularly in the form of over-education. This result has important policy implications, since over-education is quite costly for the society, due to the burden of financing excessive levels of education, for firms, as over-educated workers are generally less productive than perfectly matched colleagues, and for individuals, as over-educated workers tend to earn less compared to their perfectly matched colleagues. The apprenticeship reform had positive effects on employment flows, but unfortunately contributed to increase mismatch, particularly in the form of under-education.

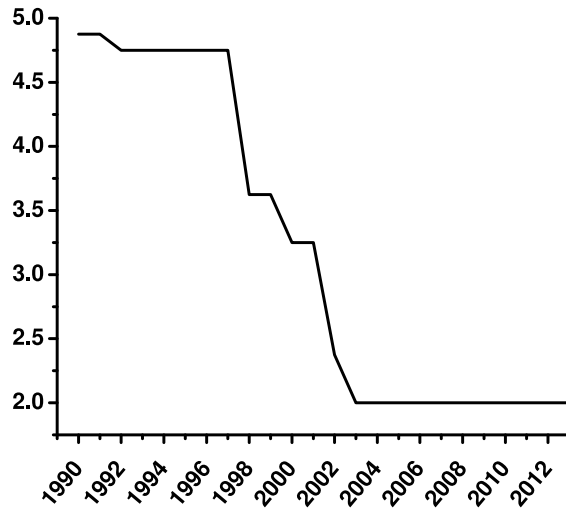
The next step in our research agenda is to further advance within this line of research, by investigating whether the reduced mismatch caused by the implementation of the reforms has translated into an increase in firms' total productivity.

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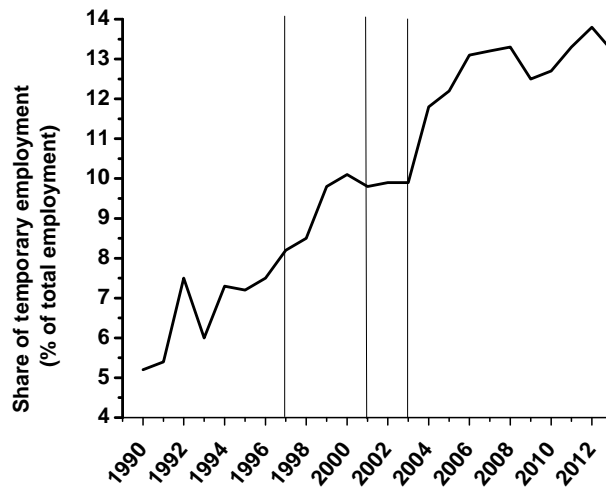
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(a) EPL Index associated with temporary contracts. Source: OECD.



(b) Share of temporary employees (as % of total employment).
Source: OECD.

Figure 1. Relative short-term workers and apprenticeship workers flows in Treated and Control groups with respect to the apprenticeship reform (2003).

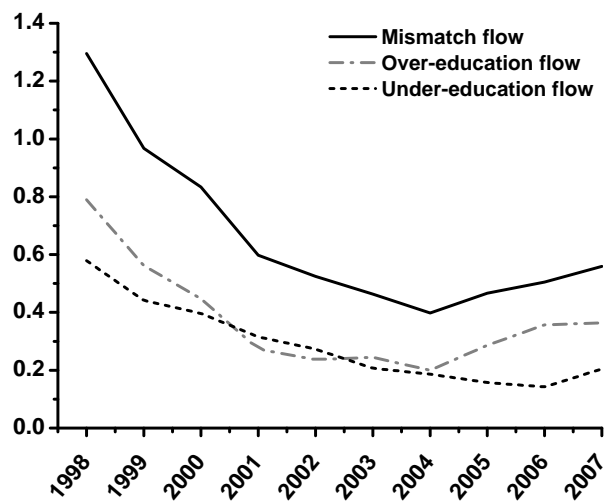
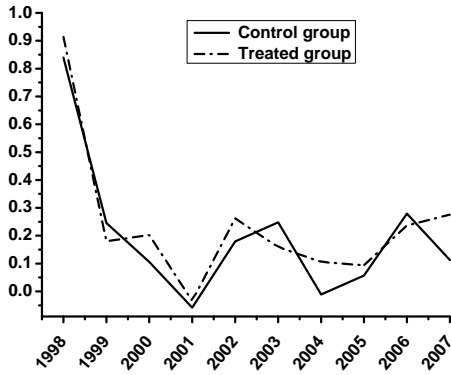
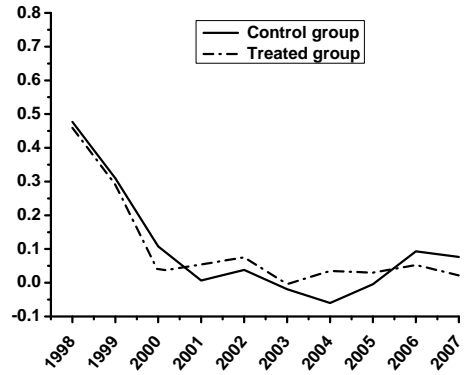


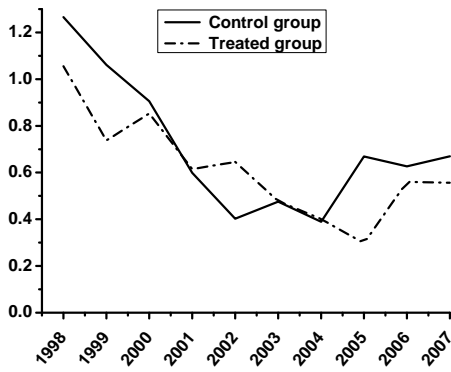
Figure 2. Flow of mismatched, over-educated and under-educated workers in Italy (1998-2007).



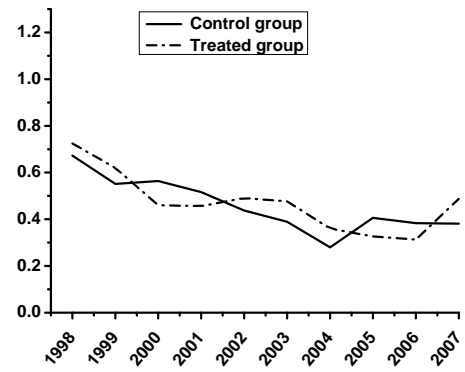
(a) Short-term workers flow.



(b) Apprenticeship workers flow.

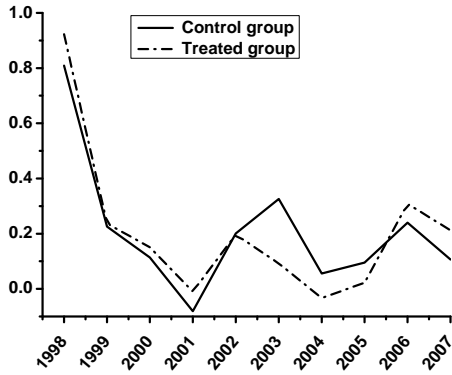


(c) Share of over-educated workers.

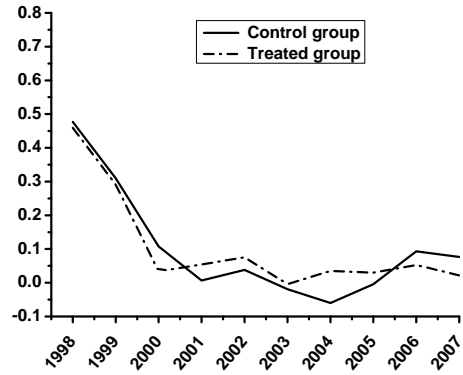


(d) Share of under-educated workers.

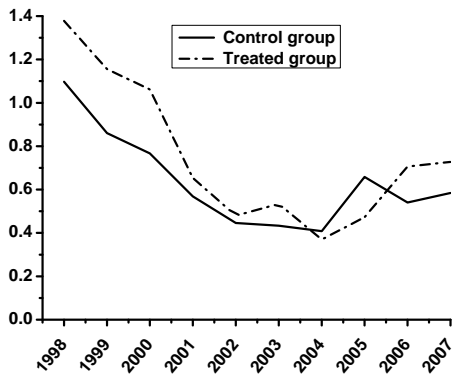
Figure 3. Relative short-term workers and apprenticeship workers flows and flows of over-educated and under-educated workers in Treated and Control groups with respect to the short-term contract reform (2001).



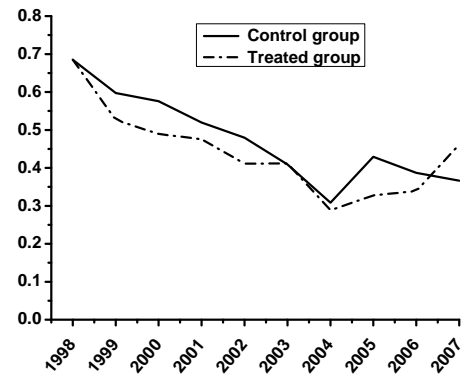
(a) Short-term workers flow.



(b) Apprenticeship workers flow.



(c) Share of over-educated workers.



(d) Share of under-educated workers.

Figure 4. Relative short-term workers and apprenticeship workers flows and flows of over-educated and under-educated workers in Treated and Control groups with respect to the apprenticeship reform (2003).

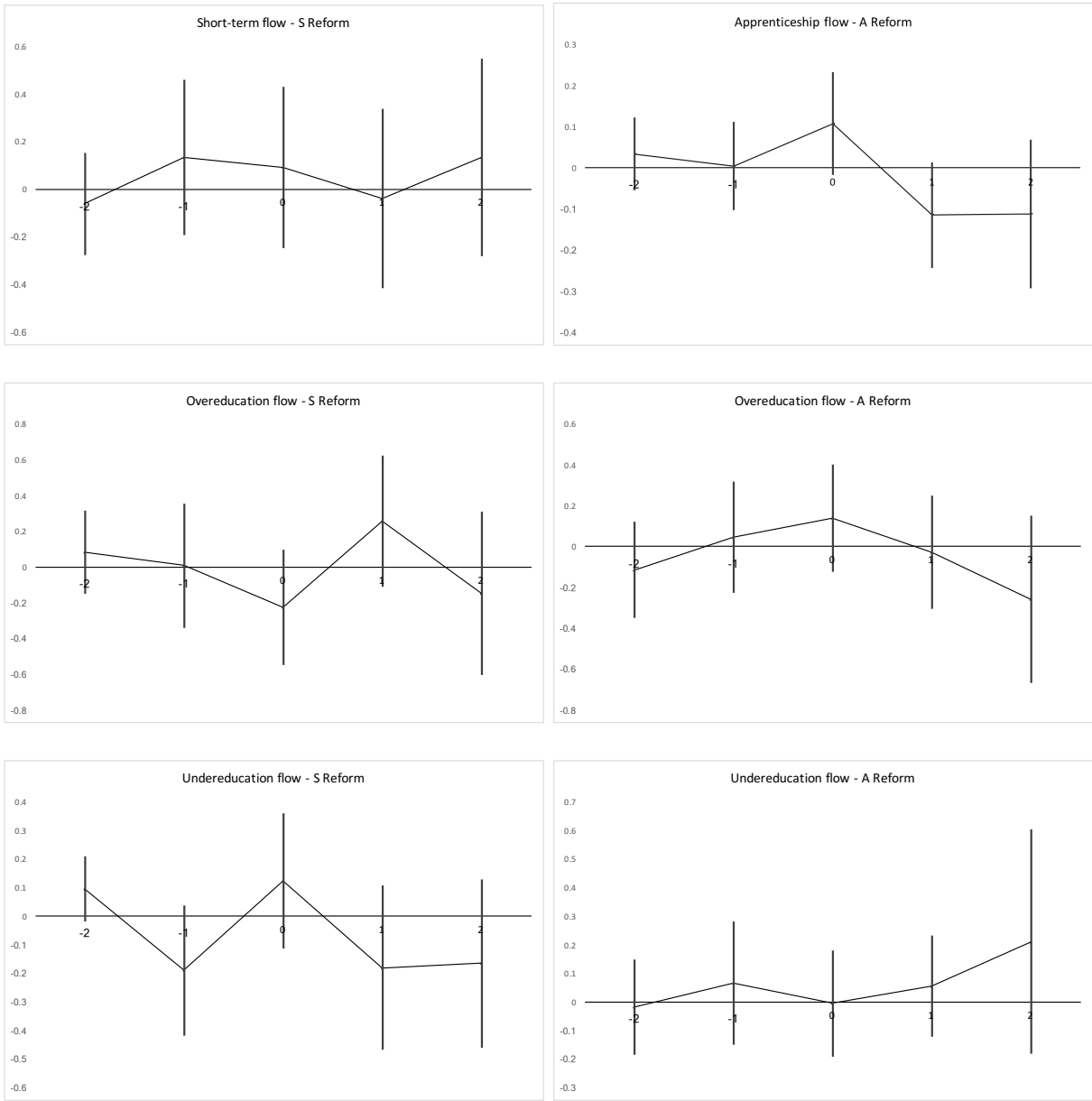


Figure 5. Time passage relative to year of adoption of Short-term and Apprenticeship reforms.

Table 1. Descriptive statistics

	Selected sample		Whole sample	
	Mean	Std. Dev	Mean	Std. Dev
Female	0.355	0.478	0.407	0.491
Age 15-24	0.301	0.458	0.285	0.451
Age 25-34	0.360	0.480	0.366	0.481
Age 35-44	0.210	0.407	0.216	0.412
Age 45-54	0.090	0.297	0.101	0.302
Age 55-64	0.029	0.168	0.028	0.167
No education	0.041	0.198	0.054	0.205
Elementary	0.068	0.251	0.069	0.259
Junior-high school	0.509	0.499	0.502	0.491
High-school	0.320	0.466	0.306	0.456
Bachelor's degree	0.058	0.234	0.063	0.241
Post-graduate degree	0.002	0.050	0.003	0.051
PhD	0.0002	0.013	0.0002	0.014
Short-term	0.293	0.455	0.337	0.472
Short-term (female)	0.371	0.483	0.410	0.491
Short-term (male)	0.250	0.433	0.287	0.452
Short-term (Age 15-24)	0.230	0.421	0.276	0.447
Short-term (Age 25-34)	0.277	0.447	0.319	0.466
Short-term (Age 35-44)	0.321	0.466	0.369	0.482
Short-term (Age 45-54)	0.417	0.493	0.447	0.497
Short-term (Age 55-64)	0.518	0.499	0.549	0.497
Apprenticeship	0.078	0.268	0.062	0.242
Apprenticeship (female)	0.069	0.253	0.055	0.228
Apprenticeship (male)	0.083	0.276	0.067	0.251
Apprenticeship (Age 15-24)	0.249	0.432	0.209	0.407
Apprenticeship (Age 25-34)	0.010	0.097	0.007	0.087
Over-education	0.232	0.422	0.248	0.432
Over-education (female)	0.214	0.410	0.235	0.424
Over-education (male)	0.243	0.429	0.259	0.438
Over-education (Age 15-24)	0.262	0.439	0.282	0.450
Over-education (Age 25-34)	0.253	0.434	0.272	0.445
Over-education (Age 35-44)	0.164	0.370	0.169	0.374
Over-education (Age 45-54)	0.199	0.399	0.218	0.413
Over-education (Age 55-64)	0.218	0.413	0.233	0.423
Under-education	0.133	0.339	0.132	0.339
Under-education (female)	0.144	0.351	0.140	0.347
Under-education (male)	0.126	0.332	0.126	0.332
Under-education (Age 15-24)	0.102	0.302	0.106	0.308
Under-education (Age 25-34)	0.116	0.320	0.114	0.319
Under-education (Age 35-44)	0.162	0.368	0.156	0.362
Under-education (Age 45-54)	0.234	0.423	0.226	0.418
Under-education (Age 55-64)	0.171	0.376	0.144	0.351
No. of observations	528,639		1,687,261	
No. of firms	12,719		16,563	

Table 2. Descriptive statistics

	Full sample	Never treated	Short-term reform	Apprenticeship reform	Both reforms	Whole sample
No. of firms	12,719	6,028	819	4251	1,621	16,563
Observations	57,317	50,682	1,442	1,995	3,198	117,646
1998	4,438	4,438	0	0	0	10,442
1999	4,916	4,438	0	0	0	11,385
2000	5,480	5,480	0	0	0	12,330
2001	5,290	5,290	0	0	0	12,466
2002	6,942	6,942	0	0	0	12,421
2003	6,490	6,490	0	0	0	12,255
2004	5,675	5,675	0	0	0	12,061
2005	6,027	4,364	1,168	105	390	11,458
2006	6,119	3,586	137	953	1,443	11,453
2007	5,940	3,501	137	937	1,365	11,375
Agriculture	0.88	1.00	0	0	0	1.11
Extraction	0.34	0.38	0	0	0	0.29
Manufacturing	48.32	47.94	39.94	84.31	35.65	48.32
Energy	0.13	0.15	0	0	0	0.15
Construction	7.32	5.59	31.35	0	28.49	7.79
Commerce	28.08	29.51	0	0	35.68	24.98
Hotels and Restaurants	1.55	1.19	0	14.39	0	2.26
Transportation and Communication	4.16	3.88	28.71	0	0.19	4.57
Finance	0.32	0.31	0	1.30	0	0.38
Real estate	6.51	7.36	0	0	0	7.33
Public sector	0.02	0.02	0	0	0	0.01
Education	0.21	0.24	0	0	0	0.23
Health	0.66	0.75	0	0	0	0.89
Others	1.48	1.68	0	0	0	1.65
Firm size	30.65	30.26	32.63	42.43	28.63	45.11
Age flow 1	-1.89	-1.74	-2.72	-4.17	-2.50	-3.36
Age flow 2	-0.80	-0.50	-2.50	-3.73	-2.97	-1.77
Age flow 3	3.26	3.11	3.95	5.72	3.70	5.21
Female flow	0.73	0.76	0.34	0.58	0.60	1.16
Employment flow	2.27	2.33	1.49	2.24	1.67	3.01
Short-term flow	0.14	0.14	0.13	0.19	0.10	0.19
Share of short-term flow	0.11	0.11	0.18	0.13	0.18	0.12
Apprenticeship flow	0.09	0.09	-0.00	0.09	0.07	0.08
Share of apprenticeship flow	0.07	0.07	0.06	0.06	0.08	0.08
Mismatch flow	0.63	0.64	0.39	0.69	0.49	0.84
Share of mismatch flow	0.28	0.28	0.25	0.28	0.29	0.28
Over-education flow	0.36	0.35	0.24	0.50	0.33	0.51
Share of over-education flow	0.16	0.16	0.13	0.18	0.15	0.15
Under-education flow	0.28	0.29	0.12	0.17	0.15	0.33
Share of under-education flow	0.12	0.12	0.11	0.09	0.13	0.12

Table 3. Descriptive statistics - Whole sample

	Whole sample	Never treated	Short-term reform	Apprenticeship reform	Both reforms
Observations	117,646	104,870	2,855	3,814	6,107
1998	10,442	10,442	0	0	0
1999	11,385	11,385	0	0	0
2000	12,330	12,330	0	0	0
2001	12,466	12,466	0	0	0
2002	12,421	12,421	0	0	0
2003	12,255	12,255	0	0	0
2004	12,061	12,061	0	0	0
2005	11,458	8,171	2,284	273	730
2006	11,453	6,681	287	1,768	2,717
2007	11,375	6,658	284	1,773	2,660
Agriculture	1.11	1.25	0	0	0
Extraction	0.29	0.32	0	0	0
Manufacturing	48.32	48.25	38.98	78.26	35.14
Energy	0.15	0.16	0	0	0
Construction	7.79	6.19	31.10	0	29.26
Commerce	24.98	25.97	0	0	35.37
Hotels and Restaurants	2.26	1.79	0	20.24	0
Transportation and Communication	4.57	4.30	29.91	0	0.23
Finance	0.38	0.37	0	1.49	0
Real estate	7.33	8.23	0	0	0
Public sector	0.01	0.01	0	0	0
Education	0.23	0.26	0	0	0
Health	0.89	1.00	0	0	0
Others	1.65	1.85	0	0	0
Firm size	45.11	44.13	44.53	63.00	50.59
Age flow 1	-3.36	-3.95	-3.33	-6.59	-4.15
Age flow 2	-1.77	-5.15	-4.36	-5.67	-4.26
Age flow 3	5.21	3.64	5.54	9.32	5.59
Female flow	1.16	1.20	0.27	1.11	0.86
Employment flow	3.01	3.11	1.54	3.14	1.95
Short-term flow	0.19	0.19	0.08	0.31	0.16
Share of short-term flow	0.12	0.11	0.19	0.15	0.18
Apprenticeship flow	0.08	0.08	-0.02	0.07	0.05
Share of apprenticeship flow	0.08	0.08	0.05	0.07	0.09
Mismatch flow	0.84	0.86	0.34	0.92	0.66
Share of mismatch flow	0.28	0.28	0.24	0.29	0.30
Over-education flow	0.51	0.51	0.24	0.74	0.50
Share of over-education flow	0.15	0.15	0.12	0.19	0.15
Under-education flow	0.33	0.36	0.06	0.17	0.12
Share of under-education flow	0.12	0.12	0.12	0.10	0.14

Table 4. Trends in temporary employment.

	S_{Reform}		A_{Reform}
short-term 2000	-0.012 (-0.26)	apprenticeship	-0.222 (-1.35)
short-term 2001	0.028 (0.58)	apprenticeship t-1	0.024 (0.19)
short-term 2002	-0.020 (-0.41)	apprenticeship t-2	0.116 (0.67)
short-term 2003	0.044 (0.90)	apprenticeship t-3	0.025 (0.19)
short-term 2004	-0.018 (-0.36)	apprenticeship t-4	0.188 (1.44)
short-term 2005	-0.028 (-0.66)	apprenticeship t-5	0.192* (1.70)
short-term 2006	-0.051 (-1.06)	apprenticeship t+1	0.055 (0.40)
short-term 2007	0.009 (0.16)	apprenticeship t+2	0.016 (0.12)
Constant	0.302** (2.34)	Constant	0.418*** (3.26)
N	2,284	N	2,284
R^2	0.0147	R^2	0.0404

t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5. Trends in over-education.

	S_{Reform}	A_{Reform}
over-education	-0.092* (-1.97)	0.220 (0.32)
over-education t-1	0.053 (0.94)	0.077 (1.18)
over-education t-2	-0.005 (-0.10)	0.061 (1.08)
over-education t-3	0.007 (0.08)	-0.010 (-0.11)
over-education t-4	0.012 (0.23)	-0.078 (-1.22)
over-education t-5	0.081 (1.30)	0.247*** (4.48)
over-education t+1	-0.115** (-2.26)	0.018 (0.27)
over-education t+2	-0.057 (-1.26)	0.040 (0.67)
Constant	0.255* (1.85)	0.274* (1.78)
N	2,284	2,284
R^2	0.0095	0.0066
under-education	-0.090 (-1.06)	-0.038 (-0.34)
under-education t-1	-0.025 (-0.32)	0.048 (0.48)
under-education t-2	0.007 (0.09)	0.117 (-1.49)
under-education t-3	0.115 (1.26)	-0.065 (-0.74)
under-education t-4	-0.055 (-0.56)	0.002 (-0.59)
under-education t-5	-0.070 (-1.29)	0.128** (-2.63)
under-education t+1	-0.004 (-1.11)	0.113 (1.10)
under-education t+2	0.002 (0.68)	0.159** (2.17)
Constant	0.291** (2.32)	0.505*** (3.59)
N	2,284	2,284
R^2	0.0485	0.0533

t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6. Employment and temporary contracts flows - Event study.

	Employment flow	Short-term flow	Apprenticeship flow	Mismatch flow	Over-education flow	Under-education flow
$S_{Reform}(t+2)$	0.007 (0.07)	0.134 (0.64)	-0.064 (-0.89)	-0.313 (-1.45)	-0.146 (-0.63)	-0.165 (-1.10)
$S_{Reform}(t+1)$	0.118 (1.16)	-0.039 (-0.20)	-0.047 (-2.21)	0.054 (0.34)	0.252 (1.35)	-0.103 (-2.01)
S_{Reform}	-0.067 (-0.80)	0.089 (-0.49)	-0.066 (0.52)	-0.096 (-0.57)	-0.228 (-1.39)	0.121 (1.01)
$S_{Reform}(t-1)$	0.022 (0.31)	0.132 (0.79)	0.076 (1.21)	-0.187 (-1.03)	0.006 (0.04)	-0.180 (-1.24)
$S_{Reform}(t-2)$	0.005 (0.09)	-0.062 (-0.57)	0.044 (1.27)	0.175 (1.28)	0.080 (0.68)	0.095 (1.65)
$A_{Reform}(t+2)$	0.202 (0.87)	0.081 (0.17)	-0.112 (-1.22)	-0.079 (-0.29)	-0.259 (-1.25)	0.210 (1.06)
$A_{Reform}(t+1)$	0.010 (0.16)	0.076 (0.48)	-0.115* (-1.76)	0.026 (0.16)	0.055 (-2.51)	-0.103 (-0.62)
A_{Reform}	-0.057 (-0.92)	0.102 (0.63)	0.106* (0.52)	0.142 (0.95)	0.089 (1.04)	-0.004 (-0.05)
$A_{Reform}(t-1)$	0.108 (1.70)	0.066 (0.40)	0.004 (0.08)	0.094 (0.62)	-0.121 (0.33)	0.065 (0.59)
$A_{Reform}(t-2)$	-0.074* (-1.81)	-0.124 (-0.109)	0.033 (0.74)	-0.122 (-0.98)	-0.115 (-0.97)	-0.018 (-0.22)
$SA_{Reform}(t+2)$	-0.158 (-0.65)	-0.259 (-0.47)	0.143 (1.09)	0.083 (0.19)	-0.121 (0.40)	-0.077 (-0.30)
$SA_{Reform}(t+1)$	-0.177 (-1.36)	-0.023 (-0.09)	0.132 (1.44)	0.378 (1.53)	-0.121 (0.12)	0.320* (1.93)
SA_{Reform}	0.164 (1.51)	-0.204 (-0.86)	-0.147** (-1.47)	-0.084 (-0.41)	-0.156 (-0.71)	0.097 (0.55)
$SA_{Reform}(t-1)$	-0.093 (-0.94)	-0.071 (-0.31)	0.103 (1.16)	-0.266 (-1.18)	-0.121 (0.08)	-0.297* (-1.87)
$SA_{Reform}(t-2)$	0.041 (0.50)	0.037 (0.20)	-0.145** (-1.98)	0.147 (0.67)	-0.121 (-0.34)	0.226 (1.62)
Constant	0.008*** (0.07)	0.132 (0.44)	0.866*** (3.16)	0.903** (2.27)	1.00*** (3.20)	-0.101* (-0.48)
N	57317	57317	57317	57317	57317	57317
R^2	0.99	0.1129	0.1733	0.4364	0.3076	0.2108

t statistics in parentheses; $p < 0.10$ ** $p < 0.05$, *** $p < 0.01$.

¹ Worker's age and gender.

² Firm's size.

Table 7. Employment and temporary contracts flows - Event study.

	Share of short-term flow	Share of apprenticeship flow	Share of mismatch flow	Share of over-education flow	Share of under-education flow
$S_{Reform}(t+2)$	-0.017 (-0.31)	-0.006 (-0.19)	-0.038 (-0.71)	0.040 (0.79)	-0.079* (-1.77)
$S_{Reform}(t+1)$	0.075 (1.26)	-0.040 (-1.36)	0.044 (0.80)	0.082 (1.68)	-0.038 (-0.86)
S_{Reform}	0.019 (0.36)	0.010 (0.38)	-0.060 (-1.17)	-0.129*** (-2.77)	0.068 (1.36)
$S_{Reform}(t-1)$	0.045 (0.98)	0.011 (0.49)	0.051 (1.07)	0.038 (0.87)	0.012 (0.33)
$S_{Reform}(t-2)$	-0.007 (-0.22)	0.014 (1.15)	-0.036 (-1.06)	-0.020 (-0.69)	-0.015 (-0.78)
$A_{Reform}(t+2)$	0.019 (0.20)	-0.044 (-1.24)	-0.080 (-0.84)	-0.142** (-2.17)	0.061 (0.67)
$A_{Reform}(t+1)$	0.069 (1.46)	-0.001 (-0.08)	-0.004 (-0.009)	0.003 (0.08)	-0.008 (-0.29)
A_{Reform}	-0.053 (-1.00)	-0.013 (-0.73)	0.007 (0.17)	0.013 (0.30)	-0.005 (-0.18)
$A_{Reform}(t-1)$	0.046 (0.90)	-0.003 (-0.15)	-0.008 (-0.18)	-0.013 (-0.38)	0.005 (0.18)
$A_{Reform}(t-2)$	-0.073** (-2.07)	0.012 (0.75)	0.036 (1.01)	0.015 (0.53)	0.021 (0.92)
$SA_{Reform}(t+2)$	0.012 (0.11)	0.035 (0.75)	0.037 (0.31)	0.084 (1.00)	-0.046 (-0.43)
$SA_{Reform}(t+1)$	-0.090 (-1.27)	0.045 (1.17)	0.058 (0.81)	-0.052 (-0.77)	0.110** (2.11)
SA_{Reform}	-0.014 (-0.18)	0.013 (0.37)	-0.005 (-0.08)	-0.029 (-0.46)	0.024 (0.47)
$SA_{Reform}(t-1)$	0.012 (0.18)	-0.004 (-0.15)	-0.048 (-0.73)	0.060 (1.07)	-0.108* (-1.91)
$SA_{Reform}(t-2)$	0.049 (0.88)	-0.026 (-1.04)	0.000 (0.00)	-0.027 (-0.54)	0.027 (0.66)
Constant	-0.062*** (-0.98)	0.207*** (6.65)	0.577*** (3.55)	0.348*** (3.37)	0.228*** (3.00)
N	57317	57317	57317	57317	57317
R^2	0.0197	0.1504	0.0149	0.0201	0.0203

t statistics in parentheses; $p < 0.10$ ** $p < 0.05$, *** $p < 0.01$.

¹ Worker's age and gender.

² Firm's size.

Table 8. Employment and temporary contracts flows.

	Employment flow		Short-term flow		Apprenticeship flow		Share of short-term flow		Share of apprenticeship flow	
S_{Reform}	-0.483 (-1.03)	-0.426 (-0.81)	0.0725 (0.65)	0.0745 (0.67)	0.0202 (0.60)	0.0209 (0.62)	0.103*** (2.85)	0.0975*** (2.80)	-0.00428 (-0.33)	-0.0041 (-0.30)
A_{Reform}	0.387 (1.15)	0.559* (1.68)	0.162* (1.80)	0.162* (1.80)	0.0719* (1.94)	0.0700* (1.89)	-0.030 (-1.18)	-0.033 (-1.30)	-0.0025 (-0.24)	-0.0050 (-0.45)
SA_{Reform}	0.429 (0.64)	0.254 (0.39)	-0.189 (-1.30)	-0.191 (-1.33)	-0.135** (-2.51)	-0.134** (-2.50)	0.0056 (0.12)	0.0106 (0.24)	-0.00124 (-0.07)	0.0008 (0.04)
Constant	4.969*** (3.45)	1.107 (0.64)	0.826*** (4.32)	0.256 (0.81)	1.165*** (2.98)	1.050*** (2.69)	0.0491 (1.64)	0.0634 (1.28)	0.150*** (3.33)	0.236*** (5.22)
Worker's ch. ¹	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Firm's ch. ²	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	57317	57317	57317	57317	57317	57317	57317	57317	57317	57317
R^2	0.0599	0.2144	0.0211	0.0246	0.0322	0.0327	0.0128	0.0393	0.0061	0.0249

t statistics in parentheses; $p < 0.10$ ** $p < 0.05$, *** $p < 0.01$.

¹ Worker's age and gender.

² Firm's size.

Table 9. Mismatch flows.

	Mismatch flow		Over-education flow		Under-education flow	
S_{Reform}	-0.362*** (-2.65)	-0.345** (-2.47)	-0.252** (-2.08)	-0.241* (-1.90)	-0.110 (-1.55)	-0.104 (-1.54)
A_{Reform}	0.196 (1.63)	0.246** (2.00)	0.0852 (0.84)	0.122 (1.24)	0.111* (1.94)	0.124** (2.07)
SA_{Reform}	0.132 (0.69)	0.0813 (0.44)	0.0931 (0.56)	0.0571 (0.35)	0.0390 (0.41)	0.0242 (0.26)
Constant	1.954*** (3.06)	1.183* (1.79)	1.364*** (3.19)	1.250*** (2.76)	0.591*** (2.65)	-0.0664 (-0.23)
Worker's characteristics ¹	No	Yes	No	Yes	No	Yes
Firm's characteristics ²	No	Yes	No	Yes	No	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	57317	57317	57317	57317	57317	57317
R^2	0.0413	0.1339	0.0383	0.1087	0.0200	0.0568

t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

¹ Worker's age and gender.

² Firm's size.

Table 10. Share of mismatch flows.

	Share of mismatch flow		Share of over-education flow		Share of under-education flow	
S_{Reform}	-0.0608** (-2.15)	-0.0596** (-2.10)	-0.0696** (-2.27)	-0.0695** (-2.36)	0.00878 (0.29)	0.00986 (0.35)
A_{Reform}	0.0209 (0.73)	0.0214 (0.76)	0.00981 (0.38)	0.0101 (0.40)	0.0110 (0.68)	0.0113 (0.70)
SA_{Reform}	0.0323 (0.78)	0.0310 (0.75)	0.0359 (0.86)	0.0357 (0.87)	-0.00357 (-0.10)	-0.00462 (-0.14)
Constant	0.465*** (3.54)	0.534*** (3.64)	0.286*** (3.89)	0.290*** (3.24)	0.178*** (2.90)	0.244*** (3.37)
Worker's characteristics ¹	No	Yes	No	Yes	No	Yes
Firm's characteristics ²	No	Yes	No	Yes	No	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	57317	57317	57317	57317	57317	57317
R^2	0.0084	0.0100	0.0083	0.0096	0.0053	0.0113

t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

¹ Worker's age and gender.

² Firm's size.

Table 11. Employment and temporary contracts flows by gender.

	Employment flow		Short-term flow		Apprenticeship flow		Share of short-term flow		Share of apprenticeship flow	
S_{Reform}	-0.337 (-0.76)	-0.122 (-0.27)	0.019 (0.21)	0.037 (0.37)	0.027 (0.78)	0.024 (0.46)	0.118** (2.75)	0.115*** (2.70)	-0.010 (-0.59)	-0.031 (-1.57)
A_{Reform}	0.349 (1.01)	0.483 (1.34)	0.148 (1.61)	0.113 (1.24)	0.098*** (2.58)	0.082** (2.23)	-0.038* (-1.35)	-0.041 (-1.45)	-0.000 (-0.02)	-0.009 (-0.75)
SA_{Reform}	0.456 (0.67)	0.123 (0.19)	-0.290** (-2.24)	-0.146** (-2.41)	-0.146*** (-2.75)	-0.168*** (-2.59)	-0.061 (-1.06)	0.054 (-0.95)	0.001 (-0.06)	0.029 (1.17)
Female	-0.046 (-0.61)	-0.035 (-0.32)	0.118*** (10.70)	0.021 (1.64)	0.032*** (9.81)	-0.002 (-0.59)	0.050*** (2.93)	0.048*** (2.83)	-0.001 (-0.30)	-0.005 (-0.79)
S_{Reform} Female	-0.413 (-1.56)	-0.926*** (-2.65)	0.165*** (3.30)	0.136** (2.45)	0.001 (0.14)	0.016 (-0.47)	-0.051 (-0.50)	-0.046 (-0.46)	0.016 (0.65)	0.107** (2.24)
A_{Reform} Female	0.167 (0.51)	0.354 (0.78)	-0.010 (-0.18)	-0.008 (-0.15)	-0.032* (-1.79)	-0.006 (-0.48)	0.028 (0.47)	0.024 (0.39)	-0.009 (-0.51)	0.000 (0.01)
SA_{Reform} Female	-0.082 (-0.18)	0.318 (0.52)	0.020 (0.25)	0.049 (0.60)	0.015 (0.50)	0.024 (0.59)	0.165 (1.22)	0.163 (1.21)	0.001 (0.05)	-0.101* (-1.79)
Constant	4.99*** (3.45)	1.06 (0.61)	0.588*** (4.55)	0.169 (0.56)	1.1.09*** (3.00)	0.869*** (3.17)	0.031 (0.94)	-0.055 (-0.87)	0.159*** (3.51)	0.204*** (6.70)
Worker's ch. ¹	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Firm's ch. ²	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	57317	57317	57317	57317	57317	57317	57317	57317	57317	57317
R^2	0.0601	0.2057	0.0737	0.1181	0.0428	0.1729	0.0170	0.0204	0.0061	0.1514

t statistics in parentheses; $p < 0.10$ ** $p < 0.05$, *** $p < 0.01$.

¹ Worker's age and gender.

² Firm's size.

Table 12. Mismatch flows by gender.

	Mismatch flow		Over-education flow		Under-education flow	
S_{Reform}	-0.317** (-2.53)	-0.298*** (-2.88)	-0.183* (-1.87)	-0.198** (-2.41)	-0.060 (-0.63)	-0.023 (-0.26)
A_{Reform}	0.125 (1.08)	0.078 (0.80)	-0.029 (-0.30)	-0.072 (-0.84)	0.089 (1.50)	0.086 (1.54)
SA_{Reform}	0.196 (1.10)	0.107 (0.75)	0.127 (0.92)	0.082 (0.72)	0.119 (1.06)	0.070 (0.64)
Female	0.306*** (25.76)	0.006 (0.51)	0.188*** (16.99)	-0.002 (-0.25)	0.134** (17.49)	0.021*** (2.50)
S_{Reform} Female	0.080 (1.09)	0.066 (1.13)	0.049 (1.60)	0.047 (1.39)	0.009 (0.19)	-0.005 (-0.09)
A_{Reform} Female	0.015 (0.40)	0.059* (1.86)	0.045 (1.26)	0.097*** (2.63)	-0.010 (-0.54)	-0.018 (-0.87)
SA_{Reform} Female	-0.078 (-0.87)	-0.109 (-1.45)	-0.029 (-0.47)	-0.066 (-1.09)	-0.050 (-0.70)	-0.042 (-0.55)
Constant	1.31*** (3.30)	0.945** (2.29)	0.907*** (3.49)	1.09*** (3.43)	0.851*** (2.97)	0.361 (1.13)
Worker's characteristics ¹	No	Yes	No	Yes	No	Yes
Firm's characteristics ²	No	Yes	No	Yes	No	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	57317	57317	57317	57317	57317	57317
R^2	0.2081	0.4342	0.1541	0.3193	0.1137	0.2295

t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

¹ Worker's age and gender.

² Firm's size.

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Table 13. Share of mismatch flows by gender.

	Share of mismatch flow		Share of over-education flow		Share of under-education flow	
S_{Reform}	-0.072** (-2.22)	-0.072** (-2.31)	0.016 (0.63)	0.009 (0.27)	-0.088** (-2.57)	-0.081*** (-2.50)
A_{Reform}	-0.011 (-0.30)	-0.010 (-0.29)	-0.00 (-0.03)	-0.003 (-0.11)	-0.010 (-0.56)	-0.007 (-0.37)
SA_{Reform}	0.039 (0.72)	0.033 (0.62)	0.059 (-1.06)	-0.053 (-0.99)	0.099** (2.41)	0.086** (2.17)
Female	-0.029 (-0.98)	-0.026 (-0.96)	-0.019 (-0.90)	-0.018 (-0.96)	-0.009 (-0.60)	-0.008 (-0.55)
S_{Reform} Female	0.035 (0.76)	0.043 (0.99)	-0.249** (-2.29)	-0.219** (-2.34)	0.284*** (3.34)	0.263*** (3.43)
A_{Reform} Female	0.123 (1.43)	0.118 (1.40)	0.048 (0.62)	0.045 (0.58)	0.075 (1.40)	0.073 (1.34)
SA_{Reform} Female	-0.069 (-0.64)	-0.075 (-0.71)	0.251 (1.72)	0.222 (1.64)	-0.321*** (-3.08)	-0.297*** (-3.04)
Constant	0.474*** (3.53)	0.576*** (3.57)	0.309*** (3.50)	0.350*** (3.40)	0.179*** (2.87)	0.225*** (2.98)
Worker's characteristics ¹	No	Yes	No	Yes	No	Yes
Firm's characteristics ²	No	Yes	No	Yes	No	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	57317	57317	57317	57317	57317	57317
R^2	0.0098	0.0157	0.0131	0.0229	0.0124	0.0258

t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

¹ Worker's age and gender.

² Firm's size.

Table 14. Employment and temporary contracts flows by age.

	Employment flow		Short-term flow		Apprenticeship flow		Share of short-term flow		Share of apprenticeship flow	
S_{Reform}	-0.475 (-1.49)	-0.202 (-0.707)	0.062 (0.61)	0.095 (0.95)	0.026 (0.66)	0.023 (0.57)	0.106*** (3.02)	0.104*** (2.96)	0.003 (0.26)	0.003 (0.24)
A_{Reform}	0.445 (1.48)	0.171 (0.69)	0.140 (1.60)	0.093 (1.03)	0.090*** (2.60)	0.091*** (2.59)	-0.028 (-1.10)	-0.008 (-0.75)	-0.009 (-0.86)	-0.009 (-0.90)
SA_{Reform}	0.227 (0.46)	0.517 (1.34)	-0.178 (-1.29)	-0.137 (-1.01)	-0.204*** (-3.64)	-0.207*** (-3.62)	0.007 (0.16)	0.006 (0.35)	-0.001 (-0.06)	-0.001 (-0.02)
Age 15-24	1.51*** (46.05)	0.969*** (30.05)	0.127*** (13.67)	0.078*** (7.19)	0.136*** (23.14)	0.146*** (23.26)	-0.017 (-1.28)	-0.019 (-1.43)	0.227*** (30.10)	0.225*** (29.77)
S_{Reform} Age 15-24	0.011 (0.07)	0.027 (0.18)	0.072* (1.90)	0.037 (0.85)	-0.037 (-0.91)	-0.043 (-1.02)	0.016 (1.49)	0.018 (1.49)	-0.008 (-1.20)	-0.008 (-1.22)
A_{Reform} Age 15-24	-0.020 (-0.20)	0.222** (2.45)	0.037 (0.91)	0.064 (1.56)	-0.022 (-1.24)	-0.025 (-1.41)	0.008 (0.90)	0.010 (1.15)	-0.004** (-2.59)	-0.004** (-2.64)
SA_{Reform} Age 15-24	-0.067 (-0.22)	-0.393 (-1.62)	-0.096 (-1.20)	-0.094 (-1.17)	0.120** (2.45)	0.131 (2.61)	-0.009 (-0.49)	0.013 (3.29)	0.014* (1.87)	0.014* (1.87)
Constant	0.222 (0.70)	-3.97 (-6.14)	0.423*** (3.82)	0.059 (0.22)	0.738*** (2.81)	0.877*** (3.15)	0.060* (1.92)	0.023 (-0.45)	0.051*** (2.97)	0.193*** (7.93)
Worker's ch. ¹	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Firm's ch. ²	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	57317	57317	57317	57317	57317	57317	57317	57317	57317	57317
R^2	0.3824	0.6174	0.0519	0.0800	0.1673	0.1732	0.0128	0.204	0.1462	0.1499

t statistics in parentheses; $p < 0.10$ ** $p < 0.05$, *** $p < 0.01$.

¹ Worker's age and gender.

² Firm's size.

Table 15. Mismatch flows by age.

	Mismatch flow		Over-education flow		Under-education flow	
S_{Reform}	-0.354*** (-2.85)	-0.294*** (-2.77)	-0.212** (-1.97)	-0.179* (-1.86)	-0.081 (-1.08)	-0.050 (-0.67)
A_{Reform}	0.159 (1.36)	0.118 (1.03)	-0.017 (-0.17)	-0.029 (-0.32)	0.135** (2.29)	0.100* (1.76)
SA_{Reform}	0.123 (0.69)	0.175 (1.09)	0.118 (0.82)	0.141 (1.08)	0.022 (0.23)	0.057 (0.58)
Age 15-24	0.363*** (25.10)	0.235*** (16.94)	0.256*** (17.76)	0.180*** (13.75)	0.117*** (16.13)	0.057*** (7.23)
S_{Reform} Age 15-24	-0.039* (-0.52)	0.000 (0.00)	0.015 (0.36)	0.057 (1.24)	-0.071 (-1.22)	-0.077 (-1.20)
A_{Reform} Age 15-24	0.068 (1.09)	0.121** (2.07)	0.107** (2.06)	0.136*** (2.77)	-0.043 (-1.41)	-0.015 (-0.52)
SA_{Reform} Age 15-24	-0.033 (-0.31)	-0.141 (-1.50)	-0.051 (-0.68)	-0.131* (-1.76)	0.068 (0.99)	0.039 (0.53)
Constant	0.814*** (2.65)	0.720* (1.71)	1.493*** (2.76)	0.999*** (3.56)	0.767*** (2.70)	0.232 (0.78)
Worker's characteristics ¹	No	Yes	No	Yes	No	Yes
Firm's characteristics ²	No	Yes	No	Yes	No	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	57317	57317	57317	57317	57317	57317
R^2	0.1907	0.3071	0.1731	0.2489	0.0703	0.1303

t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

¹ Worker's age and gender.

² Firm's size.

Table 16. Share of mismatch flows by age.

	Share of mismatch flow		Share of over-education flow		Share of under-education flow	
S_{Reform}	-0.060** (-2.14)	-0.060** (-2.13)	-0.063** (-2.46)	-0.063** (-2.48)	0.003 (0.13)	0.003 (0.12)
A_{Reform}	0.016 (0.55)	0.016 (0.55)	0.006 (0.27)	0.007 (0.27)	0.009 (0.57)	0.009 (0.57)
SA_{Reform}	0.036 (0.87)	0.036 (0.87)	0.036 (0.95)	0.036 (0.95)	-0.000 (-0.00)	-0.000 (-0.00)
Age 15-24	0.002 (0.15)	0.001 (0.12)	0.024* (1.93)	0.025* (1.96)	-0.022** (-2.10)	-0.023** (-2.18)
S_{Reform} Age 15-24	0.001 (0.30)	0.000 (0.15)	0.017 (1.02)	0.016 (1.02)	-0.015 (-0.90)	-0.015 (-0.91)
A_{Reform} Age 15-24	-0.008 (-1.11)	-0.009 (-1.16)	-0.004 (-0.55)	-0.004 (-0.62)	-0.004 (-1.11)	-0.004 (-1.07)
SA_{Reform} Age 15-24	0.007 (0.49)	0.008 (0.57)	-0.006 (-0.28)	-0.004 (-0.22)	0.013 (0.72)	0.012 (0.71)
Constant	0.463*** (3.54)	0.525*** (3.63)	0.274*** (3.90)	0.278*** (3.18)	0.188*** (2.92)	0.247*** (3.38)
Worker's characteristics ¹	No	Yes	No	Yes	No	Yes
Firm's characteristics ²	No	Yes	No	Yes	No	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	57317	57317	57317	57317	57317	57317
R^2	0.0088	0.0091	0.0109	0.0116	0.0086	0.0092

t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

¹ Worker's age and gender.

² Firm's size.