

# Opening the labor market to qualified immigrants in absence of linguistic barriers\*

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## Abstract

This paper investigates the impact of opening the labor market to qualified immigrants who hold fully equivalent diplomas with respect to natives, and do not experience any linguistic barrier. Leveraging the 2002 opening of the Swiss labor market to qualified workers from the European Union, we show that this policy led to a large increase in the share of young immigrants with the same linguistic background as natives. This reform generated heterogeneous effects on Swiss employees' wages and employment. While incumbent workers experienced a wage gain and a decrease in the likelihood of becoming inactive, the opposite happened for young natives entering the labor market after the policy change. We interpret this heterogeneity as a result of different patterns of complementarity and substitutability between natives and immigrants in terms of acquired experience in the local labor market.

**Keywords:** qualified immigration, wage effects, worker substitutability, experience

**JEL codes:** F22, J08, J31, J61

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# 1 Introduction

The economic and political debate on the opening of labor markets to immigrant workers has involved the majority of countries over the last decades. On the one side, qualified immigrants play a crucial role for the development of emerging countries and for the sustainable growth of advanced economies that deal with increasingly ageing populations and shortages of sophisticated skills (see [Peri, 2016](#) for a review). On the other side, the fear of harmful consequences for native workers has led to a growing support for right-wing populist parties that contrast migration and, more generally, globalization ([Rodrik, 2020](#)).

A large literature in economics has shown evidence of positive effects on natives' wages and employment (e.g., [Foged and Peri, 2016](#)) when immigrants are either unskilled or experience linguistic barriers. In this framework, while immigrants are more likely to specialize in manual-intensive tasks, natives exploit their comparative advantage in communication-intensive jobs ([Peri and Sparber, 2009](#); [Manacorda et al., 2012](#); [Ottaviano and Peri, 2012](#)). These complementarities lead to higher total factor productivity and wages ([Borjas, 1999](#); [Peri, 2012](#); [D'Amuri and Peri, 2014](#)). Our paper analyzes a rather different setting. We focus on the labor market impact of qualified immigration when foreign workers share the same language and hold fully equivalent certifications with respect to natives. To this aim, we leverage the natural experiment provided by the enactment of the Agreement on the Free Movement of Persons (AFMP) between Switzerland and the European Union in 2002. This agreement has implied the recognition of diplomas and professional qualifications of workers from EU countries, granting them access to the Swiss labor market without the need to acquire further certifications.

We investigate the effects of this reform on natives' labor market outcomes in Ticino, an Italian-speaking Swiss canton, where Italian employees represent a very large share of the labor force.<sup>1</sup> For identification, we rely on a difference-in-differences approach that compares over time economic sectors largely affected by the recognition of EU certifications to sectors that were not – or only marginally – affected. While the fraction of Italian employees has grown in all sectors after the introduction of the AFMP, we estimate a further increase of more than 3 percentage points in treated sectors. We document that this increase is mainly driven by young immigrants and corresponds to approximately 25% of the pre-policy share.

Our findings show evidence of a large and statistically significant negative impact for the youngest age group (18–29), an impact that turns positive for middle-aged

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<sup>1</sup>In particular, Italian cross-border workers exceed 30% of the workforce in Ticino, the highest value observed among Swiss cantons ([Swiss Federal Statistical Office, 2021](#)).

(30–49) native employees and fades away for older employees (50–64). The negative effect on the youngest age group is explained by the lower entry wages of young natives who enter the labor market after the policy change, while the wages of young incumbents were mostly unaffected. As for the wage gains experienced by middle-aged incumbent employees, they accrue mostly to high-ability workers and are more likely to materialize when negotiating a new working contract with a different firm.

We also document a decrease in the probability of leaving the labor force for older Swiss employees after the liberalization of qualified immigration from EU countries, a result consistent with existing evidence showing that a higher income reduces the chances of opting for early retirement (Kuhn et al., 2021). Conversely, our estimates suggest an increase in the likelihood of inactivity for young natives, although the robustness of this result depends on the adopted empirical specification.

In the absence of linguistic barriers, young qualified immigrants are likely close substitutes of young natives entering the labor market with comparable diplomas and no experience. At the same time, they are complementary to middle-aged experienced natives with a deeper knowledge of the local labor market (Borjas, 2003; Ottaviano and Peri, 2012). We strengthen this interpretation showing that the real wages of incumbent, thus experienced, Italian employees have not been harmed by the inflow of new Italian workers.

We complement our findings with a descriptive analysis of the evolution of the labor market at the regional level. We show macro-level evidence that, after the introduction of AFMP, (i) the labor market in Ticino experienced a sharp expansion mainly driven by the growing number of young and middle-aged Italian employees; (ii) the wages of the Swiss workers in the youngest age group suffered a steeper decline (as compared to the already declining pre-policy trend); (iii) the wages of middle-aged Swiss workers went up; (iv) the share of jobless young natives increased; finally, (v) transitions to inactivity of older Swiss employees became less frequent.

Our paper is closely related to the existing studies on the opening of the Swiss labor market to immigrants from EU countries. Focusing on cross-border workers, Beerli et al. (2021) rely on an identification strategy based on firms' distance from the border to show that the AFMP allowed firms in knowledge-intensive sectors, especially in the field of high-tech manufacturing, to acquire new skills that were previously scarce. The resulting productivity growth led to an increase in the number of firms and to wage gains for highly educated natives in top managerial positions (Basten and Siegenthaler, 2019).

Building on this evidence, we shed light on the large heterogeneity in the effect of the policy across native employees belonging to different age groups, showing that

gains are concentrated among middle-aged experienced incumbents, while young new entrants face wage losses. Similar findings are reported by [Dustmann et al. \(2017\)](#), who analyze the inflow of low-skilled Czech workers in Germany after the fall of the Berlin wall. Although their setting is different from ours, they show that the adverse effects of increased competition were borne by individuals entering the labor market after the shock, who protected *insiders* from unemployment and wage losses. [Dustmann et al. \(2013\)](#) also discuss how immigration negatively affects individuals at the bottom of the wage distribution, who are likely younger. Conversely, a positive effect of high-skilled immigration, which enhances technological progress, materializes at the top of natives' wage distribution ([Dustmann et al., 2009](#)).

Another branch of the existing literature on immigration deals with the role of natives' bargaining power when negotiating new contracts, arguing that wage gains arise from better outside options and, in particular, from a deeper knowledge of the local labor market ([Moreno-Galbis and Tritah, 2016](#)). In this framework, the inflow of qualified immigrants with lower reservation wages leads to positive externalities for experienced native individuals ([Battisti et al., 2018](#)), who obtain better paid job positions. On the contrary, young individuals at the beginning of their careers – who do not have any experience-led informational advantage – are more exposed to competition. For instance, [Aepli and Kuhn \(2021\)](#) show that Swiss employers close to the frontier have substituted young resident apprentices in need to be trained with less expensive and already qualified cross-border workers.

Our work contributes along several dimensions to the literature that investigates the impact of qualified immigration on natives' labor market outcomes. First, we focus on a setting characterized by the absence of linguistic and cultural barriers. Second, we study how the impact of the policy changes across age groups, focusing not only on the evolution of employees' real wages, but also on the likelihood of leaving the labor market. Third, we propose an alternative identification strategy to assess the impact of the AFMP on the Swiss labor market. Rather than exploiting firms' distance from the frontier and focusing on the inflow of cross-border workers ([Beerli et al., 2021](#)), we consider how different economic sectors were affected by the recognition of EU qualifications.<sup>2</sup>

The policy relevance of our research lies in its contribution to the extensive debate on the consequences of opening the labor market to qualified immigrants. Policies aiming at removing barriers for foreign workers have been at the center of the political agenda of several countries and have unleashed the fierce opposition of some parties ([Dorn and Zweimüller, 2021](#)).

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<sup>2</sup>This may also overcome the potential endogeneity of firms' location ([Aepli and Kuhn, 2021](#)).

The rest of the paper is organized as follows. Section 2 introduces the most relevant features of the institutional setting. Section 3 describes our data. Section 4 outlines the empirical models. Section 5 presents our main results and investigates the underlying mechanisms. Section 6 includes a descriptive analysis at regional level and illustrates a theoretical framework. Section 7 concludes.

## 2 Background

Switzerland and the European Union are bound by deep economic and political relations that have intensified over the last decades, implying an increasing level of integration. Apart from trade and reciprocal market access, this cooperation concerns several policy fields including education, research, security and, most of all, the free movement of people and workers. Since the beginning of the 1990s, the progressive opening of the Swiss labor market to immigrants from EU countries has been the object of a long legislative process that induced a heated debate on the potential detrimental effects on natives' labor market outcomes.

The free access to the Swiss labor market for EU workers was introduced by the AFMP, one of the seven Bilateral Agreements<sup>3</sup> between Switzerland and the EU signed on June 21, 1999 and approved by the Swiss electorate in a referendum held in May 2000. These agreements aimed at guaranteeing reciprocal market access in a variety of sectors after Swiss voters rejected membership to the European Economic Area in 1992.

The implementation of the AFMP took place gradually. Before 1999, foreign workers were subject to yearly quotas set by the Swiss federal government and to the *priority requirement*, according to which an immigrant could be hired only if an equally qualified resident worker was not available. These restrictions were quite stringent and represented an issue for industries in need of foreign skilled workers (Afonso, 2004). Since 1999, however, these restrictions were partially loosened for immigrants from the EU, triggering a transitional phase characterized by a lower degree of tightness of yearly quotas, especially when hiring cross-border workers (Beerli et al., 2021), until the AFMP was finally enacted on June 1, 2002.

A key feature of the AFMP was the recognition of EU diplomas and professional certifications, which reflected the aim of encouraging qualified immigration in Switzerland.<sup>4</sup> This recognition of EU certifications implied a remarkable difference

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<sup>3</sup>The other six agreements concerned barriers to trade, public procurement markets, agriculture, overland transport, civil aviation and research.

<sup>4</sup>Article 9 of of Section I (Basic Provisions) of the AFMP reads: “*In order to make it easier for nationals of the Member States of the European Community and Switzerland to gain access to and*

across economic sectors in the exposure to the policy. Before the enactment of the AFMP, foreign workers who aimed at obtaining a job in “regulated” professions had to acquire a further Swiss qualification. The share of non-Swiss employees in these professions was therefore rather low. The liberalization of qualified immigration prompted an influx of non-Swiss workers with now-recognized certifications. Thus, while all sectors were affected by the abolition of quotas and priority requirements, sectors relying on previously regulated occupations experienced a far larger inflow of employees from EU countries. As we will discuss more in detail in Sections 3 and 4, our empirical strategy will be based exactly on this differential exposure across economic sectors.

The AFMP has been the object of a fierce opposition by some wings of the Swiss electorate (Mazzoleni and Pilotti, 2015). Such opposition culminated in the referendum held on February 9, 2014, when voters approved the Federal Popular Initiative *Against Mass Immigration*.<sup>5</sup> This initiative aimed at reintroducing quotas for immigrants and was accepted by 50.3% of Swiss voters, a share that reached 69.2% in the canton of Ticino. While in 2016 the Swiss Parliament passed a law requiring employers to give priority to resident job seekers, however, quotas for workers from EU countries were never reintroduced.<sup>6</sup> Our estimates will not be biased by these subsequent policy changes, as our analysis will focus on the time window between 1992 and 2008 to avoid any potential confounding effect of the outbreak of the global financial crisis.

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*pursue activities as employed and self-employed persons and to provide services, the Contracting Parties shall take the necessary measures, [...], concerning the mutual recognition of diplomas, certificates and other qualifications, and coordination of the laws, regulations and administrative provisions of the Contracting Parties on access to and pursuit of activities as employed and self-employed persons and the provision of services.”* Annex III to the AFMP lists specifically the regulated professions that are affected by the new directives. The full text of the agreement is available in the Swiss Publication Platform for Federal Law (*Fedlex*) at <https://www.fedlex.admin.ch/eli/cc/2002/243/de>.

<sup>5</sup>In the context of the Swiss direct democracy, a Popular Initiative allows citizens with voting rights to propose legislative changes (i.e., amendments to the Federal Constitution). If at least 100,000 signatures are collected within 18 months from the launch of the initiative, it is examined by the Parliament, which assesses the validity of its form and content. If the Parliament recognizes the validity of the Popular Initiative, it is can be voted by the population in a referendum.

<sup>6</sup>Switzerland and the EU tried to find a compromise because the termination of the AFMP would have implied also the termination of the other six agreements signed in 1999 (*guillotine clause*). Moreover, in September 2020 the majority of Swiss voters (61.7%) rejected the Popular Initiative *For moderate immigration*, which proposed again to terminate the AFMP.

### 3 Data

This paper is based on Swiss administrative data released by the Institute of Social Security of the canton of Ticino (*Istituto delle Assicurazioni Sociali*). This dataset covers the quasi-universe of individuals paying contributions to the first pillar of the Swiss social security system, namely residents older than 20<sup>7</sup> and workers who are active in the canton regardless of their residence status, therefore including cross-border workers.

We focus on Ticino, the only Italian-speaking canton in Switzerland, because of its remarkably high degree of economic and social integration with the neighboring country of Italy (Decoville and Durand, 2019). In fact, Ticino is the Swiss canton characterized by the highest share of cross-border workers, who exceed 30% of the labor force (Swiss Federal Statistical Office, 2021).<sup>8</sup>

For each individual in a given year between 1992 and 2008, our dataset reports whether the subject is an employee, a self-employed worker, or inactive, a category that includes students, *long-term* unemployed,<sup>9</sup> people who choose not to enter the labor market (or who receive disability benefits), and early retirees. These subgroups are not explicitly distinguished in the data, but early retirement can be inferred depending on age, considering that in Switzerland it is allowed since age 58.<sup>10</sup>

Our dataset includes personal information on sex, date of birth and nationality, although for foreign workers the type of work permit is not reported. For active workers, the data contain, for every calendar year, the annual earnings and the working period in months associated with each job. When an individual has multiple jobs during the same year, we select that with the highest annual income. We express annual income in real terms using the Consumer Price Index released by the Swiss Federal Statistical Office with 2001 as the base year.

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<sup>7</sup>Note that before January 1, 1997, residents in Switzerland without gainful employment were not subject to the obligation of contribution. Their contribution was only on a voluntary basis. The obligation introduced in 1997, however, does not affect our analysis as we focus on employed individuals and their transitions to inactivity (or exit from the dataset). Reassuringly, as we show in Figure 6 in Section 6, there is no significant change in the share of employees becoming inactive in correspondence of this reform occurred in 1997.

<sup>8</sup>Appendix Figure A.1 reports the share of non-Swiss workers in the sixteen Swiss large labor market regions in 1998 and 2008. The labor market area of Lugano, where the vast majority of private sector firms in the canton is located, exhibits the highest share of non-Swiss workers of the country, reaching more than 65% in 2008. These figures are computed using Business Census data (Swiss Federal Statistical Office, 2016), which cover the universe of employees by sector, municipality, nationality, sex, and employment rate.

<sup>9</sup>In case of job loss, unemployment benefits can be received for at most two years. Over this period individuals are not observed in our dataset.

<sup>10</sup>When opting for early retirement, the pension associated with the first pillar cannot be obtained until two years before the ordinary retirement age, namely 65 for men and 64 for women.



Differently from country-level social security data, our canton-level dataset also reports the municipality and the economic sector of the firm where each employee works. Since our data do not include the level of educational attainment of each employee, we exploit the economic sector of the firm in which individuals are active to assign them to the *treatment status*.

We identify the sectors affected by the mutual recognition of qualifications relying on the classification of regulated professions provided by the [State Secretariat for Education, Research and Innovation \(2022\)](#) and listed in the AFMP (Annex III). Since we do not have any information on the share of regulated profession in each sector, we define a sector as treated when it includes at least one profession requiring a recognized certification. These sectors encompass engineering, chemical industries, hotels and restaurants, legal assistance, communication and transports, auxiliary services for trade (e.g., accounting), and information technology.<sup>11</sup> Note that our assignment based on information at sector rather than individual level may induce a potential measurement error, leading to an attenuation bias in our estimates.

We exclude female workers and public employees<sup>12</sup> from our analysis. We cannot credibly evaluate the impact of the policy change on women’s labor market outcomes as we lack information on hourly wages and the number of hours worked. Indeed, while the vast majority of men works full-time, a substantial share of Swiss female employees’ jobs are part-time, with changes in employment rates over the career.<sup>13</sup> As for women, workers in the public sector<sup>14</sup> are often part-time employees and the absence of information on the number of worked hours might undermine the reliability of our estimates. Moreover, starting from the end of the 1990s, the public sector in Ticino has been affected by potentially confounding reforms implying a large hiring of young unemployed people and the early retirement of older employees. In any case, due to its high degree of regulation, we can reasonably expect the public sector to exhibit wage dynamics that are different from the private sector.

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<sup>11</sup>Appendix Table B.1 provides the full list of treated and untreated sectors, displaying for each of them the evolution over time of the share of Italian employees, who represent more than 90% of the foreign workforce in Ticino.

<sup>12</sup>In our dataset, on average, 25% of men and 35% of women are employed in the public sector.

<sup>13</sup>According to our calculations based on Business Census data ([Swiss Federal Statistical Office, 2016](#)), not only the participation to the labor force of Swiss women was rather low in Ticino in 1998 ( $\approx 48\%$ ), but roughly 25% of active women had an employment rate between 50% and 90%, and almost 20% of them had an employment rate below 50%. On the contrary, 94% of male employees held full-time jobs. See [Buchmann et al. \(2010\)](#) for a review of the structural factors driving women’s employment decisions in Switzerland. Moreover, after the enactment of the AFMP there is also a remarkable decrease (from approximately 80% in 1998 to 70% in 2008) in the share of non-Swiss women working full-time.

<sup>14</sup>More specifically, we exclude the sectors of *public administration*, *public institutes*, *public supply of electricity and water*, *education*, and *health*. The last two categories are excluded because the vast majority of firms belonging to them are public.



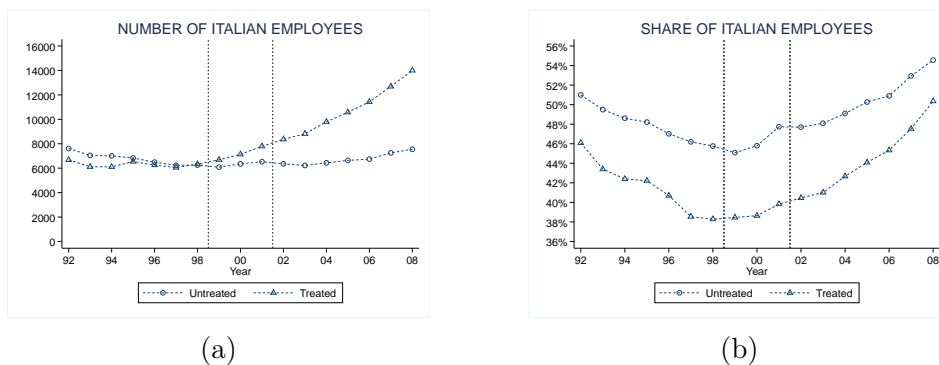


Figure 1: Evolution of Italian employees in treated *vs.* untreated sectors

Notes: This figure shows the evolution over time (1992-2008) of the absolute number (panel a) and share (panel b) of male employees of Italian nationality in private sector firms with at least two workers in the canton of Ticino. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase related to the announcement of the policy, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

Finally, since our data include individuals affiliated to the cantonal office that collects first pillar contributions in Ticino, we cannot observe workers who belong to other compensation offices depending on their profession. In particular, we are not able to cover the banking and insurance sector. However, data from the *Business Census* (Swiss Federal Statistical Office, 2016) suggest that this sector has not been highly exposed to the AFMP, as the share of Swiss employees has remained rather high in comparison to other treated sectors, only decreasing from 85% in 1998 to 80% in 2008. Furthermore, employees in the banking and insurance sector represented approximately 9% of total employment (and 16% of employment in treated sectors) in 1998, a share which has decreased over time.<sup>15</sup> While we cannot state a priori whether the effect of the AFMP on the banking and insurance sector would be homogeneous with the other treated sectors, the relatively low share of employees in this sector suggests that its inclusion should not affect our results significantly.

Figure 1 shows the evolution over time of the number (panel 1a) and share (panel 1b) of Italian employees in our sample. If the number of Italian workers has not varied substantially in untreated sectors, it has increased sharply after 1999 in treated firms (panel 1a). As a result, despite a previous decreasing trend, the share of Italian employees has sizeably grown after the AFMP was signed. Because of the recognition of EU certifications, this increase has been far more pronounced in

<sup>15</sup>According to our calculations based on *Business Census* data (Swiss Federal Statistical Office, 2016), in Ticino the banking and insurance sector accounted for 9.16% of employees in 1998, 10.08% in 2001, 7.39% in 2005, and 7.03% in 2008. In *treated* sectors, it accounted for 15.87% of employees in 1998, 17.33% in 2001, 13.32% in 2005, and 12.75% in 2008.

treated sectors (panel 1b), where the share of Italian employees was initially lower as a consequence of the restrictions described in Section 2.

Appendix Table B.2 presents the summary statistics by age group and over time for the main variables in our sample, distinguishing treated and untreated sectors.

## 4 Empirical Modelling

We study the impact of the policy on labor market outcomes in Ticino adopting a difference-in-differences (DiD) approach that compares the evolution of sectors differently affected by the recognition of EU qualifications.

### Baseline Dynamic DiD Models

To assess the salience of the reform, we first investigate the impact of the policy on the firm-level share of Italian employees in Swiss firms located in Ticino, estimating the following model:

$$y_{ft} = \alpha + \sum_{k=-6}^{+10} \pi_k \text{treated}_f \times \text{year}_{t_0+k} + \chi_d + \mu_t + \theta_f + \epsilon_{ft} \quad (1)$$

where  $y_{ft}$  is the share of employees working in firm  $f$  and year  $t$  who are Italian. We control for administrative districts ( $\chi_d$ )<sup>16</sup>, year ( $\mu_t$ ), and firm ( $\theta_f$ ) fixed effects that capture time-invariant firm characteristics affecting the propensity to hire foreign employees and correlated with the treatment status. The error term  $\epsilon_{ft}$  captures unobservable time-varying shocks to firm  $f$ . Standard errors are two-way clustered, at sector and at year level.<sup>17</sup>

The coefficients  $\pi_{ks}$  (for  $k = -6, -5, \dots, 0, \dots, +10$ ) of the interaction between the dummy variable  $\text{treated}_f$ , which takes value one if firm  $f$  belongs to a treated sector, and the variable  $\text{year}_{t_0+k}$ , which takes value one in year  $t = (t_0 + k) = 1992, \dots, 2008$ , where  $t_0 = 1998$ , measure the (potentially time-varying) impact of the policy.

This dynamic specification allows to test for parallel trends and accounts for potential transitional effects between 1999, when the AFMP was first signed, and 2002, when it was finally enacted. The omitted coefficient corresponds to the first

<sup>16</sup>The canton of Ticino consists of eight districts, three of which (Locarno, Lugano, Mendrisio) share borders with Italy, while the other five (Bellinzona, Blenio, Leventina, Riviera, Vallemaggia) are smaller and less populated. If at the beginning of the 1990s more than 70% of firms were already located in the three districts at the border with Italy, this value exceeded 80% in 2008.

<sup>17</sup>We also estimate model (1) breaking down the share of Italian workers by age groups (18–29; 30–49; 50–64). In this case, the outcome variable is the ratio of the number of Italian employees of a specific age group to the total number of employees in firm  $f$  in year  $t$ .

year before the potential transitional effects, namely  $t_0 = 1998$ . Starting from 1999, the restrictions on the hiring of workers from neighboring EU countries (i.e., yearly quotas and the priority requirement that forced employers to hire a foreign worker only in absence of an equally qualified resident) started to be progressively loosened.

We next move to a worker-level analysis and investigate the effect of the policy on native (Swiss) employees' real wages. We estimate the following model:

$$w_{ist} = \alpha + \sum_{k=-6}^{+10} \beta_k \text{treated}_{it} \times \text{year}_{t_0+k} + \chi_d + \lambda_s + \mu_t + \gamma_i + f(\text{age}) + \epsilon_{ist} \quad (2)$$

in which the outcome variable  $w_{ist}$  is the (log of) the real monthly wage of employee  $i$  in sector  $s$  in year  $t$ . As discussed in Section 3, we assign each individual to the *treatment status* depending on the employing firm's sector, so  $\text{treated}_{it}$  takes value one if employee  $i$  works in year  $t$  in a sector  $s$  affected by the policy change.

We include district fixed effects ( $\chi_d$ ), sector fixed effects ( $\lambda_s$ ) to account for time-invariant differences across sectors, year dummies ( $\mu_t$ ) to control for aggregate business fluctuations, and individual ( $\gamma_i$ ) fixed effects to account for time-invariant individual characteristics (e.g., ability) influencing wages and potentially correlated with the treatment status. This limits the extent of the omitted variable bias and helps interpreting  $\beta_k$  as the actual effect of the policy. Finally,  $f(\text{age})$  is a quadratic polynomial for age. Robust standard errors are two-way clustered at sector and at year level. To explore the potential heterogeneity of the effect, we further estimate equation (2) separately for different subsamples of native employees, depending on their age group (18-29; 30-49; 50-64).

As usual in this setting, any individual-specific time-varying shock affecting both wages and the treatment status might bias our results. A potential concern is our time-varying definition of the treatment status. We tackle this challenge as part of our 'frozen' specification in which the treatment status is time-invariant and assigned once and for all before the reform (more on this below).

### Static DiD models

We complement our worker-level investigation of the effects of the AFMP on native employees' wages and probability of inactivity by estimating also the following *static* difference-in-differences specification:

$$y_{ist} = \alpha + \delta_1 \text{treated}_{it} \times \text{transition}_t + \delta_2 \text{treated}_{it} \times \text{post2002}_t + \chi_d + \lambda_s + \mu_t + \gamma_i + f(\text{age}) + \epsilon_{ist} \quad (3)$$

in which the two time dummies  $transition_t$  and  $post2002_t$  identify, respectively, the transition phase between 1999 and 2001 and the post-policy period since 2002. In this model, the outcome variable  $y_{ist}$  can be either represented by employees' real wages - like in model (2) - or by employees' probability of becoming inactive. In this case, we estimate a linear probability model in which  $y_{ist}$  is a dummy variable that takes value one if employee  $i$  in sector  $s$  and year  $t$  becomes inactive or leaves the dataset<sup>18</sup> in year  $t + 1$ .<sup>19</sup> We further distinguish between the likelihood of becoming inactive or leaving the dataset by estimating also a multinomial logit model similar to equation (3). Appendix C provides additional details about this specification.

### “Frozen” models

To further study the heterogeneous effect of the reform, we differentiate between employees active before the policy change and those hired afterwards. Hence, we estimate a version of models (2) and (3) that focuses on incumbent workers active in 1998. In this specification, the variable  $treated_{it}$  is substituted by the time-invariant variable  $treated_i$ , which takes value one or zero depending on the sector in which the employee was active in 1998. Since movements across sectors are not frequent (the probability is approximately 3.6% in our data), any differences from baseline results are likely to be driven by new-entrant employees rather than by having fixed incumbents' economic sector in 1998. As anticipated above, this alternative specification allays also the potential concerns about self-selection into or out of treatment in baseline models (2) and (3), in which all employees active in year  $t$  in sectors exposed to the policy change are considered as treated.

## 5 Results

Figure 2 shows the estimated impact of the policy on the share of Italian employees in firms, reporting the coefficients of our multiperiod difference-in-differences model (1) with 95% confidence intervals. Panel (2a) considers the overall firm-level share of Italian employees, while panels (2b)–(2d) examine the firm-level proportion of Italian workers relative to the total workforce of the firm by age group (18-29; 30-49; 50-64).

<sup>18</sup>We define the occurrence of an *exit* when an individual leaves the dataset and does not enter again within three years. Indeed, Swiss individuals who lose their job receive unemployment benefits for up to two years and are not covered by our dataset in this period. Subjects who exit are therefore those leaving Ticino, retiring at most two years before the ordinary age, and entering economic sectors not included in our dataset.

<sup>19</sup>This model cannot include individual fixed effects because of the relatively low number of transitions out of employment.

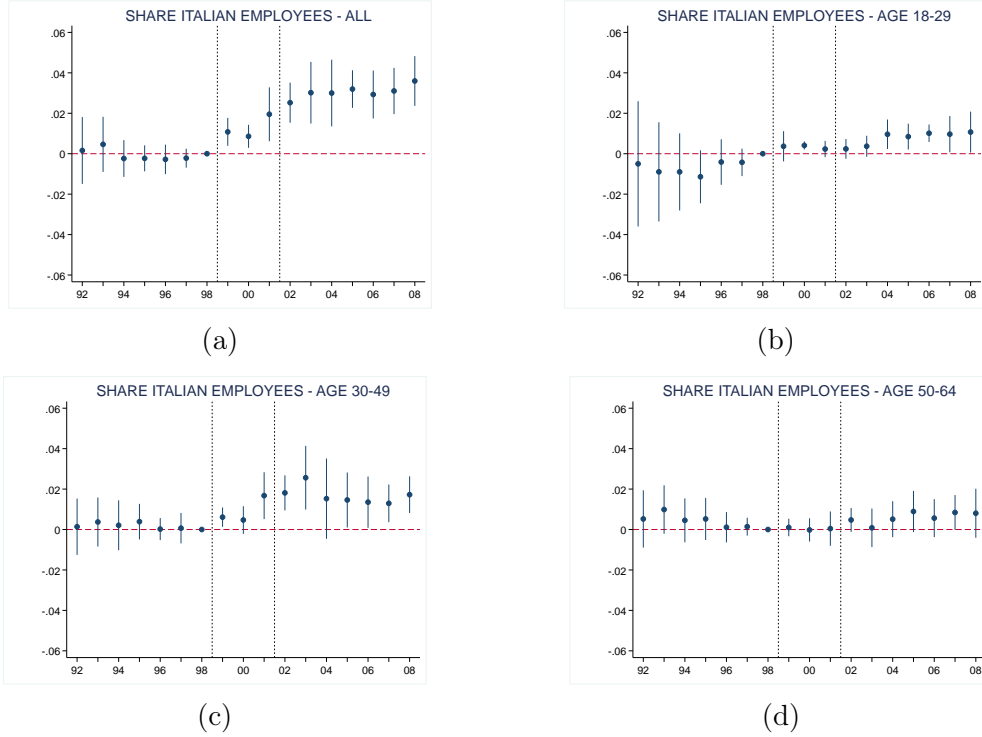


Figure 2: Share of Italian employees in firms - Dynamic DiD model

Notes: This figure shows the estimates from the dynamic difference-in-differences model (1). Panel (a) refers to the overall share of Italian male employees in private sector firms, while panels (b)–(d) refer to the proportion of Italian employees belonging to different age groups (18–29; 30–49; 50–64) on the total number of employees in a firm. Each graph shows the estimates of the coefficients  $\pi_k$  ( $k = -6, -5, \dots, 0, \dots, +10$ ) with confidence intervals at the 5% significance level. The last year before the Agreement on the Free Movement of Persons was signed (i.e., 1998) corresponds to  $k = 0$  and is the omitted year. All specifications include district, year, and firm fixed effects. Robust standard errors are two-way clustered at sector and year level. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase related to the announcement of the policy, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

The recognition of EU qualifications led to a large inflow of young (panel 2b) and middle-aged (panel 2c) Italian employees, while the increase for age group 50–64 (panel 2d) is negligible. The coefficients in panels 2b and 2c are similar in magnitude. However, the average initial share of young Italian employees in treated firms was more than four times lower than the share of their middle-aged counterparts, as displayed in the last two rows of Table 1. Hence, the effect of the policy was far larger for the youngest age group ( $\approx 25\%$  of the pre-policy value). Table 1 also presents the estimates from a *static* version of equation (1), confirming the large increase in the share of young and middle-aged employees (Columns 2 and 3).

What was the effect of this increased competition from qualified workers on natives' wages? Figure 3 presents the dynamic effect of the policy on the real wages of Swiss employees. Panel 3a shows that the policy had an overall positive,

Table 1: Share of Italian employees in firms (1992-2008)

	All	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)	(4)
treated_transition	0.014*** (0.004)	0.009 (0.006)	0.008 (0.006)	-0.003 (0.005)
treated_post2002	0.031*** (0.005)	0.013** (0.005)	0.015* (0.008)	0.002 (0.006)
<i>N</i>	86753	86753	86753	86753
Mean in 1998 (T)	10.51%	4.01%	18.60%	8.92%
Mean in 1998 (U)	12.69%	5.65%	19.74%	12.68%

Notes: This table shows the estimates of the difference-in-differences coefficients of a *static* version of model (1). Column (1) reports the estimates for the full sample of private sector male employees, while Columns (2)-(4) focus on different age groups (18–29; 30–49; 50–64). All models include district, year, and firm fixed effects. Robust standard errors are two-way clustered at sector and year level. The last two rows display the average shares of Italian employees by age group in 1998 in treated (T) and untreated (U) sectors, respectively.

Significance levels: \*\*\*  $p < 0.01$ ; \*\*  $0.01 \leq p < 0.05$ ; \*  $0.05 \leq p < 0.10$ .

Table 2: Swiss employees' (log) real monthly wages (1992-2008)

	All	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)	(4)
treated_transition	-0.004 (0.028)	-0.048 (0.034)	0.007 (0.026)	0.006 (0.025)
treated_post2002	0.019 (0.033)	-0.067** (0.029)	0.045 (0.038)	0.009 (0.050)
<i>N</i>	249405	70541	125338	48896
Mean in 1998 (T)	3.52	3.15	3.66	3.70
Mean in 1998 (U)	3.59	3.19	3.77	3.84

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3). Column (1) reports the estimates for the full sample of Swiss private sector male employees, while Columns (2)-(4) focus on different age groups (18–29; 30–49; 50–64). All models include sector, district, year, and individual fixed effects, plus a linear and a quadratic age term. Robust standard errors are two-way clustered at sector and year level. The last two rows display the average (log) real monthly wages of Swiss employees by age group in 1998 in treated (T) and untreated (U) sectors, respectively. Significance levels: \*\*\*  $p < 0.01$ ; \*\*  $0.01 \leq p < 0.05$ ; \*  $0.05 \leq p < 0.10$ .

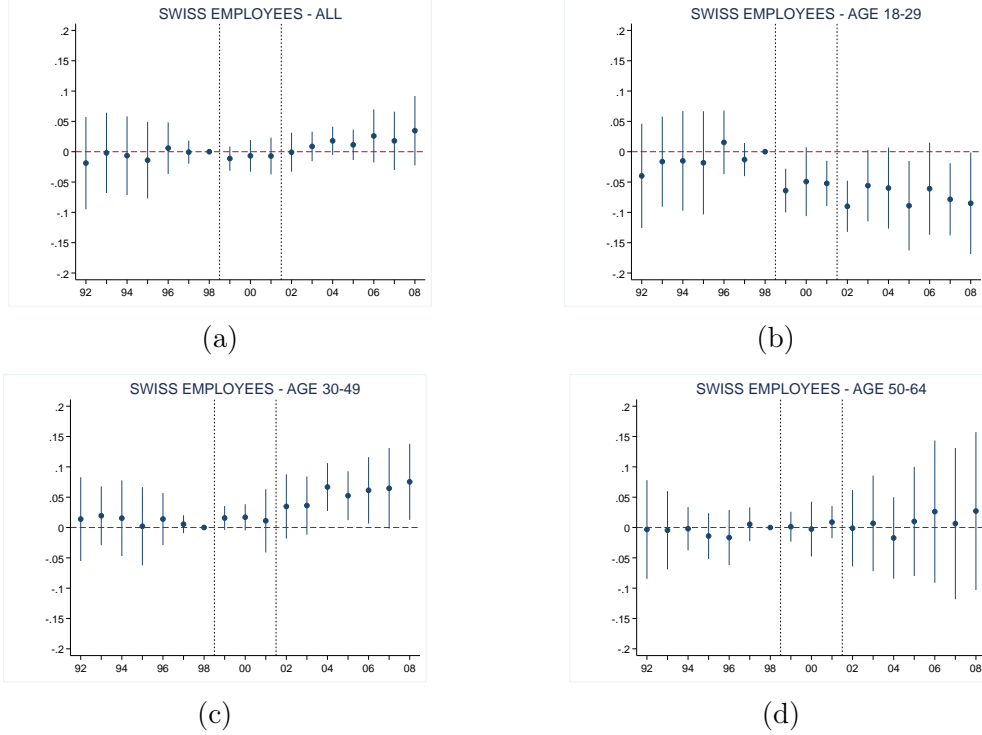


Figure 3: Swiss employees' (log) real monthly wages - Dynamic DiD model

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2). Panel (a) refers to the full sample of Swiss private sector male employees, while panels (b)–(d) refer to different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients  $\beta_k$  ( $k = -6, -5, \dots, 0, \dots, +10$ ) with confidence intervals at the 5% significance level. The last year before the Agreement on the Free Movement of Persons was signed (i.e., 1998) corresponds to  $k = 0$  and is the omitted year. All models include sector, district, year, and individual fixed effects, plus a linear and a quadratic age term. Robust standard errors are two-way clustered at sector and year level. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase related to the announcement of the policy, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

albeit not statistically significant, impact. This result, however, hides a remarkable heterogeneity across age groups. The effect was negative for young native workers aged 18–29 (panel 3b) while it was positive for employees aged 30–49 (panel 3c). The effect then vanished when considering older individuals above age 50 (panel 3d).

As we will discuss later, the negative effect on young workers is driven by a reduction in the entry wages offered to young employees after 1999. This effect already materializes before the official enactment of the policy in 2002 because restrictions started to be loosened and cantonal authorities became more flexible in the hiring process of cross-border workers, especially in high-tech sectors, right after the agreement was signed in 1999 (Beerli et al., 2021). The massive inflow of qualified young Italian workers in treated sectors has thus led to an increasing competition for native Swiss employees entering the labor market after the reform.



Table 3: Swiss employees' probability of inactivity (1992-2008)

	All	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)	(4)
treated_transition	-0.001 (0.006)	0.011 (0.011)	-0.004 (0.006)	-0.006 (0.007)
treated_post2002	-0.001 (0.003)	0.012 (0.012)	0.000 (0.004)	-0.012** (0.005)
<i>N</i>	238680	67031	122308	49341
Mean in 1998 (T)	9.02%	11.14%	6.80%	11.80%
Mean in 1998 (U)	7.34%	7.69%	5.58%	11.01%

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) when the outcome variable is the probability for Swiss employees of becoming inactive. Column (1) reports the estimates for the full sample of Swiss private sector male employees, while Columns (2)-(4) focus on different age groups (18–29; 30–49; 50–64). All models include sector, district, and year fixed effects. Robust standard errors are two-way clustered at sector and year level. The last two rows display the average share of Swiss employees (and self-employed) belonging to each age group who became inactive (or exited) in 1998 in treated (T) and untreated (U) sectors, respectively. Significance levels: \*\*\*  $p < 0.01$ ; \*\*  $0.01 \leq p < 0.05$ ; \*  $0.05 \leq p < 0.10$ .

Table 2 presents our estimates from model (3), confirming a wage loss of roughly 7 percentage points burdened by young employees aged 18–29 (Column 2) and a wage gain of more than 4 percentage points enjoyed by middle-aged (30–49) employees (Column 3).

In Table 3 we focus on the impact of the policy on the probability of becoming inactive or leaving the dataset, reporting the estimates from our linear probability model (3). According to the negative coefficient displayed in Column 4, the AFMP has led Swiss employees aged 50-64 to be less likely to become inactive or leave the dataset. On the contrary, although the positive coefficient in Column 2 lacks statistical significance, we find an opposite effect for young native employees, who have experienced an increase in their likelihood to leave the labor market.

### Incumbent vs. new-entrant native employees

As anticipated in Section 4, our definition of treatment does not preclude self-selection of workers into or out of it. To address this concern, we turn to our ‘frozen’ specifications and estimate a version of model (3) that fixes employees’ treatment status in 1998 and focuses on individuals already active in the local labor market before the reform.

Table 4 presents the results jointly for real monthly wages (Panel A) and for the probability of inactivity (Panel B).<sup>20</sup> The coefficients reported in Panel A of broadly confirm the findings presented in Figure 3 and Table 2. There is however one remarkable exception for young employees, as the negative effect disappears and even turns positive (although not statistically significant, see Column 2). Since the difference from the baseline model lies in the exclusion of individuals entering the labor market after 1998, this result suggests that the adverse consequences of the policy change have been borne by young native new entrants.<sup>21</sup> Moreover, the estimates from our linear probability model reported in Panel B suggest that young incumbents have also benefited from a reduction in the likelihood of inactivity.

To further test the hypothesis of the incumbent advantage, we repeat the analysis for incumbent Italian employees (see results in Appendix Table B.3 and Appendix Figure A.3). The results suggest that the inflow of new Italian workers has not harmed the wages of incumbent immigrants. This is not surprising, not only because incumbents could take advantage of previously acquired experience, but also because they are likely to be highly positively selected, as before the policy change they were required to obtain an additional Swiss qualification to access treated sectors.

### **The role of individual ability and firm-to-firm movers**

To shed further light on the mechanisms behind the wage gains experienced by native incumbent employees, we now investigate more in detail the role of ability.

For Swiss employees already active in 1998, we first estimate individual fixed effects from a regression of (log) real wages on sector, year, district, and individual fixed effects, plus a quadratic in age. Individual fixed effects are derived separately for each age group (conditional on age in 1998) over the years before the policy change (1992–1998). For each age group, we define high-ability employees those belonging to the top quintile of the fixed effects distribution.<sup>22</sup>

We then estimate a triple interaction version of equation (3) adding a further interaction with a dummy variable for high ability to differentiate the effect of the policy by type of worker. Table 5 shows that statistically significant and economically relevant wage gains are concentrated among middle-aged and, to a lesser extent,

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<sup>20</sup>See Appendix Figure A.2 for the estimates from the ‘frozen’ version of model (2) for Swiss employees’ (log) real monthly wages.

<sup>21</sup>Appendix Figure A.4 sheds further light on this by showing a reduction in the average entry wages of young native new entrants in treated sectors after 1999, when the effects of the policy started to materialize.

<sup>22</sup>This should approximately capture the fraction of the Swiss population with tertiary-level degree or professional qualification as, according to Census data, in year 2000, about 22% of the Swiss population had either tertiary education or a professional qualification. More details are available at: <https://www.bfs.admin.ch/bfs/en/home/basics/census.assetdetail.1021397.html>.

Table 4: Incumbent Swiss employees' labor market outcomes (1992-2008)

	All	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)	(4)
<b>Panel A: (Log) real monthly wages</b>				
treated_transition	0.001 (0.025)	0.001 (0.039)	0.005 (0.026)	0.016 (0.026)
treated_post2002	0.023 (0.032)	0.042 (0.036)	0.026 (0.034)	0.028 (0.055)
<i>N</i>	151766	40104	82414	29248
Mean in 1998 (T)	3.52	3.15	3.66	3.70
Mean in 1998 (U)	3.59	3.19	3.77	3.84
<b>Panel B: Probability of inactivity</b>				
treated_transition	-0.015** (0.006)	-0.019* (0.010)	-0.010* (0.006)	-0.017*** (0.003)
treated_post2002	-0.014* (0.008)	-0.014* (0.007)	-0.010 (0.009)	-0.021 (0.016)
<i>N</i>	165380	43137	88884	33359
Mean in 1998 (T)	9.02%	11.14%	6.80%	11.80%
Mean in 1998 (U)	7.34%	7.69%	5.58%	11.01%

*Notes:* This table shows the estimates of the difference-in-differences coefficients of model (3) when treatment is fixed in year 1998 (“frozen” model). Column (1) reports the estimates for the full sample of Swiss private sector male employees, while Columns (2)-(4) focus on different age groups (18–29; 30–49; 50–64). Panel A refers to Swiss employees’ (log) real monthly wages, while panel B refers to their probability of becoming inactive or leaving the dataset. All models include sector, district, year, and (only for real monthly wages) individual fixed effects, plus a linear and a quadratic age term. Robust standard errors are two-way clustered at sector and year level. The last two rows of Panel A display the average value of the logarithm of real monthly wages of Swiss employees by age group in 1998 in treated (T) and untreated (U) sectors, respectively. The last two rows of Panel B display the corresponding average shares of Swiss employees by age group who became inactive (or exited the dataset). Significance levels: \*\*\*  $p < 0.01$ ; \*\*  $0.01 \leq p < 0.05$ ; \*  $0.05 \leq p < 0.10$ .

young incumbent native employees with high ability. On the contrary, the wages of Swiss employees with a low level of ability have remained substantially unaffected.<sup>23</sup>

We also explore whether the wage effects of the policy differ between incumbent native employees who have changed firm and those who have not. Appendix

<sup>23</sup>Appendix Table B.4 shows that estimates do not change when high-ability employees are defined as those belonging to the top tercile of the predicted distribution of individual fixed effects.

Table 5: Incumbent Swiss employees' (log) real monthly wages by ability (1992-2008)

	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)
treated_post_1999 $\times$ low	-0.018 (0.053)	0.008 (0.022)	0.013 (0.030)
treated_post_1999 $\times$ high	0.005 (0.051)	0.133** (0.056)	0.072 (0.112)
treated_post_2002 $\times$ low	-0.011 (0.037)	0.034 (0.049)	0.069 (0.078)
treated_post_2002 $\times$ high	0.133* (0.073)	0.132** (0.046)	-0.043 (0.061)
<i>N</i>	34421	78150	28182
Mean in 1998 (T)	3.15	3.66	3.70
Mean in 1998 (U)	3.19	3.77	3.84

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) when treatment is fixed in 1998 (“frozen” model). In these models we control for high ability by considering the top quintile of the predicted distribution of individual fixed effects (between 1992 and 1998) for Swiss workers active in 1998. Columns (1)-(3) report the estimates for Swiss private sector male employees belonging to different age groups (18–29; 30–49; 50–64), fixed in 1998. All models include sector, district, and year fixed effects, plus a linear and a quadratic age term and a dummy for high ability. Robust standard errors are two-way clustered at sector and year level. The last two rows display the average value of the logarithm of real monthly wages of Swiss employees by age group in 1998 in treated (T) and untreated (U) sectors, respectively.

Significance levels: \*\*\*  $p < 0.01$ ; \*\*  $0.01 \leq p < 0.05$ ; \*  $0.05 \leq p < 0.10$ .

Table B.5 suggests that, while there are no statistically significant wage effects for employees remaining at the same firm where they were active in 1998, the policy has led to sizeable gains for firm-to-firm “movers” aged 30-49, namely those with more experience in the local labor market. This positive effect may also reflect, at least partially, a higher degree of screening by firms, as increased competition might induce to select the most skilled and productive native employees.

### Robustness checks

As a first robustness check, we estimate model (2) considering as outcome variable Swiss employees' annual earnings rather than the monthly wage associated with their main job. Reassuringly, the results presented in Appendix Figure A.5 and in Panel A of Appendix Table B.6 are consistent with our main findings in Figure 3 and

in Table 2. We also estimate the impact of the policy change on native employees' likelihood of holding more than one job in private sector firms using model (3). In Panel B of Appendix Table B.6 we only report an increase in the probability of having simultaneous contracts for middle-aged employees, while we do not find any statistically significant effect for younger and older individuals. For young natives, therefore, the wage loss associated to their main job is not accompanied by an increase in the likelihood of holding more part-time occupations at the same time.

As an additional robustness check, we estimate equation (2) including firm fixed effects (instead of sector fixed effects) in the specification of the model. Appendix Figure A.6 presents these estimates, which largely confirm our main results, in particular the wage losses burdened by young native employees and the wage gains obtained by their middle-aged counterparts.

To reinforce our experience-based interpretation of the differences in the wage effects of the policy across age groups, we estimate model (3) splitting the sample of employees according to years of experience in Ticino rather than age.<sup>24</sup> Appendix Table B.7 confirms that gains are concentrated among Swiss and Italian experienced employees, while wage losses are borne by subjects with less experience.

As for the effect of the AFMP on native employees' labor market status, we report in Appendix Table B.8 the estimates from our multinomial logit model that studies the probability of remaining employed, moving to inactivity, or leaving the dataset.<sup>25</sup> These estimates are consistent with those obtained from the OLS model presented in Table 3. The only remarkable difference is that we now estimate for young native employees a statistically significant reduction in the probability of remaining employed, driven by an increase in the likelihood of inactivity and, most of all, of leaving the dataset as a result of out-migration.<sup>26</sup>

Finally, we strengthen our evidence about the wage gains experienced by Swiss employees when changing firm by estimating equation (3) on entry wages. More specifically, we focus on the worker's entry wage upon entering a new firm. Results in Appendix Table B.9 are consistent with those reported in Appendix Table B.5, documenting wage gains for middle-aged natives who change employer.<sup>27</sup>

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<sup>24</sup>Experience is measured counting the years in which an employee is recorded in our dataset.

<sup>25</sup>See Appendix C for the full specification of our multinomial logit model.

<sup>26</sup>Notice that, by splitting age groups 50–57 and 58–64, we can attribute the reduced likelihood of inactivity to a lower propensity of opting for early retirement in the latter group.

<sup>27</sup>Notice that, since the model includes individual fixed effects, the coefficient is identified on the subsample of employees that change firm at least twice.

## 6 Discussion

### The macro trends

To provide a more comprehensive interpretation of our results, this section presents descriptive macro evidence of the labor market trends in Ticino over the period in which the Bilateral Agreements were enacted. We first show how the reform affected the size and nationality composition of the workforce. We then discuss the behaviour of real wages and of the share of employees becoming inactive by age group.

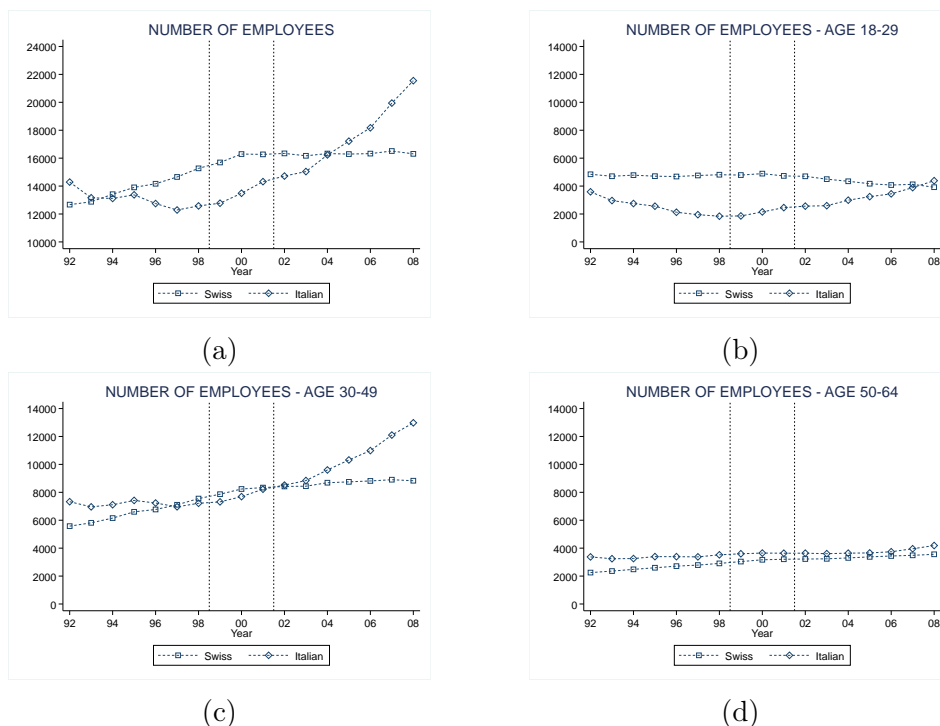


Figure 4: Number of employees by nationality and age group

Notes: This figure shows the evolution over time (1992-2008) of the number of private sector male employees in Ticino. Each panel refers to a specific age group (18–29; 30–49; 50–64) and compares the number of Swiss and Italian employees. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase related to the announcement of the policy, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

Figure 4 shows the evolution of the number of Swiss and Italian employees in Ticino (irrespective of treatment status). After a decreasing trend until 1999, the number of Italian employees increased sharply, while for Swiss employees the initial upward trend stops and becomes flat in 2000 (panel 4a). The breakdown by age group shows that not only the number of young Italian employees aged 18–29 exhibits sizeable growth (panel 4b), but there is an even steeper increase in the number of Italians aged 30–49, while the number of Swiss workers rises before 1999 and then

flattens out (panel 4c). Finally, there are no visible effects among older employees (panel 4d). All in all, Figure 4 suggests that the policy change may have contributed to an expansion of the labor market. While the total number of employees was already slightly increasing before 1999 as the result of the rising number of Swiss workers, a subsequent steeper growth took place, driven by Italian immigrants.

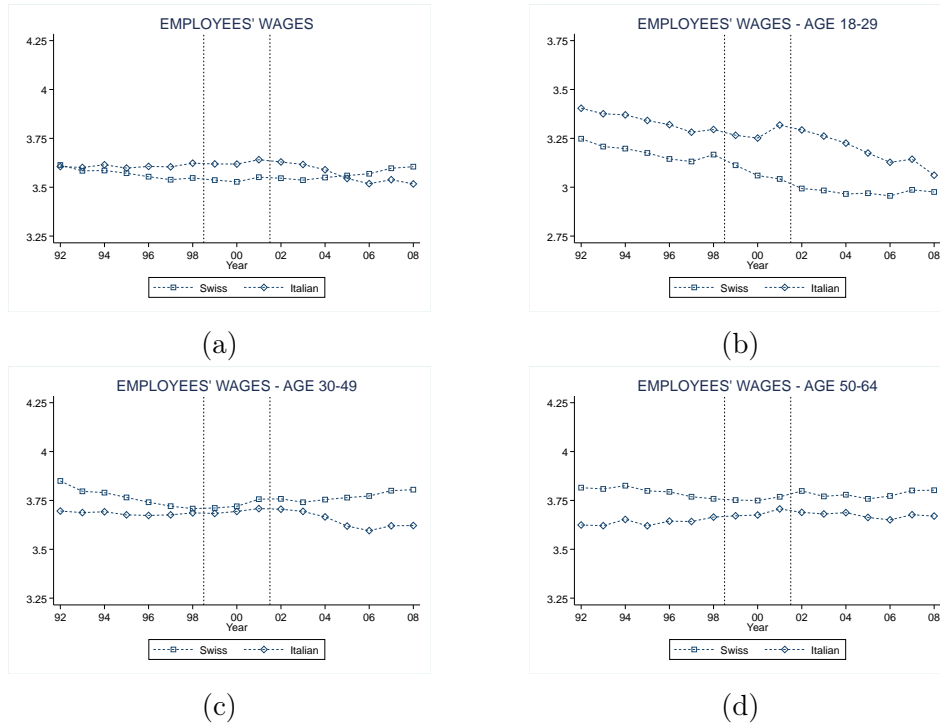


Figure 5: Employees' (log) real wages by nationality and age group

Notes: This figure shows the evolution over time (1992-2008) of the average value of the logarithm of real monthly wage of private sector male employees in Ticino. Each panel refers to a specific age group (18–29; 30–49; 50–64) and compares the evolution of wages for Swiss and Italian employees. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase related to the announcement of the policy, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

Next, Figure 5 focuses on the average real wages of Swiss and Italian employees by age group. In general, we observe a small overall increase in the average wages of Swiss employees after 2002 (panel 5a). However, for young natives (panel 5b) the initial decreasing trend becomes steeper after 1999. We observe the opposite pattern for middle-aged Swiss employees, with a clear increase in their wages after 1999 (panel 5c),<sup>28</sup> while there are no relevant changes for older subjects (panel 5d).

<sup>28</sup>The decrease in middle-aged Swiss employees' average wages during the second half of the 1990s, instead, is likely driven by the reintegration in the labor market of previously unemployed individuals during the 1991-94 Swiss recession.



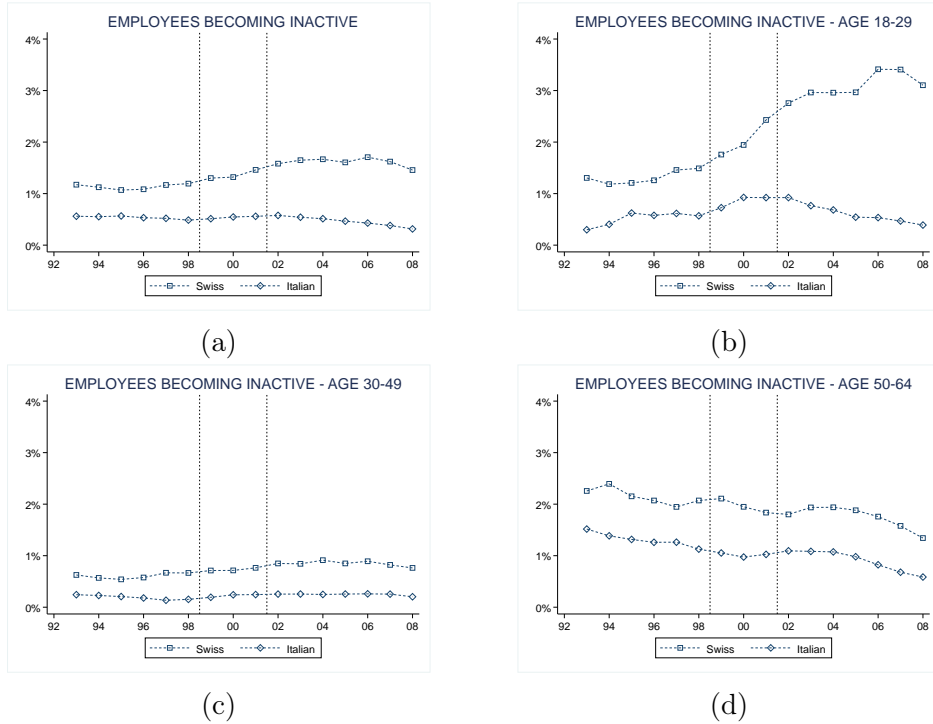


Figure 6: Share of employees becoming inactive by nationality and age group

Notes: This figure shows the evolution over time (1993-2008) of the average share of private sector male employees in Ticino who become inactive (i.e., inactive, long-term unemployed, or early retired). Each panel refers to a specific age group (18–29; 30–49; 50–64) and compares the evolution of transitions to inactivity between Swiss and Italian employees. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase related to the announcement of the policy, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

Finally, Figure 6 reports the evolution of the average shares of Swiss employees in different age groups who leave the labor force. Consistently with our micro empirical results, the share of Swiss employees who become inactive is characterized by a growing tendency after 1999 (panel 6a). This pattern is driven by a sizeable increase for young employees (panel 6b), while we do not observe any relevant change for their middle-aged counterparts (panel 6c). On the contrary, the average share of older people becoming inactive decreases more sharply after the policy change (panel 6d), mirroring a likely reduction in the share of early retirees.

### Theory-based interpretation

According to a standard model of demand and supply in a competitive labor market, a massive inflow of qualified immigrant workers would lead to a decrease in the wages and employment opportunities for same-language natives holding comparable certifications.

Our empirical results however point to an opposite effect: the recognition of EU diplomas introduced by the AFMP did lead to a massive inflow of young qualified Italian workers in Ticino, but had an almost negligible aggregate effect on native employees' labor market outcomes. This null result masks however an important heterogeneity across age (i.e., experience) groups. While incumbent middle-aged and older experienced employees enjoyed a wage gain and became less likely to become inactive, the opposite happened for young inexperienced natives entering the labor market after the policy change. We further show that wage gains were mostly concentrated among high-ability middle-aged incumbents changing employer.

These results can be interpreted within a theoretical framework in which native workers are heterogeneous and exhibit different patterns of complementarity and substitutability with immigrants (see, e.g., [Borjas, 2003](#); [Ottaviano and Peri, 2012](#); [Gentili and Mazzonna, 2017](#)). In this framework, the AFMP should negatively affect the wage (i.e., marginal product of labor) and probability of employment of native workers with characteristics that are similar to those of competing immigrants, who are close substitutes for them. On the contrary, native workers with characteristics that are complementary to those of immigrants should experience a wage gain and a higher likelihood of being employed.

In our case, the policy led to a disproportionate increase in the number of young qualified immigrant workers sharing the same linguistic background with natives. These immigrants, however, lack experience of the local labor market (as in, e.g., [Chiswick, 1978](#)). Young Italian immigrants are therefore likely to substitute young Swiss workers entering the labor market after the recognition of EU qualifications, while they are complementary to experienced incumbents. The concentration of wage gains among high-ability incumbents is consistent with the fact that experienced workers with high ability are not only complementary to immigrants, but are also likely to exhibit higher complementarity with physical capital.<sup>29</sup>

While this framework allows to interpret the heterogeneity across age groups of our empirical results, it does not per se explain why we do not find an overall negative effect. One potential explanation, also argued by [Beerli et al. \(2021\)](#), lies in the sharp expansion of the labor market and the decrease in its degree of *tightness* thanks to the attraction of previously scarce skills ([Pissarides, 2000](#)). In this setting, the overall effect on wages and employment is positive if the production function exhibits increasing returns to education, especially when combined with experience, because of the positive externalities induced by qualified workers.

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<sup>29</sup>High-skilled workers are in general complementary to physical capital ([Lewis and Peri, 2015](#)), but, conditional on being high-skilled, employees with more experience exhibit a higher degree of complementarity with capital in comparison to their younger inexperienced counterparts.

## 7 Conclusions

This paper contributes to the extensive economic literature and policy debate on the labor market effects of immigration by investigating the consequences of an inflow of qualified foreign workers who hold fully equivalent certifications with respect to natives and do not experience any linguistic barrier.

To this aim, we leverage the natural experiment represented by the opening of the Swiss labor market to workers from EU countries by recognizing their qualifications. Our analysis focuses on Ticino, an Italian-speaking Swiss canton, where Italian workers represent a high share of the labor force. Using a difference-in-differences empirical strategy to compare over time economic sectors differently affected by the recognition of EU diplomas, we first estimate a large increase in the share of young Italian workers in firms after the policy.

Considering natives' labor market outcomes, we show that the almost negligible average effect of the AFMP masks a substantial heterogeneity across age groups. While we provide evidence of a wage gain for middle-aged (30–49) employees, the impact of the policy turns out to be negative for younger (18–29) workers. More specifically, the former effect is driven by high-ability employees and is more likely to materialize when moving to a different firm, whereas the latter effect is explained by a decrease in the entry wages earned by young employees entering the labor market after the policy change. According to our estimates, the reform is also associated with an increase in the probability of inactivity for young new entrants, while middle-aged and older incumbents become less likely to experience long-term unemployed or, more generally, to exit labor force.

Interpreting age as a proxy for the amount of labor market experience of the individual, our findings suggest that young Italian immigrants are complementary to incumbent Swiss employees, but are close substitutes for native new entrants with equivalent qualifications and the same linguistic background. This interpretation is strengthened by the absence of any negative effect for Italian workers already active in Switzerland before the policy change.

Our results also open the path for future lines of research. First, while our analysis focuses on the impact of the policy on individual labor market outcomes, more attention may be devoted to study firms' choices and outcomes when the pool of available workers enlarges and there are different patterns of complementarity and substitutability between natives and immigrants. Second, the disparities in the effects between native workers belonging to different generations ask for a deeper understanding of social welfare implications of the policy and for an evaluation of the most adequate policy interventions to compensate potential arising inequalities.

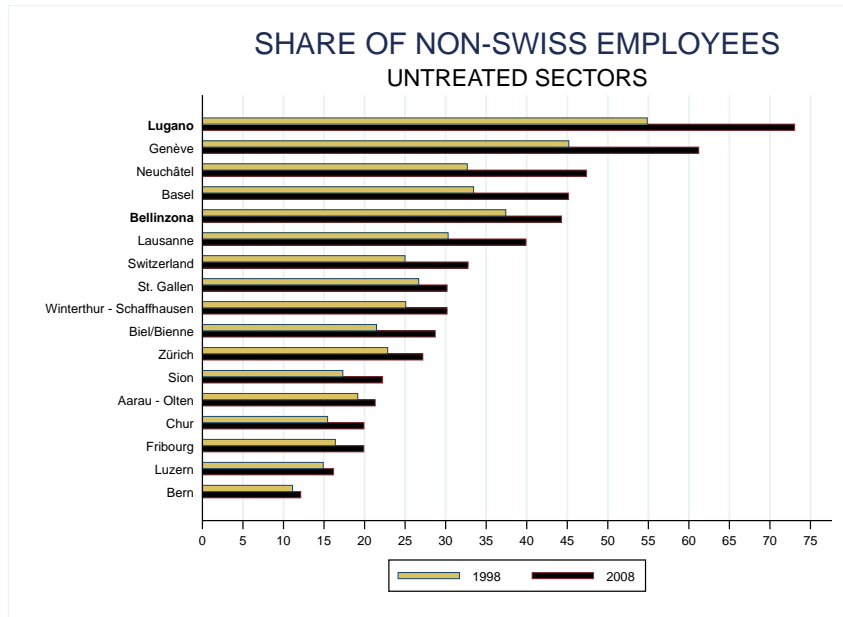
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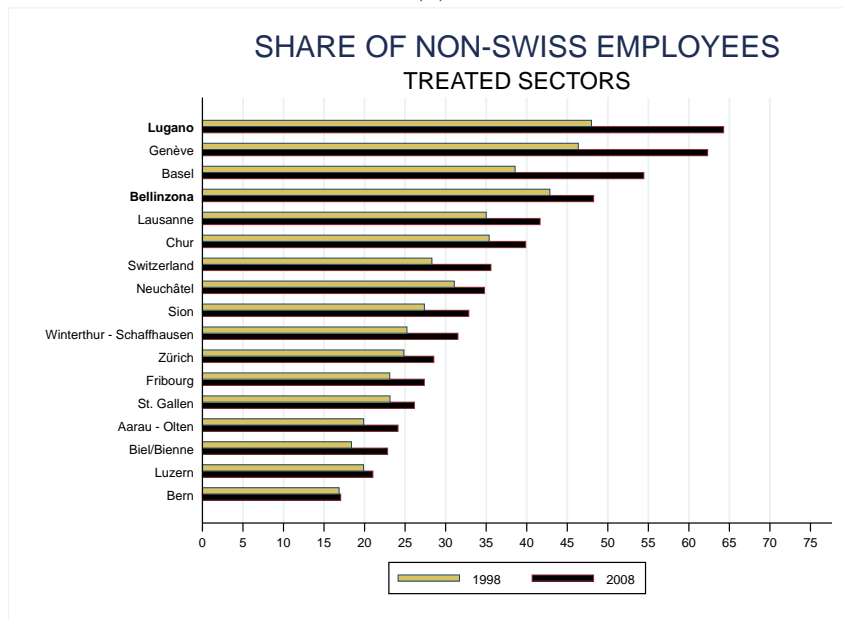
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# Appendix A Additional Figures



(a)



(b)

Figure A.1: Non-Swiss employees by labor market region

Notes: This figure represents the share of non-Swiss workers in private sector firms with at least two employees in the sixteen Swiss large labor market regions (Swiss Federal Statistical Office, 2000) in 1998 and 2008. Our dataset covers the regions of Lugano (which accounts for almost 80% of private sector firms in the canton of Ticino in 2008) and Bellinzona. Panels (a) and (b) refer to untreated and treated workers, respectively.



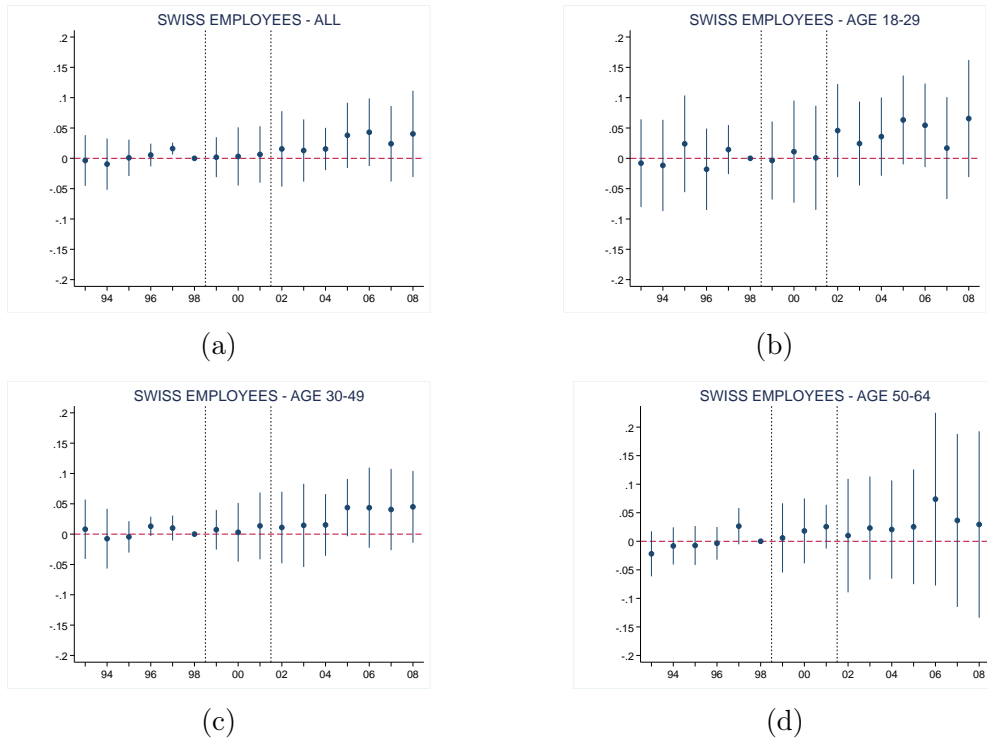


Figure A.2: Incumbent Swiss employees' (log) real monthly wages - Dynamic DiD model

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2), when treatment is fixed in year 1998 (“frozen” model). Panel (a) refers to the full sample of Swiss private sector male employees, while panels (b)–(d) focus on different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients  $\beta_k$  ( $k = -9, -8, \dots, 0, \dots, +6$ ) with the corresponding confidence intervals at the 5% significance level. The last year before the Agreement on the Free Movement of Persons was signed (i.e., 1998) corresponds to  $k = 0$  and is the omitted year. All models include sector, district, year, and individual fixed effects, plus a linear and a quadratic age term. Robust standard errors are two-way clustered at sector and year level. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase related to the announcement of the policy, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

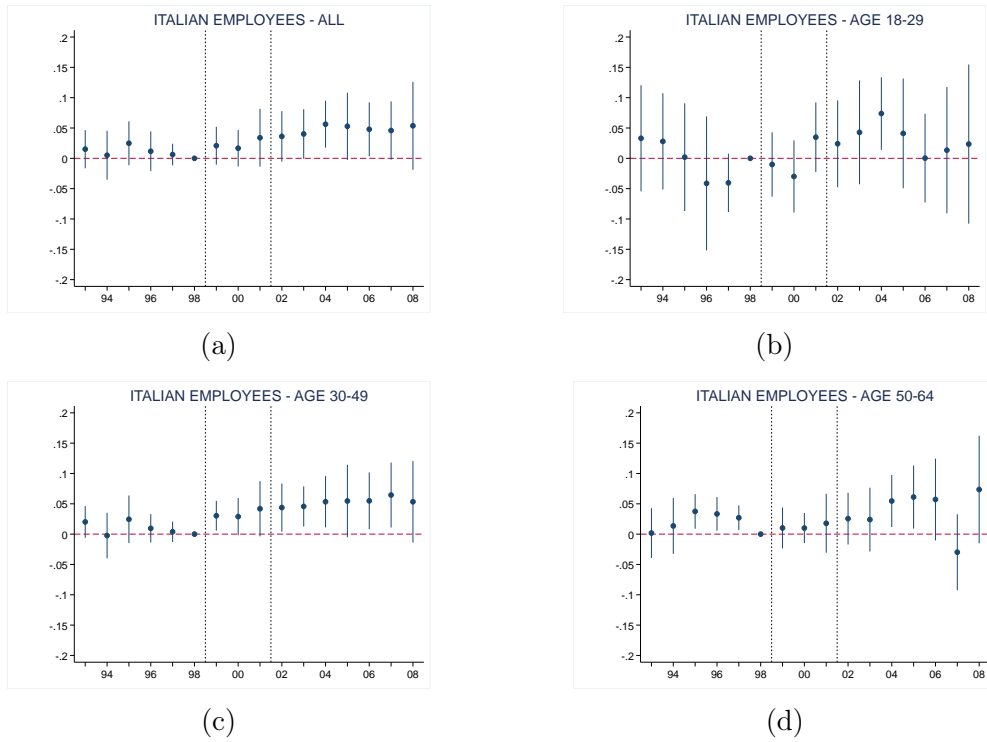


Figure A.3: Incumbent Italian employees' (log) real monthly wages - Dynamic DiD model

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2), when treatment is fixed in year 1998 (“frozen” model). Panel (a) refers to the full sample of Italian private sector male employees, while panels (b)–(d) refer to focus on different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients  $\beta_k$  ( $k = -9, -8, \dots, 0, \dots, +6$ ) with the corresponding confidence intervals at the 5% significance level. The last year before the Agreement on the Free Movement of Persons was signed (i.e., 1998) corresponds to  $k = 0$  and is the omitted year. All models include sector, district, year, and individual fixed effects, plus a linear and a quadratic age term. Robust standard errors are two-way clustered at sector and year level. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase related to the announcement of the policy, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

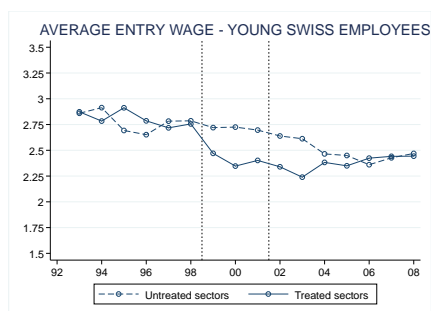


Figure A.4: Young Swiss employees' average entry (log) real monthly wages

Notes: This descriptive figure shows the evolution over time (1993-2008) of the average value of the logarithm of the first real monthly wage earned by young (18–29) new entrant Swiss employees in treated and untreated sectors. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase related to the announcement of the policy, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

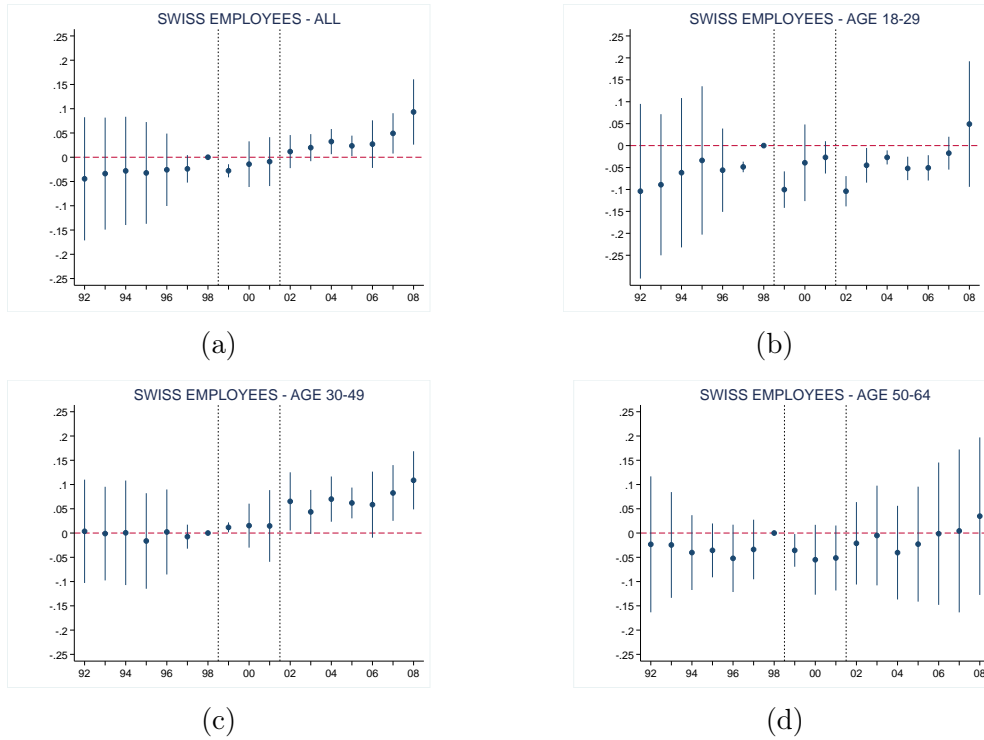


Figure A.5: Swiss employees' (log) real annual earnings - Dynamic DiD model

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2), when the outcome variable is the logarithm of Swiss employees' real annual earnings. Panel (a) refers to the full sample of Swiss private sector male employees, while panels (b)–(d) focus on different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients  $\beta_k$  ( $k = -9, -8, \dots, 0, \dots, +6$ ) with the corresponding confidence intervals at the 5% significance level. The last year before the Agreement on the Free Movement of Persons was signed (i.e., 1998) corresponds to  $k = 0$  and is the omitted year. All models include sector, district, year, and individual fixed effects, plus a linear and a quadratic age term. Robust standard errors are two-way clustered at sector and year level. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase related to the announcement of the policy, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

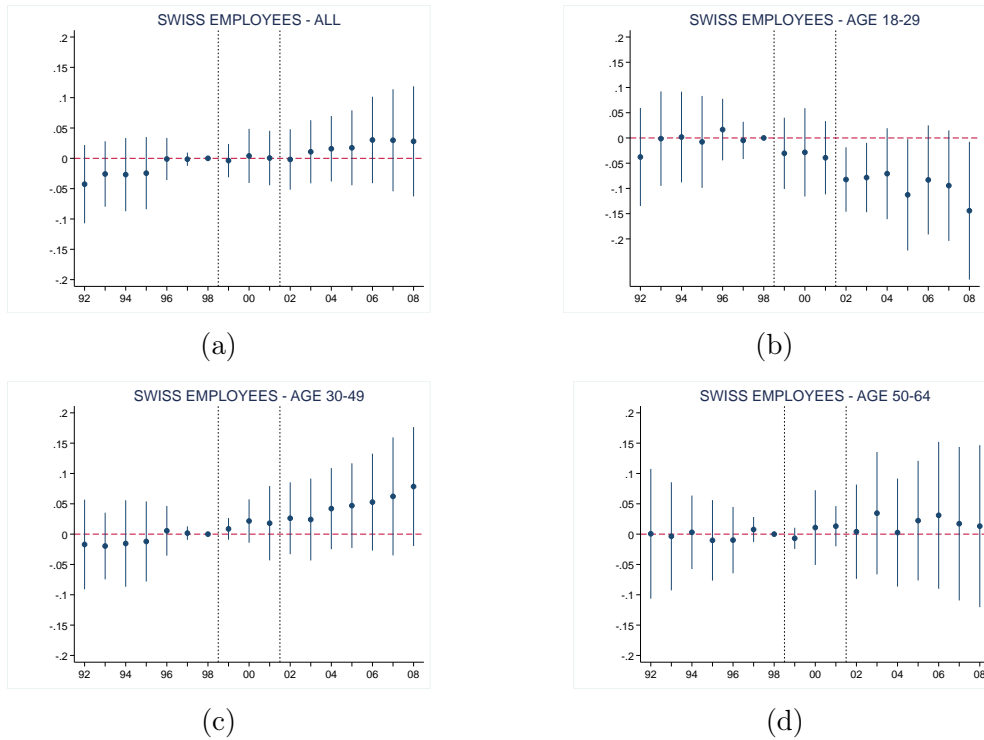


Figure A.6: Swiss employees' (log) real monthly wages - Dynamic DiD model with firm fixed effects

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2). Panel (a) refers to the full sample of Swiss private sector male employees, while panels (b)–(d) focus on different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients  $\beta_k$  ( $k = -9, -8, \dots, 0, \dots, +6$ ) with the corresponding confidence intervals at the 5% significance level. The last year before the Agreement on the Free Movement of Persons was signed (i.e., 1998) corresponds to  $k = 0$  and is the omitted year. All models include firm (instead of sector), district, year, and individual fixed effects, plus a linear and a quadratic age term. Robust standard errors are two-way clustered at sector and year level. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase related to the announcement of the policy, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

## Appendix B Additional Tables

Table B.1: Share of Italian employees by economic sector

	1992	1998	2002	2008
<b>Panel A: Treated Sectors</b>				
Chemical Industry	45.96%	45.81%	53.94%	61.40%
Communication and Transports	42.94%	38.97%	41.61%	41.13%
Engineering Industry and Architecture	55.83%	48.96%	51.34%	52.87%
Hotels, restaurants	30.40%	24.59%	33.82%	41.68%
Information Technology	33.13%	32.36%	34.80%	51.34%
Legal Assistance	9.02%	8.97%	9.52%	13.01%
<b>Panel B: Untreated Sectors</b>				
Domestic Services	39.00%	45.35%	40.86%	40.98%
Entertainment	28.78%	26.17%	32.28%	53.72%
Graphic Industry	32.08%	31.15%	25.83%	33.03%
Jewelry Industry	48.00%	43.12%	42.27%	50.23%
Leather Industry	66.67%	52.44%	66.67%	52.94%
Metallurgic Industry	54.09%	47.71%	52.20%	57.01%
Minerary Industry	54.98%	48.37%	51.51%	58.34%
Retail Trade	45.23%	41.12%	42.18%	50.21%
Textile Industry	62.99%	64.73%	63.53%	74.56%
Wholesale Trade	32.35%	39.87%	42.33%	48.36%
Wine and Drinks Industry	48.15%	58.06%	55.56%	35.71%
Wood Industry	47.62%	36.88%	35.52%	33.12%

Notes: This table reports the shares of male employees of Italian nationality working in private sector firms with at least two employees in Ticino in 1992, 1998, 2002, and 2008. Panel A refers to treated economic sectors, namely those which were affected by the mutual recognition of diplomas and qualifications implied by the Agreement on the Free Movement of Persons between Switzerland and the European Union (2002), while Panel B refers to untreated sectors. (*Source: Istituto delle Assicurazioni Sociali*)

Table B.2: Descriptive statistics (1992-2008)

	All			Age 18-29			Age 30-49			Age 50-64		
	Pre 1998	1999-2001	Post 2002	Pre 1998	1999-2001	Post 2002	Pre 1998	1999-2001	Post 2002	Pre 1998	1999-2001	Post 2002
<b>PANEL A: TREATED SECTORS</b>												
<b>Swiss Employees</b>												
Share	49.92%	52.60%	44.68%	62.84%	64.76%	48.63%	45.95%	49.68%	42.32%	43.89%	46.98%	46.87%
(Log) Real Monthly Wage	3.55 (1.02)	3.51 (1.18)	3.56 (1.17)	3.17 (0.94)	3.00 (1.20)	2.93 (1.18)	3.74 (0.96)	3.71 (1.06)	3.77 (1.04)	3.74 (1.12)	3.71 (1.25)	3.76 (1.23)
(Log) Entry Wage at New Job	3.44 (0.97)	3.47 (1.01)	3.42 (1.06)	3.15 (0.92)	3.17 (1.00)	3.02 (1.04)	3.65 (0.89)	3.64 (0.94)	3.65 (0.95)	3.62 (1.19)	3.63 (1.12)	3.56 (1.25)
Transitions to Inactivity	1.63%	1.75%	2.06%	2.10%	3.13%	4.66%	0.86%	0.82%	1.04%	2.85%	2.40%	2.01%
<b>Italian Employees</b>												
Share	41.55%	39.00%	44.82%	28.60%	27.22%	38.52%	43.57%	40.52%	46.99%	52.44%	47.78%	45.95%
(Log) Real Monthly Wage	3.61 (0.68)	3.63 (0.79)	3.57 (0.85)	3.36 (0.75)	3.24 (0.87)	3.16 (0.86)	3.69 (0.59)	3.72 (0.72)	3.66 (0.80)	3.62 (0.74)	3.67 (0.81)	3.68 (0.85)
(Log) Entry Wage at New Job	3.54 (0.69)	3.61 (0.77)	3.50 (0.78)	3.27 (0.79)	3.30 (0.79)	3.23 (0.74)	3.63 (0.60)	3.68 (0.71)	3.58 (0.75)	3.59 (0.74)	3.66 (0.83)	3.55 (0.87)
Transitions to Inactivity	0.83%	0.82%	0.68%	0.86%	1.61%	0.91%	0.29%	0.34%	0.39%	1.98%	1.42%	1.35%
<b>PANEL B: UNTREATED SECTORS</b>												
<b>Swiss Employees</b>												
Share Swiss	44.58%	46.56%	41.59%	57.39%	61.69%	51.15%	39.67%	42.26%	38.49%	39.37%	40.69%	39.60%
(Log) Real Monthly Wage	3.59 (0.83)	3.58 (0.86)	3.57 (0.93)	3.19 (0.80)	3.17 (0.84)	3.04 (0.94)	3.80 (0.72)	3.76 (0.75)	3.76 (0.81)	3.86 (0.88)	3.83 (0.92)	3.83 (0.94)
(Log) Entry Wage at New Job	3.41 (0.77)	3.40 (0.82)	3.35 (0.92)	3.23 (0.72)	3.25 (0.72)	3.10 (0.85)	3.62 (0.71)	3.57 (0.83)	3.54 (0.91)	3.49 (1.01)	3.32 (1.04)	3.56 (0.99)
Transitions to Inactivity	1.07%	1.32%	1.64%	1.29%	1.68%	3.07%	0.55%	0.83%	0.81%	1.97%	2.01%	2.01%
<b>Italian Employees</b>												
Share	48.09%	46.20%	50.56%	35.60%	30.10%	38.06%	51.54%	49.46%	53.85%	56.40%	55.58%	55.11%
(Log) Real Monthly Wage	3.60 (0.54)	3.62 (0.57)	3.55 (0.74)	3.34 (0.59)	3.33 (0.64)	3.19 (0.84)	3.67 (0.46)	3.66 (0.51)	3.60 (0.70)	3.65 (0.61)	3.69 (0.60)	3.66 (0.71)
(Log) Entry Wage at New Job	3.49 (0.58)	3.54 (0.62)	3.49 (0.66)	3.27 (0.68)	3.29 (0.67)	3.25 (0.77)	3.56 (0.49)	3.62 (0.57)	3.57 (0.59)	3.59 (0.59)	3.53 (0.68)	3.59 (0.67)
Transitions to Inactivity	0.45%	0.43%	0.30%	0.24%	0.63%	0.47%	0.16%	0.20%	0.13%	1.30%	0.83%	0.63%

Notes: This table shows descriptive statistics for our sample of private sector male employees in firms with at least two workers. Panels A and B focus on treated and untreated sectors, respectively, and compare for every single age group three periods (before 1998, between 1999 and 2001, after 2002). Standard deviations in parentheses. (Source: *Istituto delle Assicurazioni Sociali*)

Table B.3: Incumbent Italian employees' labor market outcomes (1992-2008)

	All	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)	(4)
<b>Panel A: (Log) real monthly wages</b>				
treated_transition	0.015 (0.026)	0.005 (0.044)	0.026 (0.024)	-0.004 (0.025)
treated_post2002	0.038 (0.032)	0.040 (0.054)	0.044 (0.031)	0.020 (0.032)
<i>N</i>	137690	17271	85048	35370
Mean in 1998 (T)	3.62	3.26	3.71	3.64
Mean in 1998 (U)	3.62	3.33	3.67	3.69
<b>Panel B: Probability of inactivity</b>				
treated_transition	-0.006 (0.006)	-0.012 (0.014)	-0.002 (0.007)	-0.014 (0.009)
treated_post2002	0.007 (0.009)	-0.004 (0.019)	0.006 (0.008)	0.024 (0.016)
<i>N</i>	143913	17945	87320	38647
Mean in 1998 (T)	11.60%	14.12%	9.09%	15.51%
Mean in 1998 (U)	7.56%	6.95%	5.41%	12.19%

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) when treatment is fixed in year 1998 (“frozen” model). Column (1) reports the estimates for the full sample of Italian private sector male employees, while Columns (2)-(4) focus on different age groups (18–29; 30–49; 50–64). Panel A refers to Italian employees’ (log) real monthly wages, while panel B refers to their probability of becoming inactive or leaving the dataset. All models include sector, district, year, and (only for real monthly wages) individual fixed effects, plus a linear and a quadratic age term. Robust standard errors are two-way clustered at sector and year level. The last two rows of Panel A display the average value of the logarithm of real monthly wages of Italian employees by age group in 1998 in treated (T) and untreated (U) sectors, respectively. The last two rows of Panel B display the corresponding average shares of Italian employees by age group who became inactive (or exited the dataset). Significance levels: \*\*\*  $p < 0.01$ ; \*\*  $0.01 \leq p < 0.05$ ; \*  $0.05 \leq p < 0.10$ .



Table B.4: Incumbent Swiss employees' (log) real monthly wages by ability (1992-2008)

	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)
treated_post_1999 × low	-0.018 (0.047)	-0.014 (0.012)	0.002 (0.027)
treated_post_1999 × high	-0.007 (0.054)	0.114** (0.050)	0.079 (0.074)
treated_post_2002 × low	-0.041 (0.036)	0.032 (0.047)	0.081 (0.080)
treated_post_2002 × high	0.158** (0.061)	0.082* (0.043)	-0.075 (0.065)
<i>N</i>	34421	78150	28182
Mean in 1998 (T)	3.15	3.66	3.70
Mean in 1998 (U)	3.19	3.77	3.84

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) when treatment is fixed in year 1998 (“frozen” model). In these models we control for high ability by considering the top tercile of the predicted distribution of individual fixed effects (between 1992 and 1998) for Swiss workers active in 1998. Columns (1)-(3) report the estimates for Swiss private sector male employees belonging to different age groups (18–29; 30–49; 50–64), fixed in 1998. All models include sector, district, and year fixed effects, plus a linear and a quadratic age term and a dummy for high ability. Robust standard errors are two-way clustered at sector and year level. The last two rows display the average value of the logarithm of real monthly wages of Swiss employees by age group in 1998 in treated (T) and untreated (U) sectors, respectively.

Significance levels: \*\*\*  $p < 0.01$ ; \*\*  $0.01 \leq p < 0.05$ ; \*  $0.05 \leq p < 0.10$ .

Table B.5: Incumbent Swiss employees' (log) real monthly wages (1992-2008)

	All	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)	(4)
<b>Panel A: At same firm as 1998</b>				
treated_post_1999	-0.005 (0.029)	-0.023 (0.041)	0.010 (0.029)	-0.008 (0.028)
treated_post_2002	0.022 (0.052)	0.032 (0.072)	0.022 (0.045)	0.032 (0.069)
<i>N</i>	83953	15538	46359	22056
<b>Panel B: Changing employer</b>				
treated_post_1999	0.010 (0.020)	0.002 (0.037)	0.008 (0.029)	0.111*** (0.031)
treated_post_2002	0.037* (0.018)	0.034 (0.038)	0.054* (0.030)	0.071 (0.042)
<i>N</i>	67813	24566	36055	7192
Mean in 1998 (T)	3.52	3.15	3.66	3.70
Mean in 1998 (U)	3.59	3.19	3.77	3.84

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) when treatment is fixed in year 1998 ("frozen" model). Column (1) reports the estimates for the full sample of Swiss private sector male employees, while Columns (2)-(4) focus on different age groups (18-29; 30-49; 50-64). Panel A refers to the subsample of employees who always remained at the same firm where they were active in 1998, while panel B refers to the subsample of employees who changed employer over time. All models include sector, district, year, and individual fixed effects, plus a linear and a quadratic age term. Robust standard errors are two-way clustered at sector and year level. The last two rows display the average value of the logarithm of real monthly wages of Swiss employees by age group in 1998 in treated (T) and untreated (U) sectors, respectively. Significance levels: \*\*\*  $p < 0.01$ ; \*\*  $0.01 \leq p < 0.05$ ; \*  $0.05 \leq p < 0.10$ .

Table B.6: Swiss employees' (log) real annual earnings and number of contracts (1992-2008)

	All	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)	(4)
<b>Panel A: (Log) real annual earnings</b>				
treated_post_1999	0.007 (0.046)	-0.015 (0.050)	0.017 (0.044)	-0.020 (0.044)
treated_post_2002	0.057 (0.049)	-0.013 (0.033)	0.070 (0.050)	0.016 (0.074)
<i>N</i>	248986	70458	125082	48801
Mean in 1998 (T)	5.71	5.13	5.92	6.06
Mean in 1998 (U)	5.83	5.27	6.08	6.20
<b>Panel B: Probability of having multiple contracts</b>				
treated_post_1999	-0.000 (0.003)	-0.012 (0.008)	0.004 (0.006)	0.007 (0.012)
treated_post_2002	0.012 (0.008)	0.004 (0.018)	0.017** (0.008)	0.012 (0.022)
<i>N</i>	248986	70458	125082	48801
Mean in 1998 (T)	10.69%	11.81%	10.51%	9.37%
Mean in 1998 (U)	12.06%	9.10%	6.29%	10.69%

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3). Column (1) reports the estimates for the full sample of Swiss private sector male employees, while Columns (2)-(4) focus on different age groups (18-29; 30-49; 50-64). Panel A refers to Swiss employees' (log) real annual earnings, while panel B refers to their probability of having more than one working contract with private sector firms at the same time. All models include sector, district, year, and individual fixed effects, plus a linear and a quadratic age term. Robust standard errors are two-way clustered at sector and year level. The last two rows of Panel A display the average value of the logarithm of total annual earnings of Swiss employees by age group in 1998 in treated (T) and untreated (U) sectors, respectively. The last two rows of Panel B display the average shares of Swiss employees by age group having more than one contract at the same time in 1998 in treated (T) and untreated (U) sectors, respectively. Significance levels: \*\*\*  $p < 0.01$ ; \*\*  $0.01 \leq p < 0.05$ ; \*  $0.05 \leq p < 0.10$ .

Table B.7: Employees' real monthly wages by years of experience (1992-2008)

	Swiss			Italian		
	All	1-4 years	5+ years	All	1-4 years	5+ years
	(1)	(2)	(3)	(4)	(5)	(6)
treated_post_1999	-0.016 (0.017)	-0.072*** (0.024)	0.006 (0.015)	0.011 (0.017)	-0.022 (0.029)	0.023 (0.014)
treated_post_2002	0.003 (0.017)	-0.016 (0.027)	0.018*** (0.003)	0.020* (0.011)	0.012*** (0.002)	0.022* (0.011)
<i>N</i>	198863	89949	104755	186791	85867	96585
Mean in 1998 (T)	3.42	3.15	3.74	3.60	3.47	3.70
Mean in 1998 (U)	3.49	3.23	3.74	3.57	3.41	3.65

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) when considering acquired experience rather than age. Columns (1)-(3) refer to Swiss private sector male employees, while Columns (4)-(6) refer to Italian private sector male employees. All models include sector, district, year, and individual fixed effects, plus a linear and a quadratic term for experience. Robust standard errors are two-way clustered at sector and year level. The last two rows display the average value of the logarithm of real monthly wages of Swiss and Italian employees by experience group in 1998 in treated (T) and untreated (U) sectors, respectively.

Significance levels: \*\*\*  $p < 0.01$ ; \*\*  $0.01 \leq p < 0.05$ ; \*  $0.05 \leq p < 0.10$ .

Table B.8: Swiss employees' probability of changing labor market status (1992-2008)

	Age 18-29	Age 30-39	Age 40-49	Age 50-57	Age 58-64
	(1)	(2)	(3)	(4)	(5)
<b>Employee</b>					
treated_transition	-0.004 (0.010)	-0.001 (0.006)	-0.003 (0.007)	0.003 (0.006)	0.031 (0.021)
treated_post2002	-0.024*** (0.006)	0.004 (0.003)	0.005 (0.004)	0.012*** (0.004)	0.060*** (0.013)
Mean in 1998 (T)	88.86%	93.26%	93.10%	92.86%	79.79%
Mean in 1998 (U)	92.31%	94.00%	95.11%	95.15%	78.79%
<b>Inactive</b>					
treated_transition	0.000 (0.003)	-0.001 (0.003)	-0.004*** (0.001)	-0.004* (0.002)	-0.007 (0.006)
treated_post2002	0.005** (0.003)	-0.001* (0.001)	-0.003*** (0.001)	-0.008*** (0.001)	-0.021*** (0.004)
Mean in 1998 (T)	2.45%	0.78%	1.54%	0.89%	4.83%
Mean in 1998 (U)	1.51%	0.56%	0.74%	0.81%	4.46%
<b>Exit</b>					
treated_transition	0.004 (0.008)	0.002 (0.006)	0.006 (0.007)	0.001 (0.006)	-0.024 (0.017)
treated_post2002	0.018*** (0.005)	-0.003 (0.003)	-0.002 (0.004)	-0.004 (0.004)	-0.041*** (0.011)
Mean in 1998 (T)	8.68%	5.95%	5.36%	6.24%	15.38%
Mean in 1998 (U)	6.18%	5.45%	4.15%	4.04%	16.74%

Notes: This table shows the estimates of the marginal effects of the difference-in-differences coefficients of our multinomial logit model (4) for Swiss employees' probability of changing labor market status ( $N = 238,684$ ). According to this model, an employee (or self-employed) can remain employed, become inactive, or exit. The model includes sector, district, and year fixed effects (see Appendix C). Robust standard errors are two-way clustered at sector and year level. The last two rows display the shares of transitions in 1998 in treated (T) and untreated (U) sectors, respectively. Significance levels: \*\*\*  $p < 0.01$ ; \*\*  $0.01 \leq p < 0.05$ ; \*  $0.05 \leq p < 0.10$ .

Table B.9: Swiss employees' entry (log) real monthly wages at new job (1992-2008)

	All	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)	(4)
treated_transition	0.023 (0.039)	-0.003 (0.042)	0.068 (0.070)	0.043 (0.037)
treated_post2002	0.088 (0.057)	0.043 (0.071)	0.141*** (0.032)	0.028 (0.075)
<i>N</i>	12609	4597	5443	988
Mean in 1998 (T)	3.45	3.16	3.60	3.69
Mean in 1998 (U)	3.41	3.28	3.60	3.34

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) for the first wage earned by Swiss employees who are hired by a new firm. Column (1) reports the estimates for the full sample of Swiss private sector male employees, while Columns (2)-(4) focus on different age groups (18-29; 30-49; 50-64). All models include sector, district, year, and individual fixed effects, plus a linear and a quadratic age term. Robust standard errors are two-way clustered at sector and year level. The last two rows display the average value of the logarithm of entry real monthly wages at a new job of Swiss employees by age group in 1998 in treated (T) and untreated (U) sectors, respectively. Significance levels: \*\*\*  $p < 0.01$ ; \*\*  $0.01 \leq p < 0.05$ ; \*  $0.05 \leq p < 0.10$ .

## Appendix C The multinomial logit model

In order to study the impact of the policy on employees' likelihood of changing labor market status, we estimate the following multinomial logit model for the probability of staying employed, becoming inactive<sup>30</sup>, or leaving the dataset (i.e., exit):

$$S_{iast} = \alpha + \sum_{a=0}^4 \eta_{1,a} \text{treated}_{it} \times \text{transition}_t \times \text{age}_a + \sum_{a=0}^4 \eta_{2,a} \text{treated}_{it} \times \text{post2002}_t \times \text{age}_a + \lambda_s + \mu_t + \chi_d + \epsilon_{iast} \quad (4)$$

The outcome variable  $S_{iast}$  is the labor market status in year  $t + 1$  (employed, inactive, exit) of employee  $i$  in age group  $a$  (18–29; 30–39; 40–49; 50–57; 58+) and economic sector  $s$  in year  $t$ . This specification is similar to model (3), except for the exclusion of individual fixed effects. Hence, it only includes sector ( $\lambda_s$ ), year ( $\mu_t$ ), and district ( $\chi_d$ ) fixed effects. Moreover, the relatively low number of annual transitions to inactivity or exit in every single age group prevents us from splitting the sample by age. We therefore explore the potential heterogeneity across this dimension by further interacting  $\text{treated}_{it} \times \text{transition}_t$  and  $\text{treated}_{it} \times \text{post2002}_t$  with dummy variables for age groups.

We are interested in the age group-specific coefficients  $\eta_{1,a}$  and  $\eta_{2,a}$ , which capture the impact of the policy on the probability of moving to a certain status for an employee belonging to age group  $a$ . We compute marginal effects to interpret results.

The constraint represented by the relatively low number of annual transitions by age group also prevents us from estimating a reliable version of model (4) which “freezes” employees' economic sector in 1998, neglecting workers entering the labor market after the policy change and further reducing the sample size.

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<sup>30</sup>This category includes inactive subjects, long-term unemployed, and early retirees.