Temporary Workers, Educational Mismatch and Firm Productivity

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Abstract

The objective of this paper is to provide new evidence on the effect of temporary contracts on firms' productivity through their impact on skill mismatch using a matched worker flows employer-employee dataset. To achieve this goal, we regress TFP on the fraction of educationally mismatched temporary workers and a set of additional controls in a dynamic panel model at firm-year level controlling for industry and time effects. We also take advantage of institutional labour market reforms occurred in Italy in 2001 and 2003 to study how the mismatch among temporary workers and its impact on TFP have changed. We find that skill mismatch has increased among temporary workers (compared to permanent workers); the reforms were able to mitigate this effect, but were not enough to overcome the trend. The impact on firms' productivity, positive for one reform and negative for the other, were overall quite small.

Keywords: temporary contracts, skill mismatch, firm's productivity.
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1   Introduction

During the recent economic crisis several European countries have experienced an increase in both unemployment and educational mismatch. Specifically, a recent European Commission working document (2012) report that

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skill mismatch is particularly severe in Mediterranean Countries, characterized by more segmented labor markets, and younger male workers hired on non-standard contracts are predominantly affected. This problem dates back to the mid-eighties when non- standard low EPL short-term contracts were introduced side by side with the unchanged strict EPL permanent contracts as a response of high and persistent unemployment, in the attempt to inject flexibility into the market. Given the presence of asymmetric information in the labor market, temporary contracts may be used by firm as a screening device to better learn about the quality of the match. It has been argued that due to termination costs, in recent years many firms have either outsourced responsibility for sorting and screening to temporary help agencies or have made greater use of temporary (fixed- term) contracts (Lazear & Gibbs, 2009). However, the effectiveness of these measures in mitigating the prevalence and negative effects of skill mismatch is yet to be assessed. For temporary contracts in particular, there is the need to distinguish between two opposing effects on skill mismatch: on one hand such contracts have a potential positive filtering effect by allowing firms to learn about the workers suitability during the initial stages of their careers, on the other hand they might have a negative impact due to reduced job security, higher turnover and lack of incentives to invest in firm-specific training.

In a recent work, Lazear & Gibbs (1998) show that when firms face barriers to laying off due to legal or other institutional impediments (e.g., powerful trade unions), this may compromise the quality of the workers that are eventually 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. In contrast, 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.

While a vast literature has focused on the impact of temporary contract on employment outcomes and firm productivity, there are only few studies that analyze the relationship between employment protection legislation and skill mismatch, and to the best of our knowledge no studies that focus on the effect of temporary workers on both skill mismatch and firm productivity. The aim of this paper is to fill this gap in the literature and provide new evidence on the effect of temporary contracts on firm productivity through

their effects on skill mismatch, measured as educational mismatch using a matched worker flows employer-employee dataset.

A number of studies link employment protection legislation and skill mismatch with firm performance separately. Predictions on the effects of temporary employment on workersï£· effort and productivity are ambiguous. Boeri & Garibaldi (2007) find a temporary positive effect on employment and a permanent negative effect on productivity, while Ichino & Riphahn (2010) find a positive impact of effort and productivity when temporary jobs have a high probability to be transformed into permanent ones after the probation period. Similarly they find that the effects of skill mismatch on firm productivity are somewhat ambiguous.

Skill mismatch has also been linked to a number of adverse outcomes related to productivity at the firm level, such as a higher level of absenteeism and turnover of the workforce (Robst, 1995; Sicherman, 1991; Sloane & Battu, 1999; Tsang & Levin, 1985, 1987). Moreover, studies using firm-level data show that there is a positive relationship between the proportion of over-qualified/over-skilled workers within the workforce and the productivity of the firm (Jones *et al.* , 2009; Kampelman & Rycx, 2012). However, if these positive outcomes are outweighed by the lower productivity of mismatched workers due to de-motivation or higher quit rates, the under-utilization of skills can result in an overall waste of talent and lower productivity growth. Therefore, the impact of EPL on skill mismatch and ultimately on firm performance is an area that remains unexplored and requires further research.

We focus our study on Italy, which is a particularly suitable country since after the implementation of several labor market reforms (1997, 2001 and 2003), the share of temporary contracts increased significantly (from approximately 5% in mid eighties to more than 13% in 2013). Indeed, by relaxing the EPL of temporary contracts, these reforms created important incentives for firms to substitute permanent with temporary workers (Tealdi, 2011a). Moreover, it has been shown that the magnitude of educational mismatch is in Italy one of the highest in Europe (Verhaest & van der Velden, 2013). According to McGuinness & Sloane (2011), the share of overeducated workers is approximately 23% at the time of their first job and of 13% five years after graduation. In addition, more in line with the European average, over-skilling in Italy equals 21% at the first job and 11% five years after graduation.

To study the relationship between temporary contracts and skill mismatch, we use a longitudinal dataset for workers in the Italian region Veneto

(PLANET), which provides information on the universe of worker flows in the private sector over the period 1998-2011. We estimate a difference in difference model, in which we consider the period before and after the reforms and select as control group young workers hired on temporary contracts and as a treated group young workers hired on permanent contracts. The diff-in diff coefficient provides information on how the skill mismatch has changed among temporary versus permanent employees as a consequence of the increased labour market flexibility, brought by the reforms.

As a second step, we merge the data set described above with the AIDA data set which provides information on the balance sheets of Italian corporate firms. We propose an econometric model, which aims to relate TFP to the share of temporary workers and the share of educational mismatched temporary workers. In order to estimate the impact of temporary workers via skill mismatch we regress TFP on the fraction of educational mismatched temporary workers and a set of additional controls in a dynamic panel model at firm year level controlling for industry fixed effects and time effect. Within a fixed effect framework - having information only on the flows of workers - we are able to add some additional controls (such as occupation, geographical location, conversion rates). We can then take advantage of the institutional reforms occurred in 2001 and 2003 to study the way the mismatch among temporary workers have affected the firm's productivity before and after the reforms. We construct two-step dummy variables, which take the values 1 for the period after the reforms and zero before. The share of skill mismatched workers interacted with temporary workers and the reforms is then our key variable to identify this effect.

We find that skill mismatch among temporary workers has increased compared to skill mismatch among permanent workers. Even though the reforms mitigated somehow this effect, they were not enough to overcome the positive trend. Moreover, our estimates suggest that the effect on firm's productivity was positive for the first reform and negative for the second, even though the magnitude of the change was overall small.

Our paper is organized as follows. Section 3 presents an overview of the Italian institutional background. Section 4 describes and the data and Section 5 presents the main descriptive statistics. In Section 6 we outline the empirical strategy, which provides the results shown in Section 7. Section 8 concludes the paper.

2 Overeducation and skills mismatch

Skills mismatch in the labour market concerns the extent to which people work in jobs which are not matched to their qualifications and skills (CEDEFOP, 2014). Freeman (1976) with his seminal work on over education was the first to bring this issue to the attention of researchers. Since then, many studies have been performed both at the theoretical and empirical level to evaluate its effects on the labour market.

Theoretically, there exists no accepted unified theory of skills mismatch. Theories that try to explain it range from two extreme perspectives: the human capital theory and the job competition model. According to the first, it is possible that workers are overeducated in the short run, while they are looking for a more appropriate job or while firms adjust their production processes to fully utilize the worker's human capital. However, a sufficient degree of wage flexibility should restore any imbalance between labour demand and labour supply, since wages always match the worker's marginal product, which is determined by the level of acquired human capital (Becker, 1964).

The job competition model suggests that job characteristics may be the only factor determining earnings. Based on the work of Thurow (1975), the model emphasizes the importance of a worker's relative position compared to other workers competing for jobs. Excess schooling is the consequence of the competition for jobs in presence of rigidity of demand for highly educated workers, which leads graduates to invest in education in order to increase their chances to get a job.

The assignment literature (Sattinger, 1993) offers a middle ground between the two theories. Like the job competition model, this theory assumes that the jobs available in the economy are limited and therefore earnings are job specific; like the human capital theory, it assumes that by investing in education individuals compete for the best jobs and therefore the wages are bound to be influenced by the human capital level of the workers. Thus, wages and earnings are determined both by the characteristics of the worker and of the job.

The search theory assumes that unemployment is largely voluntary: individuals accept jobs only when the offered wage is higher than their reservation wage. High skilled individuals have higher reservation wages and therefore tend to wait longer before accepting a position. Over education arises because low skilled workers due to their low reservation wage tend to accept the first offer they get.

Finally, career mobility theories predict that wages increase overtime together with the work experience accumulated by individuals. Therefore, matches of firms and workers tend to exhibit low earnings in the short run, but better prospects in the long run (Caroleo & Pastore, 2013).

Most of the empirical evidence comes from studies which estimate wage equations based on the decomposition of educational years acquired (McGuinness, 2006). They find that the returns to surplus education is positive and significant, but lower than required education. Most researchers have interpreted this result as evidence against the human capital theory that predicts equal returns for surplus and required education. Consistent with the job competition theory, Rumberger (1987) found no significant returns to surplus education in certain occupations. Vahey (2000) reported no lower returns to surplus education for overeducated Canadian females, but lower returns for overeducated Canadian males. Battu *et al.* (2000) examined the validity of the human capital theory by testing for the hypothesis that graduates jobs converge overtime, making over education a short term phenomenon. They find no evidence that overeducated graduates have been able to upgrade their jobs, suggesting that over education may be a phenomenon which persists in the long run. In support of the assignment model, McGuinness (2003) proved that both human capital and job characteristics are important determinants of wages.

Most of the empirical studies measure over education only in terms of level and not in terms of type of education. A number of economists have tried to address this issue by taking into account heterogeneity among individuals with the same level of education. Dekker *et al.* (2002) find that young workers are more likely to be overeducated: 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 overqualified. On 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 overeducated is approximately the same for men and women. Finally ethnic minorities may also be more overeducated compared to ethnic majorities. Duncan & Hoffman (1981) find that 49% of black males were overeducated compared to 42% of the US male workforce. Similarly, Alpin *et al.* (1998) find that 30% of non-white graduates in the UK were overeducated compared to 27% of white

graduates.

3   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 labor 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 (up to two years, with only one possibility of renewal). 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,[1] and therefore, were specifically designed for young people below the age of 34.

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.[2] The objectives of these interventions, in accordance with the European guidelines, were the reduction of unemployment, particularly among young people, the increase of labor force participation, and the boosting of employment. Indeed, employment, unemployment, and labor 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%),[3] labor 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).[4] In order

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[1]Together they represented less than 10% of the total number of contracts.They differed in the length of the contract and in the training required. The apprenticeship contract was in general longer and demanded more training. Controls for training were much stricter for apprenticeship and were organized at both national and local levels.

[2]See Tealdi (2011b) for an extensive description of these reforms.

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

[4]Average rate across 19 European countries. Year: 1990. Source: OECD.

to promote the utilization of these new forms of employment contracts, 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 labor cost burden, was the recipe adopted to trigger a more competitive labor market.

Specifically, three were the major reforms implemented with the objectives of improving labor market flexibility. The first reform known as Legge Treu was approved in 1997. It represents a milestone in the history of the recent Italian labor market. Some of the major innovations brought by Law-196/1997 are the regulation of agency contracts and collaboration contracts and the relaxation of the rules for the utilization of fixed-term contracts and apprenticeships. Few years later, 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.[5] The most recent reform took place in 2003 with Law-30/2003. This law, known as Legge Biagi, introduced new additional forms of atypical contracts (such as job on call and job sharing) and introduced several modifications to the apprenticeship and vocational training contract.

While the second reform (2001) was meant to increase flexibility by relaxing the rules for the utilization of short-term contracts, its implementation was not immediate, but delayed due to technical aspects delegated for regulation to unions' collective agreements. Therefore, firms had to wait before being able to take advantage of the new legislation. (Cappellari *et al.* (2012)). Therefore, even though the 2001 and 2003 reforms were regulating different types of temporary contracts, their effect may have overlapped.

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[5]According to some scholars (Aimo (2006), Cappellari *et al.* (2012)), 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. 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 disincentives for the adoption of the contracts and therefore distorting the objective of the law.

4 Data

We use employer-employee data from the Italian region Veneto (PLANET). The data set 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 data set is that it includes detailed information on occupation (categorized by 4 digit code), education (8 categories) and different types of labor contracts. This allows us to construct measures of skill mismatch by contract. Unfortunately, no information on wages is provided. The data set includes also information on characteristics of the firm, such as industry, detailed geographic information, and the firm national tax number (*codice fiscale*); however no information on the stock of workers is available. Our balance sheet data are derived from standardized reports that firms are required to file annually with the Chamber of Commerce. These data are distributed as the database by Bureau van Djik, and are available from 1995 onward for firms with annual sales above 500,000 euros. All (non-financial) incorporated firms with annual sales above this threshold are included in the database. The available data include sales, value added, total wage bill, the book value of capital (broken into a number of subcategories), total number of employees, industry (categorized by five- digit code), total wage cost, and the firm tax number. The presence of detailed information on occupation and education allows us to identify skill mismatches 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. Specifically, we identify a worker as mismatched whether she is over or under qualified, i.e., her level of education is higher or lower compared to the mode of the workers within the same occupation. 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. This definition based on flows rather than stocks allows to capture the fact that over time the skills requirement for a specific type of job evolve and get higher. We are then able to provide detailed insights on the role temporary contracts on educational mismatch focusing on hiring, separations, conversion rates and career profile of workers. Specifically, we analyze the way the relaxation of the rules governing short term contracts and the introduction of new types of short-term contracts had an effect on skill mismatch and therefore on firm's TFP. We

focus our analysis on individuals aged 15 to 64, whose contract length is at least 3 months. 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. Since we are aware of the issues related to the reliability of the information regarding the education of foreign workers, we conduct our analysis both on a sample of all Italian individuals as well as on the total working population, including foreigners.[6]

5   Descriptive statistics

By analyzing the data set described above, we provide some descriptive statistics regarding the share of temporary contracts and the skill mismatch over the time period 1998-2007. Note that we observe the flows of workers who enter and leave the firms and therefore each characteristic that we consider refers to the workers' flows and not to the workers' stock.

Table 1 reports the average age of entry per year, the share of female employees and the share of foreign workers. It is interesting to notice that while the share of females does not change over the years, the share of foreign workers increases consistently. Table 2 shows the share of temporary workers according to contract type. The share of short-term contracts increased consistently and significantly since 1998 with important jumps between 2001 and 2005. We can also notice a significant increase of other contracts and collaborations. Looking at the apprenticeships, we detect instead an hump-shaped trend, decreasing until 2003 and increasing after.

Figure 1 shows the share of mismatched workers, over and under educated workers during the time frame considered. We can notice that all three measures show a positive trend particularly after 2001, year of the first reform considered.

6   Empirical strategy

Our strategy includes two steps: first, we estimate the effect of temporary contracts on skill mismatch, by looking at how skill mismatch has changed after the implementation of two important labour market reforms, which affected significantly the regulation of temporary contracts. Second, we focus

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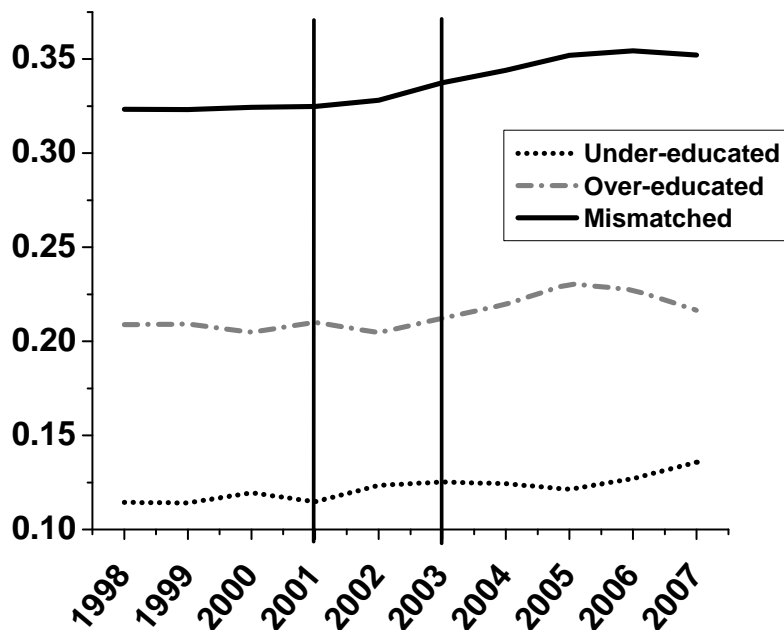[6]Additional robustness exercise are provided in the appendix.

Figure 1. Mismatched, Over and Under Educated workers in Italy (1998-2007).

on how the resulting change in skill mismatch among temporary workers brought by the reforms has affected the firms' TFP.

6.1 The worker side: the effect of temporary contracts on skill mismatch

In order to study whether the flexibilisation of the Italian labour market through the relaxation of the rules governing existing short term contracts and the introduction of new types of short term contracts has affected skill mismatch, we exploit two labour market reforms which were implemented in Italy in 2001 and 2003. Since it is not clear whether firms reacted immediately to the new laws or with some delay, for the first reform we consider the 1998-2001 time period as the pre reforms and the 2002-2007 time period as the post reforms. For the second reform, we refer to the 1998-2003 time period

as the pre reforms and to the 2004-2007 as the post reforms. We do not include later years because of the economic crises who severely hit Europe, which is outside the scope of this paper and might have created confounding effects.

It is well known in the literature that young workers are those who are most likely to be hired on a short-term basis when they enter in the labor market and it is suggested that young people and those working in fixed-term jobs are those who are more affected by skills mismatch (WEF, 2014). Therefore, we focus our analysis on young workers (below the age of 34) and we perform a difference in difference analysis in which we use as control group individuals hired on permanent contracts and as a treated group individuals hired on temporary contracts. Since the 2001 reform amended short-term contracts, while the 2003 legislation reformed mostly the apprenticeship contract, we consider the effects of the two reforms separately. Moreover, we look at the effects of the first reform on the educational mismatch of young workers hired on short-term contracts, and of the second reform on the educational mismatch of young workers hired on apprenticeship contracts. We estimate the following equation

$$y_t = \beta_0 + \beta_1 Temps + \beta_2 Reform + \beta_3 Temps * Reform + \boldsymbol{\beta_4}\mathbf{z} + \epsilon \quad (1)$$

where y is a dummy variable which identifies whether the worker is skill mismatched, overeducated or under-educated, *Temps* is the share of temporary workers, which refers to short-term contracts for the 2001 reform and to apprenticeship contracts for the 2003 reform. *Reform* is a dummy variable which takes value 0 for the period pre-reforms (1998-2001) and value 1 for the period post-reforms (2002-2007) for the first reform and takes value 0 for the period pre-reforms (1998-2003) and value 1 for the period post-reforms (2004-2007) for the second reform. Finally, $\mathbf{z}$ is a vector of controls which includes age, education, the square of both variables, part-time work, gender, other types of temporary contracts, occupation, sector and province. Our coefficient of interest is β_3, which is the difference in difference output.

6.2 The firm side: the effect of the change in skill mismatch due to temporary contracts on firms' TFP

As a second step we consider a production function of the form

$$Y = AK \exp(\alpha L_P + \gamma L_T + \beta M + \boldsymbol{\phi}\mathbf{I}) \tag{2}$$

where Y is the firm's value added, K is capital and L_P and L_T represent permanent and temporary workers, respectively, and M is the mismatched workers. I represents a vector of interaction terms between temporary and permanent workers, mismatch and the dummy for the reforms. Specifically,

$$\boldsymbol{\phi}I = \delta_0 + \delta_1 M * R + \delta_2 P * R + \delta_3 T * R + \delta_4 M * T + \delta_5 M * T * R \tag{3}$$

where R i the dummy for the reforms.

By taking the log on both sides of the equation and compute the first difference we get

$$y_t - y_{t-1} = a_t - a_{t-1} + k_t - k_{t-1} + \alpha F_P + \gamma F_T + \beta F_M + \boldsymbol{\phi}\mathbf{I} \tag{4}$$

where small letters identify the variables in log and F_P and F_T represent the net flows of permanent and temporary workers[7] within the firm, respectively. F_M represents the net flow of mismatched workers.

The variable of interest is δ_5 which can be interpreted as the effect of the change in the mismatch of temporary workers before and after the reforms.

7   Results

Results of the difference in difference estimations are shown in Table 3 and Table 4, for the 2001 and 2003 reforms respectively.

Our estimates show that new entrants in the labour market with short-term contracts are more mismatched compared to their permanent counterpart. Moreover, we find that after the 2001 reform the overall likelihood of being perfectly matched is smaller. Therefore, the reform seems to have reinforced the existing negative effect of short-term contracts on skill mismatch, by further reducing the probability of ending up in a perfectly matched job,

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[7]They are computed as the difference between the number of workers who enter the firm and the the number of workers who leave the firm, on a permanent or temporary basis.

when hired on a short-term contract. When looking at the particular type of mismatch, we find that being hired on a short-term contract leads to an higher probability of being over educated and a lower probability of being under educated. After the 2001 reform, our estimates show that being hired on a short-term contract reduces the likelihood of being over educated and increases the likelihood of being under educated. However, the effect of the reform in that sense is able to mitigate, but is not strong enough to overcome the positive likelihood of being overeducated and the negative likelihood of being under educated, which individuals have to face when hired on short-term contracts.

Regarding the 2003 reform, our estimates show that new entrants in the labour market with an apprenticeship contract are more mismatched compared to their permanent counterpart. Moreover, we find that after the 2003 reform the overall likelihood of being perfectly matched is smaller. Therefore, the reform reinforced the negative effect, by further reducing the probability of ending up in a perfectly matched job, when hired on an apprenticeship contract. We also find that being hired on a apprenticeship contract decreases the probability of being over educated and increases the probability of being under educated. This result does not seem surprising since the apprenticeship contract was created with the specific purpose to train young individuals on the job. After the 2003 reform, being hired on an apprenticeship contract however increases the probability to be over educated and decreases the probability to be under educated. The effect of the reform is strong enough to overcome the first effect thus generating an overall positive effect on over education and a negative effect on under education.

In that respect, it seems that the reforms, by creating incentives for the utilization of temporary contracts and therefore by increasing the share of temporary workers, where not effective in reducing the relative mismatch of temporary workers compared to permanent workers. It is interesting to notice that according to our estimates female workers tend to be less mismatched compared to male workers. As a robustness check, we repeat the same estimation by considering as period post-reforms the years 2004-2007, and we find similar results. The results of our GMM estimation are reported in Table 5. Our variables of interest are given by the interaction of over and under education, temporary and reforms. Our estimates seem to suggest that the 2001 reform through its effect on mismatch was able to improve firms' productivity, while the 2003 reform through its effect on mismatch had negative effects on firms' TFP. Overall, the magnitude of the effect is rather

small.

8 Conclusions

To be completed

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Table 1. Descriptive statistics I

Year	Entry age	Female	Foreign
1998	30.01937	.4500441	.1123620
1999	30.44651	.4550301	.1324549
2000	30.85274	.4609482	.1622965
2001	31.43799	.4652311	.1727738
2002	31.80888	.4447180	.2431555
2003	32.45571	.4507379	.2471522
2004	32.73932	.4480922	.2679272
2005	33.08517	.4509432	.2686510
2006	33.34631	.4575754	.2743859
2007	33.73843	.4722672	.3230851

Table 2. Descriptive statistics II

Year	Short-term contracts	Apprenticeships	Others	Collaborations
1998	.2004930	.1374155	.0132709	.0000965
1999	.2083060	.1427699	.0132409	.0001710
2000	.2058117	.1360112	.0227731	.0009685
2001	.2092722	.1275397	.0316743	.0021176
2002	.2283433	.1226912	.0453230	.0020962
2003	.2550253	.1161091	.0488961	.0035070
2004	.2797966	.1226812	.0529108	.0056644
2005	.2927336	.1333555	.0734914	.0126981
2006	.2938700	.1365020	.0891764	.0238460
2007	.2957226	.1097027	.1105660	.0416849

Table 3. Estimation results : Reform 2001

	Perfect Match	Over education	Under education
Short-term*Reform2001	-0.018	-0.214	0.316
	(0.005)	(0.011)	(0.011)
Short-term	-0.004	0.258	-0.328
	(0.004)	(0.010)	(0.009)
Reform2001	-0.055	-0.919	1.248
	(0.005)	(0.011)	(0.011)
Female	0.206	-0.349	0.498
	(0.003)	(0.006)	(0.006)
Age	0.013	-0.087	0.104
	(0.001)	(0.002)	(0.002)
Age2	0.000	0.003	-0.003
	(0.000)	(0.000)	(0.000)
Education	4.974	11.610	-7.640
	(0.012)	(0.035)	(0.035)
Education2	-1.203	-0.882	0.363
	(0.003)	(0.006)	(0.006)
Full time	0.061	-0.046	-0.014
	(0.003)	(0.006)	(0.006)
Other temps	-0.065	0.243	-0.285
	(0.005)	(0.011)	(0.012)
Cococo	-0.245	-0.343	0.377
	(0.016)	(0.025)	(0.030)
Apps	-0.114	0.161	-0.030
	(0.004)	(0.008)	(0.009)
Constant	-2.751	-32.465	13.615
	(0.162)	(0.262)	(0.395)
Occupation FE	yes	yes	yes
Sector FE	yes	yes	yes
Province FE	yes	yes	yes
Time FE	yes	yes	yes
N	4618800	4618800	4618800

Table 4. Estimation results: Reform 2003

	Perfect Match	Over education	Under education
Apprenticeship*Reform2003	-0.031	0.572	-0.523
	(0.006)	(0.014)	(0.015)
Apprenticeship	-0.101	-0.102	0.196
	(0.005)	(0.010)	(0.011)
Reform2003	-0.054	-1.058	1.392
	(0.005)	(0.011)	(0.011)
Female	0.206	-0.345	0.495
	(0.003)	(0.006)	(0.006)
Age	0.013	-0.089	0.105
	(0.001)	(0.002)	(0.002)
Age2	0.000	0.003	-0.003
	(0.000)	(0.000)	(0.000)
Education	4.972	11.628	-7.672
	(0.012)	(0.035)	(0.025)
Education2	-1.202	-0.884	0.369
	(0.003)	(0.006)	(0.006)
Full time	0.061	-0.040	-0.020
	(0.003)	(0.006)	(0.006)
Short-term	-0.016	0.124	-0.130
	(0.003)	(0.006)	(0.005)
Cococo	-0.245	-0.279	0.308
	(0.016)	(0.025)	(0.030)
Other temps	-0.065	0.283	-0.332
	(0.005)	(0.011)	(0.012)
Constant	-2.748	-32.392	13.557
	(0.162)	(0.264)	(0.394)
Occupation FE	yes	yes	yes
Sector FE	yes	yes	yes
Province FE	yes	yes	yes
Time FE	yes	yes	yes
N	4618800	4618800	4618800

Table 5. Estimation results : GMM

Variable	Coefficient	(Std. Err.)
Over education*Short-term	0.007	(0.002)
Under education*Short-term	0.031	(0.008)
Over education*Apps	-0.034	(0.007)
Under education*Apps	-0.008	(0.008)
Permanent	0.003	(0.001)
Short-term	0.000	(0.001)
Apps	0.029	(0.005)
Over education	-0.005	(0.001)
Under education	-0.023	(0.008)
Cococo	0.006	(0.002)
Other temps	0.000	(0.000)
Female	0.000	(0.000)
Age firm	-0.002	(0.000)
Age firm 2	0.000	(0.000)
Capital	0.261	(0.003)
Intercept	0.108	(0.003)