Università della Svizzera italiana

Faculty of Economics

IdEP Economic Papers

2022 / 01

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Opening the Labor Market to Qualified Immigrants: A Double-Edged Sword for Native Employees*

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May 2023

Abstract

This paper investigates the impact of opening the labor market to qualified immigrants who hold fully equivalent diplomas as native citizens and share the same mother tongue. Leveraging the 2002 opening of the Swiss labor market to qualified workers from the European Union, we show that the policy led to a large inflow of young immigrants, with highly heterogeneous effects on the wages and employment status of qualified Swiss employees. While incumbent employees experienced a wage gain and a decrease in the likelihood of becoming inactive, the opposite happened to young native workers entering the labor market after the policy change.

Keywords: qualified immigration, worker substitutability, experience

JEL codes: J08, J31, J61

*We thank the *Istituto delle Assicurazioni Sociali* (Bellinzona, CH) for providing the data. We are grateful to Zareh Asatryan, Miguel Cardoso, Laura Casellini, Dennis Egger, Tommaso Frattini, Andrew Goodman-Bacon, Dominik Hangartner, Giovanni Mastrobuoni, Giovanni Peri, Hans Martin von Gaudecker, and Andrea Weber for valuable suggestions and feedbacks. We thank participants to the *Workshop on Cross-Border Labour Mobility & Data Linkage* (LISER, February 2023), to the 12^{th} *Alp-Pop Conference* (La Thuile, January 2023), to the *Workshop on Macroeconomic Implications of Migration* (Bank of Canada, August 2022), to the 12^{th} Annual Meeting of the *Armenian Economic Association* (June 2022), to the 2^{nd} Annual Meeting of the *Network on Counterfactual Impact Evaluation* (NetCIEX, November 2021), and to IdEP Brown Bag Seminars.

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 emerging countries aiming at raising the level of human capital of the workforce, as well as for advanced economies that are increasingly relying on foreign workers to deal with population ageing and skills shortages (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 contest migration and, more generally, globalization (Rodrik, 2020).

A large literature in economics has shown evidence of positive effects on native workers' wages and employment when immigrants are either unskilled (Foged and Peri, 2016), experience linguistic barriers (Peri and Sparber, 2009), or have skills complementary to those of (high-skilled) native workers (Beerli et al., 2021). These complementarities lead to higher total factor productivity and wages (Borjas, 1999; Peri, 2012; D'Amuri and Peri, 2014), with natives who exploit their comparative advantage by taking communication-intensive and better paid managerial positions (Peri and Sparber, 2009; Manacorda et al., 2012; Ottaviano and Peri, 2012; Basten and Siegenthaler, 2019). Yet, opening the labor market to qualified immigrants could be a double-edged sword for native employees, especially when foreign workers speak the same mother tongue and hold fully equivalent certifications with respect to natives, with potentially harmful effects for the most substitutable native workers, namely, the young and those who lack experience in the local labor market.

This paper studies the heterogeneous effects of the 2002 Agreement on the Free Movement of Persons (AFMP) between Switzerland and the European Union on the labor market outcomes of qualified native workers with a different degree of attachment to the local labor market. 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 focus on Ticino, an Italian-speaking Swiss canton where Italian workers represent on average 42% of private sector employees. This is a very large share if compared to the fraction of non-Swiss employees in the whole country, which over our sample period amounts on average to 25% of the total workforce.

For identification, we rely on a difference-in-differences approach that compares the evolution of the real wages and employment status of native employees in sectors with a high intensity of occupations exposed to the recognition of EU certifications to the evolution of the same outcomes of native employees in less exposed sectors, before and after the policy change.

We document three main effects of the AFMP. First, while the fraction of Italian employees grew in all sectors after the introduction of the AFMP, we estimate a further increase of more than 3 percentage points in treated sectors. This increase is mainly driven by young immigrants and corresponds to approximately 23% of the pre-policy share for this age group.

Second, the increased competition on qualified native workers from qualified immigrants had a large and statistically significant negative impact (-7%) on the real wages of young (18–29) Swiss employees; an impact that turns positive for middle-aged (30–49) native employees (+5%), and fades away for older employees (50–64). The wage gains experienced by middle-aged incumbent employees accrue mostly to high-ability workers and are more likely to materialize when negotiating a new working contract with a different firm. 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 even increased.

More in detail, the steep reduction in new entrants' wages reflects not only the direct effect of increased competition from immigrant workers on wages, but also the indirect effect through changes in the composition of the labor force. Indeed, we observe that, after the reform, the age (and likely the education level) at which young natives enter the labor market in treated sectors decreases from 23 to 22. We speculate that this drop may be due to the concurrent increase in the share of slightly older resident citizens aged 25–29 (likely with a college degree) moving to other cantons instead of entering the local labor market. This age-driven composition effect explains at least 8.5% of the wage drop estimated for the workers in this age range.

Third, we find that young native residents, especially those entering the labor market for the first time after the liberalization of qualified immigration from the EU, were more likely to become inactive (i.e., to leave the labor force) or to leave the region. Conversely, we document a decrease in the probability of leaving the labor force for older Swiss employees, a result consistent with existing evidence showing that a higher income reduces the probability of early retirement (Kuhn et al., 2021).

The observed heterogeneity across age groups in the effect of the liberalization of qualified immigration on natives' wages and employment status is likely due to the fact that, in the absence of linguistic barriers, young qualified immigrants are close substitutes of young natives entering the labor market with comparable diplomas and no experience; at the same time, they are complementary to middle-age experienced native workers 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 aggregate (regional) level. We show that after the introduction of the 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 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 inactive young native citizens increased; finally, (v) transitions to inactivity of older Swiss employees became less frequent.

Our paper contributes to the large literature investigating the impact of immigration on natives' labor market outcomes by focusing on a setting characterized by an inflow of same-language foreign qualified workers. Language barriers have been shown to be an important factor preventing migrants to substitute natives (see, e.g., Ottaviano and Peri, 2012). We find that experienced (i.e. middle-aged and older) natives are shielded from the detrimental effects of qualified migration, even in a context in which natives can be more easily replaced by migrants because they speak the same mother tongue. The burden of increased competition from qualified immigrants is instead borne by young (inexperienced) natives.

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) 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). Consistent with this evidence, Cristelli and Lissoni (2020) find that the AFMP fostered innovation and the development of new patents in Switzerland thanks to the inflow of cross-border inventors who turned out to be highly complementary to Swiss incumbents. Related to this, Dicarlo (2022) shows evidence of a brain drain effect of the AFMP on the Italian side of the border, with an increase in firms' exit and a reduction of surviving firms' productivity, which in turn led to lower wages for their employees.

We complement these findings by showing that the effect is heterogeneous even among skilled natives and depends crucially on workers' experience.[1] We find that

[1]Our identification strategy differs from Beerli et al. (2021) who rely on firms' distance from the border. We use instead the differential exposure of economic sectors to the recognition of EU qualifications. Such an alternative identification strategy arguably does not suffer from the potential endogeneity of firms' location choices.

the gains are concentrated among middle-aged experienced incumbents, while young new entrants face wage losses and an increasing probability of becoming inactive. 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).

Our study is also related to the existing research that investigates the impact of policies that liberalize the labor market by recognizing immigrants' occupational qualifications. For instance, Brücker et al. (2021) document that immigrants with recognized diplomas in Germany can access regulated occupations that offer better employment opportunities and higher wages with respect to those of other foreign workers. Regarding the impact of such policies on native workers' outcomes, Prantl and Spitz-Oener (2020) examine the impact of the massive inflow of East Germans in West Germany after the fall of the Berlin Wall, differentiating between sectors with different levels of regulation strictness. In a setting close to ours, with absence of linguistic barriers and immigrants holding occupation-specific degrees equivalent to those of natives, they find that West Germans' wages declined in highly competitive sectors and remained unaffected in sectors where a high degree of regulation limited the entry of new firms and increased incumbents' bargaining power.

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 substitute young resident apprentices in need to be trained with less expensive and already qualified cross-border workers. Accordingly, Bächli and Tsankova (2023) investigate the effects of the AFMP on native citizens' educational choices and show that the growing presence of cross-border workers active in STEM

occupations induced young Swiss individuals to enroll in vocational universities to acquire non-STEM skills complementary to those of incoming immigrants.

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).

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.

Free access to the Swiss labor market for EU workers was introduced by the AFMP, one of the seven Bilateral Agreements between Switzerland and the EU.[2] The aim of the Agreements was to guarantee and promote reciprocal market access in several sectors after the Swiss voters rejected membership to the European Economic Area in 1992. They were announced by the Swiss government and the European Commission in June 1998, signed on June 21, 1999, approved by the Swiss electorate in a referendum in May 2000, and officially effective from June 1, 2002.

The implementation of the AFMP took place gradually. Before 1999, foreign workers in Switzerland were subject to yearly quotas set by the 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

[2]The other six agreements concern barriers to trade, public procurement markets, agriculture, overland transport, civil aviation and research.

(Afonso, 2004). Since 1999, however, these restrictions started to be 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). Indeed, a report published already in 2000 by the Canton of Ticino (Cantonal Statistical Office of Ticino, 2000) documents a remarkable increase in the number of incoming Italian cross-border workers in high-skilled occupations, especially in the tertiary sector. Such an inflow of newly hired cross-border workers materialized right after the introduction of the AFMP in 1999, reversing a previously decreasing trend.

A key feature of the AFMP (Article 9) was the recognition of EU diplomas and professional certifications to encourage qualified immigration in Switzerland. However, the recognition of EU certifications was not uniform across the board. It was granted only to a number of precisely listed occupations that were heavily regulated before the reform. This implies remarkable differences across sectors in the exposure to the policy, depending on the share of treated occupations in each sector. We exploit this cross-sectoral variation for identification purposes.

More in detail, before the enactment of the AFMP, foreign workers who aimed at obtaining a job in a regulated occupation had to acquire a further occupation-specific Swiss qualification. The recognition of EU qualifications lifted this additional requirement. While all sectors were in principle equally affected by the abolition of quotas and priority requirements, sectors relying on a high share of previously regulated occupations were more exposed to the policy change. We exploit the differential exposure to the reform across sectors for identification and, indeed, find that sectors more intensive in occupations with now-recognized certifications experience a larger inflow of EU employees relative to less exposed sectors.

In 2004, two years after the full implementation of the AFMP, the Swiss government put in place a package of "accompanying measures" meant to limit the potential adverse effects of increased competition on the labor market. These measures aimed at strengthening the application of sector-level collective labor agreements that fix sectoral minimal wages and termination clauses. However, these measures are more likely to protect incumbent employees rather than new entrants in the labor market, who may instead face even stronger entry barriers.

The AFMP has been the object of a fierce opposition by some wings of the Swiss electorate (Mazzoleni and Pilotti, 2015). Such an opposition culminated in the referendum held on February 9, 2014, when voters approved the Federal Popular Initiative *Against Mass Immigration*. 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. However, while in 2016 the Swiss Parliament passed a law requiring employers to give priority to resident job seekers, quotas for EU workers were never reintroduced. Our analysis will focus on the time window between 1992 and 2008 to avoid not only the confounding effects of these developments in the immigration policy, but also the impact of the appreciation of the Swiss Franc during the Euro crisis, which altered cross-border workers' incentives.

3 Data

Our main empirical analysis leverages individual-level *social security* data for the canton of Ticino over the period 1992-2008. We complement this dataset with the *Swiss Labor Force Survey* to compute the share of treated occupations by sector. Additional data from the *Swiss Federal Statistical Office* (e.g., *Business Census* data on firms' workforce and *SHIS-Studex* data on tertiary education attendance) and from the *Cantonal Statistical Office of Ticino* (e.g., data on out-migration) will be used to offer a more complete picture of the labor market.

Social security 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*). The dataset covers the quasi-universe of individuals paying contributions to the first pillar of the Swiss social security system since 1992, namely residents older than 20[3] and active workers regardless of their residence status, including cross-border workers.

We focus on Ticino, the only Italian-speaking[4] 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 both the highest share of non-Swiss employees[5] and the highest

[3]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. Reassuringly, there is no significant change in the share of employees becoming inactive in correspondence of this reform occurred in 1997 (see Section 6, Figure 8).

[4]While approximately 90% of Swiss citizens in Ticino speak Italian, German and French are ranked among the three main languages spoken only by 8% and 4% of them, respectively (Cantonal Statistical Office of Ticino, 2021).

[5]Appendix Figure A.1 reports the share of non-Swiss employees 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 employees in the country, reaching more than 65% in 2008. These figures are computed using Business Census data (Swiss Federal Statistical Office, 2016), which reports employment rate (but no wage rate) by

share of cross-border workers that exceeds 30% of the labor force (Swiss Federal Statistical Office, 2021). Indeed, the large wage differential between Switzerland and Italy represents a strong incentive for Italian residents close to the border to search for a job in Ticino. For instance, in 2002, employees' average annual earnings amounted to roughly 22,500 Euros in Italy and 77,200 Francs (i.e., 52,400 Euros) in Switzerland (OECD, 2023), a gap that is likely wider for high-skilled occupations requiring specific qualifications.[6]

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 is inactive, a category that includes students, *long-term* unemployed,[7] 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 from age (in Switzerland early retirement is allowed from age 58).

Our dataset includes personal information on sex, date of birth, and nationality. Unfortunately, the type of work permit for foreign workers (e.g., resident foreign national vs. cross-border worker) is not reported.[8] For every calendar year, the data contain active workers' annual earnings and the working period in months associated with each job. To avoid the potential impact on our estimates of extreme outliers in the values of annual earnings, we winsorize the top and the bottom percentiles of the distribution, by year and sex.

When an individual has multiple jobs during the same year, we select the one associated with the highest annual income. We express annual income in real terms at 1998 prices, using the Consumer Price Index released by the Swiss Federal Statistical Office. Differently from social security data available for the whole country, our canton-level dataset reports the sector according to an internal classification that we link to the two-digit *Swiss General Classification of Economic Activities* (NOGA, 2002 Nomenclature).

sector, municipality, nationality, and gender.

[6]This large wage gap implies that, although the AFMP introduced a *mutual* recognition of qualifications, the outflow of Swiss workers towards Italy was very limited (see Beerli et al., 2021).

[7]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.

[8]We do not observe either posted workers who remain affiliated to their home-country social security system and work in Switzerland upon registration if the working period exceeds 8 days. According to the AFMP, posted workers are entitled to work in Switzerland for up to 90 days per calendar year only in the sectors of construction and civil engineering, hotels, restaurants and catering, cleaning, and itinerant retail trade. We acknowledge that these workers may play a role in explaining part of the effects on natives' labor market outcomes.

Assignment to treatment – Swiss Labor Force Survey data

Since our social security data do not include information on the level of educational attainment and on the specific occupation of each employee, we rely on the sector of the firm in which individuals are active to assign them to the treatment or control group. More specifically, in order to identify the sectors heavily exposed to the recognition of EU qualifications, we leverage additional data from the *Swiss Labor Force Survey* (SLFS), a representative survey covering the working-age (15+) resident population in Switzerland (Swiss Federal Statistical Office, 2022). For each employee, the SLFS reports the occupation and sector of activity according to, respectively, the *International Standard Classification of Occupations* (ISCO-08) and the NOGA classification. Relying on the list of regulated occupations in Switzerland (State Secretariat for Education, Research and Innovation, 2022) involved in the enactment of the AFMP, we identify the occupations (ISCO-08) affected by the recognition of qualifications released by EU countries. Then, we compute the share of individuals employed in a "treated" occupation within each sector to evaluate its degree of exposure to the reform. To be consistent with the sample selected for our empirical investigation (more on this below), we focus on private sector male employees active in Ticino over the period 1996–2008.[9]

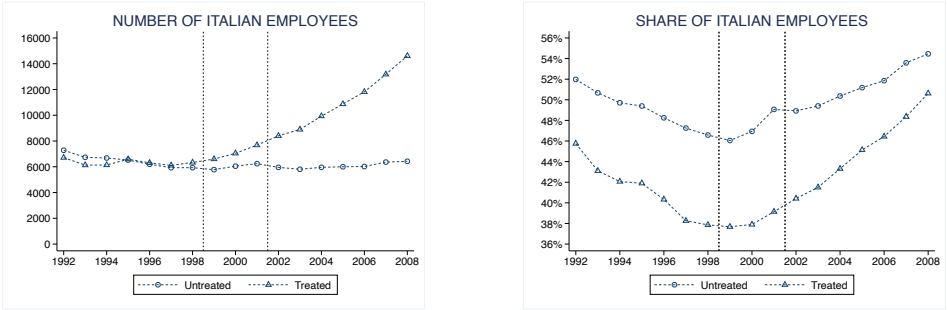
From this procedure, we obtain a bimodal distribution of shares of workers employed in treated occupations. This allows us to clearly distinguish between sectors with low and high shares (on average, 16.41% vs. 47.55%). Henceforth, we will refer to these two groups as, respectively, *untreated* and *treated* sectors. Appendix Table B.1 provides the full list of treated and untreated sectors in our social security data, showing for each of them the share of employees holding treated occupations according to the SLFS, as well as the evolution over time of the share of Italian employees. Treated sectors include chemical industries, legal assistance, engineering and architecture, communication and transports, hotels and restaurants, IT and auxiliary services for trade (e.g., accounting). As robustness check, we will also investigate the role of treatment intensity to verify whether the effect of the policy is larger in sectors with a higher share of treated occupations.

[9]Ideally we would like to focus on the pre-reform period, but before 2002 the SLFS is not representative at canton level due to the low number of observations. Reassuringly, our results are robust to the use of a treatment definition based on private sector male employees active in Switzerland in the pre-reform period.

Sample selection and descriptive evidence

Since a substantial share of Swiss females and of public sector employees are part-time workers, we exclude them from our analysis. In their case, indeed, the lack of information on the number of hours in our data is problematic because we cannot distinguish changes in hours worked from changes in hourly wages.[10] Additionally, due to pervasive regulation, public sector wage dynamics are likely different from private sector dynamics.

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. In particular, we are not able to cover the banking and insurance sector, which represented approximately 9% of private sector male employees in 1998, a share that has largely decreased over time. At the same time, the share of Swiss employees in this sector decreased from 85% in 1998 to 80% in 2008 (*Business Census* data). According to the SLFS data, the banking and insurance sector would belong to the treated group. While we cannot state a priori whether the effect of the AFMP on this 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.



(a) (b)

Figure 1: Evolution of Italian employees in treated and 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 employees in the canton of Ticino. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

[10] 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 worked part-time at a rate between 50% and 90%, and almost 20% of them at a 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.

Figure 1 shows the evolution over time of the absolute number (panel 1a) and share (panel 1b) of Italian employees for treated and untreated sectors. The number of Italian employees in treated sectors increased sharply after 1999, doubling in size in 2008 compared to 1998, while it remained constant in untreated sectors (panel 1a). The share or Italian employees in both treated and untreated sectors has sizeably grown after the AFMP was signed, reversing a previous decreasing trend (panel 1b). Because of the recognition of EU certifications, this increase has been far more pronounced in treated sectors, where the share of Italian employees was initially lower as a consequence of the restrictions described in Section 2. Appendix Table B.2 displays the evolution of the share of Italian employees in treated and untreated sectors by age group. It also presents the summary statistics for our main variables (real monthly wage, entry wage after changing firm, and probability of transition to inactivity).

Additional data

To compare young Swiss citizens entering the labor market in Ticino before and after the reform, we leverage additional data on education and migration decisions. We rely on the *SHIS-Studex*[11] database (Swiss Federal Statistical Office, 2023) to have information on the annual number of male students from Ticino attending Swiss universities, including vocational ones. In addition, we use statistics from the Cantonal Statistical Office (*USTAT*) to examine the annual share of residents moving to other Swiss cantons or abroad, by sex, age, and nationality.

4 Empirical Modelling

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

Baseline dynamic DiD model

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

[11] Note that, while this dataset includes individual-level information, it cannot be linked to our social security data over the years of interest for our analysis. In fact, the linkage between the two datasets through the individual social security ID is possible only after 2012.

$$y_{ft} = \alpha_f + \sum_{k=1992}^{2008} \pi_k \, treated_f \cdot \mathbb{1}[t = k] + \chi_d + \mu_t + \epsilon_{ft} \tag{1}$$

where y_{ft} is the share of Italian employees, overall or by age group (18–29; 30–49; 50–64), working in firm f and year t.[12] We include administrative districts fixed effects (χ_d) to account for geographical time-invariant features, in particular distance from the Italian border,[13] year dummies (μ_t) that capture aggregate fluctuations, and firm fixed effects (α_f) that control for time-invariant firms' characteristics affecting the propensity to hire foreign employees and potentially correlated with the treatment status. The error term ϵ_{ft} captures unobservable time-varying shocks to firm f. Standard errors are two-way clustered, at sector and at year level.

The dummy variable $treated_f$ takes value one if firm f belongs to a treated sector and is further interacted with an indicator variable $\mathbb{1}[t = k]$, one for each year t, excluding the reference year 1998 – the last year before the announcement of the AFMP, which led to a gradual loosening of restrictions on the hiring process of EU workers. Thus, the coefficients π_ks ($k = 1992, ..., 1997, 1999, ..., 2008$) measure the (potentially time-varying) impact of the policy.

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

$$w_{ist} = \alpha_i + \sum_{k=1992}^{2008} \beta_k \, treated_{it} \cdot \mathbb{1}[t = k] + \chi_d + \lambda_s + \mu_t + f(age) + \epsilon_{ist} \tag{2}$$

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 $treated_{it}$ takes value one if employee i works in year t in a treated sector.

We include district fixed effects (χ_d), sector fixed effects (λ_s) to account for time-invariant differences across sectors, year dummies (μ_t), and individual fixed effects (α_i) to account for time-invariant individual characteristics (e.g., ability) influencing wages and potentially correlated with the treatment status. This limits the extent

[12] When we estimate model (1) breaking down the share of Italian employees by age group, 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.

[13] 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. At the beginning of the 1990s, more than 70% of firms were already located in the three districts at the border with Italy; this proportion reached 80% in 2008.

of the omitted variable bias and helps interpreting β_k as the actual effect of the policy. Finally, $f(age)$ 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 estimate equation (2) separately for different subsamples of native employees, depending on their age group (18-29; 30-49; 50-64) in each year t.

The key underlying assumption is that trends in the outcome of interest for treated and untreated sectors would be identical in the absence of treatment. While this assumption is not directly testable, our dynamic specification allows us to formally test the presence of parallel trends in the pre-policy period. Moreover, the unconditional comparison of the two wage series for treated and untreated sectors (Appendix Figure A.2) suggests that the two groups are also very similar in levels, making the parallel trend assumption more credible.

"Frozen" model

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 model (2) that focuses on incumbent employees 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 in and out of treatment are not frequent (on average, 4% of employees every year) and do not affect our estimates (see robustness checks below), any differences from baseline results are driven by new-entrant employees rather than by having fixed incumbents' sector in 1998.

Static DiD model

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

$$\begin{aligned} y_{ist} = \alpha_i + \delta_1 treated_{it} \times transition_t + \delta_2 treated_{it} \times post2002_t \\ + \chi_d + \lambda_s + \mu_t + f(age) + \epsilon_{ist} \end{aligned} \tag{3}$$

in which the two time dummies $transition_t$ and $post2002_t$ identify the transition phase between 1999 and 2001 and the post-policy period since 2002, respectively. 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 (i.e., facing long-term unemployment or remaining out of the labor force in Ticino).

In the latter case, we estimate a linear probability model in which y_{ist} is a dummy variable taking value one if employee i in sector s and year t becomes inactive in year $t+1$. Differently from the model for wages, this model cannot include individual fixed effects because of the relatively low number of transitions out of employment.

We also estimate a multinomial logit model to distinguish between private sector employees' likelihood of becoming inactive, leaving the dataset,[14] or moving to the public sector. Appendix C provides more details about this specification.

5 Results

Figure 2 shows the dynamic impact of the policy on the share of Italian employees in firms, reporting the coefficients of our multi-period 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 proportion of Italian employees in each age group (18-29; 30-49; 50-64) relative to the total workforce of the firm.

The recognition of EU qualifications led to a large increase in the share of Italian employees (panel 2a), especially young (panel 2b) and middle-aged (panel 2c), while the increase for age group 50–64 (panel 2d) is negligible. While the coefficients in panels 2b and 2c are similar in magnitude, the average initial share of young Italian employees in treated firms was almost 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 ($\approx 23\%$ of the pre-policy value). Table 1 presents the estimates from the *static* version of equation (1), confirming the large increase in the share of young and middle-aged employees (Columns 2 and 3).

In what follows, we investigate 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, albeit not statistically significant, impact. This result, however, hides a remarkable heterogeneity across age groups. The effect was negative for young native employees 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). It is worth noting that the coefficients in the pre-treatment period are always close to zero and never statistically significant.

[14] We define the occurrence of an *exit* when an individual leaves the dataset and does not enter again within three years. Indeed, we do not observe individuals who receive unemployment benefits for up to two years after the job loss. Excluding subjects who enter economic sectors not covered by our data, the vast majority of exits are represented by (intercantonal) out-migration.

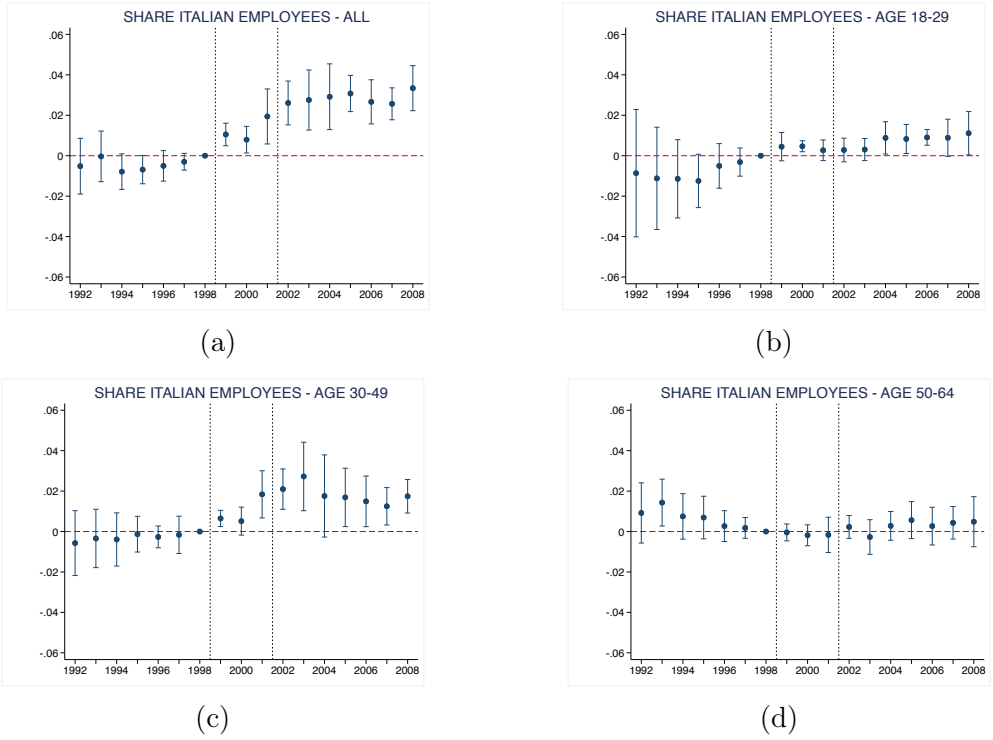


Figure 2: Share of Italian employees in firms – Dynamic DiD model

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 with at least two employees, 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 π_k (k = 1992,..., 1997, 1999, ..., 2008) 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) 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 following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

As we will discuss later, the negative effect borne by young Swiss employees is driven by a reduction in the entry wages offered to those entering the labor market *after* 1999. This effect materializes relatively soon after the announcement of the AFMP in 1998. As anticipated in Section 2, since 1999 restrictions on the hiring process of cross-border workers, especially in high-skilled sectors, were progressively loosened (Beerli et al., 2021; Cantonal Statistical Office of Ticino, 2000).

Table 2 presents our estimates from model (3), confirming a wage loss of 6 percentage points burdened by young employees aged 18–29 (Column 2) and a wage gain of more than 3 percentage points enjoyed by middle-aged (30–49) employees (Column 3). Note that the point estimates obtained from the static specification summarize well the estimated effects in the dynamic specification, but standard errors tend to be larger. This is likely the result of the different reference periods,

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	0.016***	0.010*	0.012*	-0.006
	(0.004)	(0.006)	(0.007)	(0.005)
treated × post2002	0.032***	0.013***	0.021**	-0.002
	(0.005)	(0.005)	(0.008)	(0.006)
N	84955	84955	84955	84955
Mean in 1998 (T)	31.47%	4.02%	18.49%	8.96%
Mean in 1998 (U)	38.13%	5.66%	19.76%	12.72%

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 male employees in private sector firms with at least two 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: *** $p < 0.01$; ** $0.01 \leq p < 0.05$; * $0.05 \leq p < 0.10$.

namely the whole 1992–1998 pre-policy period in the static model instead of year 1998 only in the dynamic specification.

In Table 3, we then focus on the impact of the policy on employees' probability of becoming inactive, reporting the estimates from our linear probability model (3). The negative coefficient displayed in Column 4 shows that the AFMP has led Swiss employees aged 50-64 to be less likely to become inactive. On the contrary, young native employees have experienced an increase in their likelihood to leave the labor force in Ticino (Column 2).

Incumbent vs. new-entrant native employees

We now turn to our 'frozen' specification of model (3), which fixes employees' treatment status and age group in 1998, focusing on incumbent individuals already active in the local labor market before the reform.

Table 4 presents the results for incumbent employees' wages (Panel A) and for their probability of inactivity (Panel B). The coefficients reported in Panel A 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

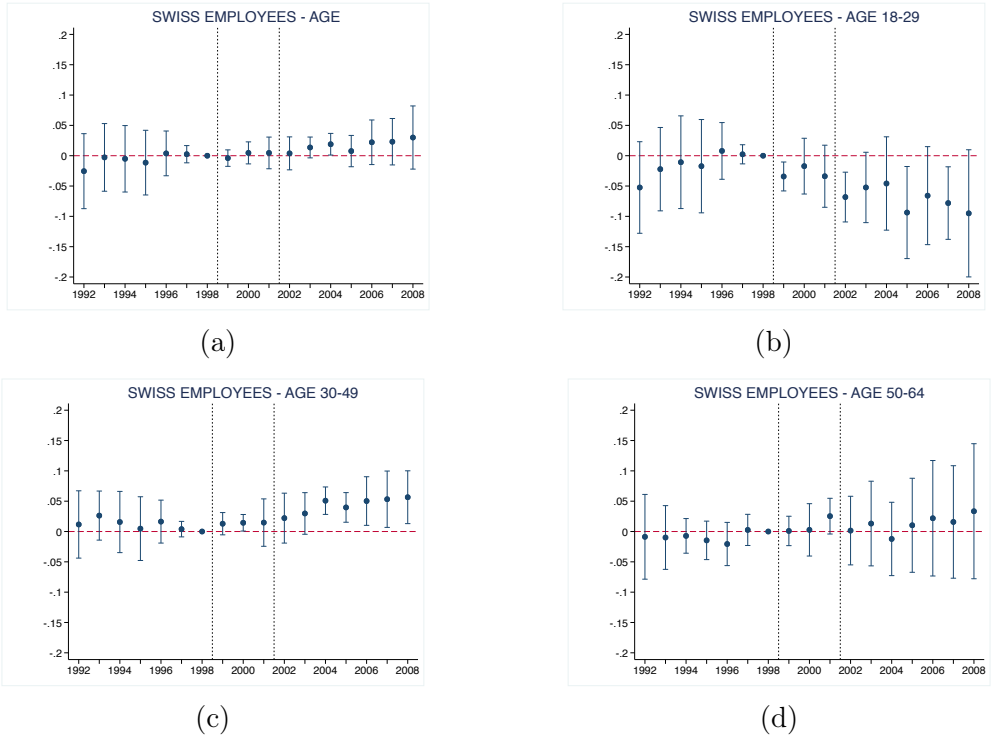


Figure 3: Swiss employees' (log) real monthly wages – Dynamic DiD model

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2). Panel (a) refers to the full sample of Swiss male employees in private sector firms with at least two employees, while panels (b)–(d) refer to different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients β_k (k = 1992,..., 1997, 1999, ..., 2008) 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) 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 following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

even turns positive, although not statistically significant (Column 2).[15] Besides, 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.

Since the difference from the baseline model lies in the exclusion of employees 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. Figure 4 shows a reduction in their entry wages in treated sectors since 1999. As we will discuss, this drop is explained not only by increased wage competition,[16] but also by the compositional changes in the profiles of young new entrants induced by the policy.

[15] Appendix Figure A.3 shows the estimates from the corresponding 'frozen' version of model (2).

[16] Note that the gap with untreated sectors begins fading away after 2004, when the government introduced the accompanying measures meant to limit the downward pressure on wages driven by increased wage competition (see Section 2).

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	0.006	-0.022	0.006	0.016
	(0.022)	(0.032)	(0.020)	(0.023)
treated × post2002	0.020	-0.060	0.031	0.014
	(0.028)	(0.035)	(0.028)	(0.042)
N	243250	68546	122433	47710
Mean in 1998 (T)	3.56	3.20	3.70	3.74
Mean in 1998 (U)	3.65	3.28	3.82	3.88

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) for real wages. Column (1) reports the estimates for the full sample of Swiss male employees in private sector firms with at least two 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.

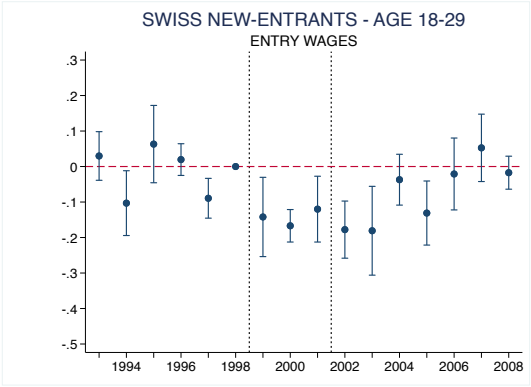


Figure 4: Young Swiss employees' entry (log) real monthly wages

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2) for the cross-section of young Swiss employees observed in their first year in the labor market. It reports the estimates of the coefficients β_k (k = 1993,..., 1997, 1999, ..., 2008) 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) is the omitted year. The model includes sector, district, and year fixed effects, plus a linear and a quadratic age term. Since in this cross-sectional analysis each individual is considered only once, when entering the labor market, individual fixed effects are dropped. 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 following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

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	-0.002**	0.004*	-0.003**	-0.004
	(0.001)	(0.002)	(0.001)	(0.002)
treated × post2002	-0.000	0.009**	-0.000	-0.006*
	(0.001)	(0.004)	(0.001)	(0.003)
N	227844	61432	119735	46677
Mean in 1998 (T)	1.73%	2.61%	1.00%	2.46%
Mean in 1998 (U)	1.11%	1.10%	0.64%	2.29%

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) for the probability of becoming inactive. Column (1) reports the estimates for the full sample of Swiss male employees in private sector firms with at least two 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, 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 shares of Swiss employees becoming inactive (or leaving the dataset) by age group in 1998 in treated (T) and untreated (U) sectors, respectively. Significance levels: *** $p < 0.01$; ** $0.01 \leq p < 0.05$; * $0.05 \leq p < 0.10$.

To further test the hypothesis of the incumbent advantage, we repeat the analysis for Italian employees (see Appendix Table B.3 and Appendix Figure A.4). The results suggest that incumbent Italians' labor market outcomes were not harmed. This is not surprising because they could take advantage of acquired experience and are also likely to be positively selected, as they were required to obtain an additional Swiss qualification to access treated sectors before the policy change.

The role of incumbent workers' individual ability and firm-to-firm movers

To shed further light on the mechanisms behind the wage gains experienced by native incumbent employees, we investigate more in detail the role of ability. For Swiss employees active in 1998, i.e. for incumbent native workers, we first estimate individual fixed effects from a regression of (log) real wages on sector, year, district, and individual fixed effects, plus a quadratic age term, over the pre-policy period (1992–1998). Individual fixed effects are derived separately for age groups, conditional on age in 1998. For each age group, we define as high-ability employees those belonging to the top quintile of the fixed effects distribution.[17]

[17]This should approximately capture the fraction of the Swiss population with a tertiary-level degree or a professional qualification as, according to Census data, in year 2000, about 22% of the

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

	All	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)	(4)
Panel A: (Log) real monthly wages				
treated × transition	0.010	0.013	0.011	0.017
	(0.021)	(0.034)	(0.022)	(0.022)
treated × post2002	0.029	0.045	0.029	0.034
	(0.026)	(0.033)	(0.026)	(0.047)
N	148164	39068	80561	28535
Mean in 1998 (T)	3.56	3.20	3.70	3.74
Mean in 1998 (U)	3.65	3.28	3.82	3.88
Panel B: Probability of inactivity				
treated × transition	-0.008**	-0.010***	-0.006	-0.006
	(0.003)	(0.004)	(0.004)	(0.005)
treated × post2002	-0.007**	-0.008***	-0.006*	-0.004
	(0.003)	(0.001)	(0.003)	(0.009)
N	154403	39809	84245	30349
Mean in 1998 (T)	1.73%	2.61%	1.00%	2.46%
Mean in 1998 (U)	1.11%	1.10%	0.64%	2.29%

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) when treatment status and age are fixed in 1998 ("frozen" model). Column (1) reports the estimates for the full sample of Swiss male employees in private sector firms with at least two employees, while Columns (2)-(4) focus on different age groups (18–29; 30–49; 50–64). Panel A refers to wages, while panel B to the probability of becoming inactive. All models include sector, district, year, and (only for 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 (log) 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 average shares of Swiss employees becoming inactive in Ticino. Significance levels: *** $p < 0.01$; ** $0.01 \leq p < 0.05$; * $0.05 \leq p < 0.10$.

We then estimate a triple interaction version of equation (3) on the sample of incumbent native workers for which we are able to get the individual fixed effects from the above regression, adding a further interaction with a dummy variable for high ability. Table 5 shows that statistically significant and economically relevant wage gains are concentrated among middle-aged and, to a lesser extent, young in-

Swiss population had either tertiary education or professional qualification (https://www.bfs.admin.ch/bfs/en/home/basics/census.assetdetail.1021397.html).

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 × transition	-0.006	0.019	0.020
	(0.047)	(0.022)	(0.032)
treated × transition × high	0.013	0.095***	0.047
	(0.044)	(0.031)	(0.072)
treated × post2002	0.003	0.035	0.069
	(0.038)	(0.045)	(0.071)
treated × post2002 × high	0.125*	0.081***	-0.048
	(0.063)	(0.016)	(0.048)
N	33505	76354	27525
Mean in 1998 (T)	3.31	3.78	3.83
Mean in 1998 (U)	3.38	3.85	3.92

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) when treatment status and age are 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 employees active in 1998. Columns (1)-(3) report the estimates for Swiss male employees in private sector firms with at least two employees, distinguishing between 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 (log) real monthly wages of Swiss employees by age group in 1998 in treated (T) and untreated (U) sectors, respectively. Significance levels: *** $p < 0.01$; ** $0.01 \leq p < 0.05$; * $0.05 \leq p < 0.10$.

cumbent native employees with high ability.[18] On the contrary, the wages of Swiss employees with a low level of ability have remained substantially unaffected.

We next explore whether the wage effects of the policy differ between incumbent native employees who have moved to a different firm and those who have not. Appendix 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 (Panel A), the policy has led to sizeable gains for firm-to-firm "movers" aged 30–49 and 50–64 (Panel B), 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 them to select the most skilled and productive native employees.

[18] 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.

The profile of young Swiss new entrants

Since the wage loss and the increased inactivity for young Swiss employees is driven by new entrants in the labor market after the policy change (as in Figure 4), we now investigate whether compositional changes, such as changes in the age and education of new-entrants, might explain, at least partly, our results.

We start our investigation from Figure 5a, which shows the age profile of young Swiss new entrants. While new entrants in treated sectors are on average older than new entrants in untreated sectors, there is evidence of a more pronounced decline in the entry age in treated sectors after 1999: the average entry age in treated sectors, which was stable at roughly 23 until 1999, sharply decreased to 22 within the subsequent two years. As the initial difference in levels between the two groups can be explained by the higher level of education of employees in treated sectors, one might be tempted to interpret the decline in the age of entry in the labor market observed in treated sectors after the policy change as evidence of a decline in the level of education of the new entrants in those sectors. However, this interpretation is in contrast with the rise in the number of male students from Ticino attending tertiary education in Swiss universities (Figure 5b), which started in 1997 and was likely triggered by the contemporaneous increase in the supply of educational services.[19]

The out-migration patterns for age groups 18-24 and 25-29 reported in Figure 5c is, instead, consistent with the declining age (and wages) of new entrants. The figure clearly shows that the proportion of young male residents aged 25–29 moving from Ticino to other cantons started to increase in 1999, after exhibiting a declining trend over the previous years. This suggests that more educated native citizens, who would have otherwise entered the labor market upon completing their tertiary education, may have instead moved to other cantons. On the opposite, there is no evidence of outflow migration for younger male residents (aged 18–24). Finally, Figure 5d shows no evidence of increased migration abroad.

All in all, Figure 5 indicates that the wage losses experienced by young native new entrants after the introduction of the AFMP may partly reflect compositional changes, likely triggered by the policy change. Despite the increasing number of students attending tertiary education, the growing share of young native citizens aged 25–29 – likely with tertiary education – that relocate to other cantons implies that young Swiss employees entering the labor market in Ticino are on average younger and less likely to have achieved tertiary education.

[19] Precisely in 1997 vocational universities were established in the Swiss education system (Bächli and Tsankova, 2023). These universities, also known as *universities of applied sciences*, offer vocational training in several fields (e.g., engineering, IT, chemistry, business, healthcare...), emphasizing the acquisition of industry-specific practical skills. One of them was established in Ticino.

We attempt to measure the extent to which the decline in native young employees' average entry wages reported in Figure 4 after 1999 can be attributed to changes in age composition. To this aim, we first estimate the coefficients of our difference-in-differences model on Swiss employees' entry wages separately for each specific age cohort between 19 and 29. We then compute the counterfactual coefficient that would have been observed in the year 2000 for the age group 18-29 absent compositional changes, by averaging the age-specific coefficients keeping the share of entrants belonging to each age cohort at the 1998 level. According to this back-of-the-envelope calculation, the magnitude of the coefficient would have decreased (in absolute value) from -0.182 to -0.167, suggesting that approximately 8.5% of the overall decline in entry wages can be attributed to the change in the age composition due to the policy.

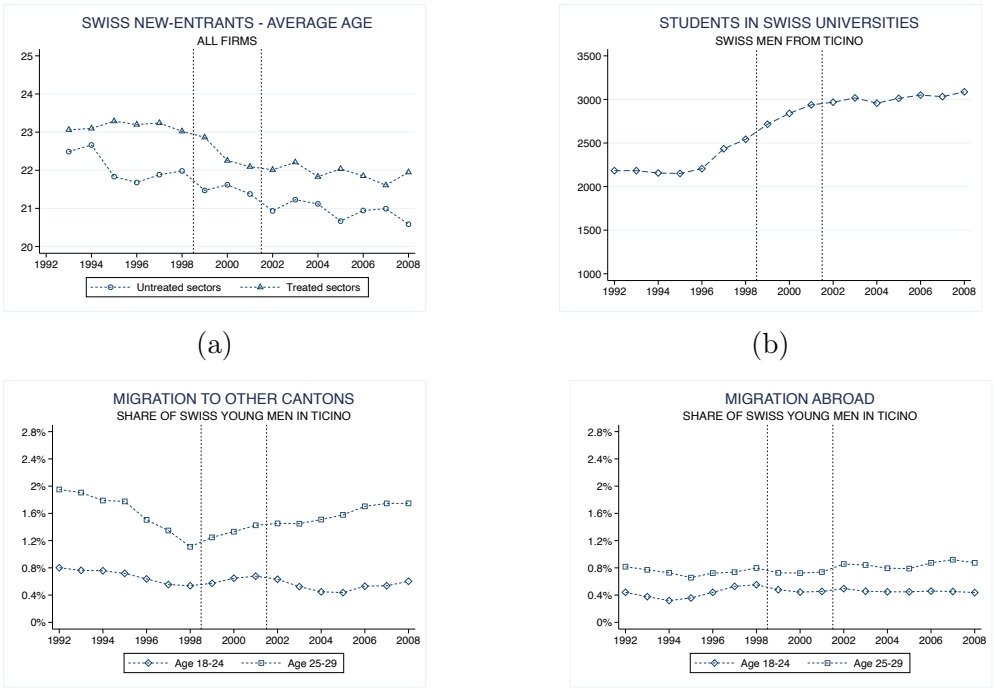


Figure 5: Young native citizens' entry age in the labor market, tertiary education attainment, and migration decisions (1992–2008)

Notes: Panel (a) shows the average age of Swiss young individuals entering the labor market in Ticino for the first time in treated and untreated sectors. Panel (b) reports the number of male students from Ticino attending tertiary education in Swiss universities, including vocational universities. Panels (c) and (d) display the share of Swiss male residents in Ticino who move, respectively, to other Swiss cantons or abroad, distinguishing age groups 18–24 and 25–29. In each panel, the first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

Robustness checks and extensions

As a first robustness check, we estimate equation (2) excluding employees who change treatment status. The coefficients displayed in Appendix Figure A.5 are consistent with those reported in Figure 3, although sometimes less precisely estimated. Our baseline results are therefore not driven by employees self-selecting into treated sectors.

In Appendix Figure A.6 we report the estimates of our dynamic difference-in-differences model when we use as treatment variable the continuous share of treated occupations in each sector, rescaled by their interquartile range to make coefficients easier to interpret. Different from the baseline specification with binary treatment, the figure shows evidence of a positive pre-trend for young and old employees.[20] This is not particularly worrying as, right after the policy, the pre-trend flattens out (50–64 age group) or even turns negative (18–29 age group). Thus, the pre-trend does not drive our results: it rather hides it. To clean up the effect of the policy from the differential pre-trend across treated and control sectors, we use a two-step procedure: *i*) we first regress log wages on a linear trend interacted with the continuous treatment variable (controlling for a quadratic polynomial in age, as well as for year, sector, district, and individual fixed effects) using only the pre-policy period (1992–1998); *ii*) we then remove the differential pre-trend from log wages and estimate the event study model again.[21] Figure A.7 reports the results of this procedure for the two age groups (young and old) for which we observed evidence of differential pre-trends. Our main result of a negative effect of the reform on the wages of native employees aged 18–29 is confirmed once we account for the differential trend showing up before the enactment of the AFMP. Also, the policy did not significantly impact the trend of wages for older individuals above age 50, although point estimates tend to be negative after 2004.

Next, we change our main specification and estimate equation (2) including firm (instead of sector) fixed effects. Results in Appendix Figure A.8 largely confirm our findings, in particular the wage losses borne by young native employees and the wage gains obtained by their middle-aged counterparts.

We also estimate equation (2) for Swiss employees' total real average monthly earnings, instead of focusing only on the monthly wage associated to the main job. Despite the additional noise potentially introduced by including short contracts and intermittent jobs, results in Appendix Figure A.9 are largely consistent with our

[20] The differential pre-trend is driven by the IT sector which was booming during the 90's.

[21] Since we do not have a staggered design, we cannot include this pre-trend in the main model à la Dobkin et al. (2018) because of the collinearity between event time and calendar time. So, we estimate it on the pre-policy period as described above.

main findings in Figure 3. Besides, in Appendix Figure A.10 we show evidence of an increase in the average worked months for middle-aged and young employees, although in the latter case the pattern is less clear, while we do not find any effect for older individuals.

To reinforce our experience-based interpretation of the differences in the wage effects of the policy across age groups, we estimate equation (3) splitting the sample of employees according to years of experience in Ticino rather than age.[22] Appendix Table B.6 confirms that the gains are concentrated among employees with a larger experience acquired on the local labor market, while wage losses are borne by less experienced native employees.

As far as the effect of the AFMP on native employees' labor market status is concerned, Appendix Table B.7 reports estimates from a multinomial logit model that studies the probability of remaining employed, becoming inactive (i.e., long-term unemployed or out of the labor force in Ticino), leaving the dataset, or moving to the public sector (see Appendix C). Results are consistent with those obtained from the OLS model and presented in Table 3.[23] For young native employees, we now estimate a statistically significant reduction in the probability of remaining employed, driven by an increase in both the likelihood of inactivity and, to a larger extent, of leaving the dataset as a result of out-migration.[24]

We strengthen our evidence on the channel through which Swiss employees enjoy wage gains by estimating equation (3) on the first wages earned by firm-to-firm movers. Results in Appendix Table B.8 are consistent with those in Appendix Table B.5 and show that the wages earned by middle-aged native employees upon switching firm increased after the reform in treated relative to untreated sectors.[25]

Finally, we estimate a version of model (3) that accounts also for firms' distance from the Swiss-Italian border, using a triple difference-in-differences estimator.[26] As anticipated in Section 3, the majority of private sector firms in Ticino are close to the border with Italy, so we use a threshold of 5 kilometers, which leaves 54% of observations in the border area. The results of our triple difference-in-differences model for native employees' wages and probability of inactivity are presented in

[22] Experience is measured counting the years in which an employee is recorded in our dataset.

[23] 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.

[24] While the probability of switching from private to public sector does not change, native citizens may still have become more likely to directly enter the labor market in the public sector.

[25] Notice that, since the model includes individual fixed effects, the coefficient is identified on the subsample of employees that change firm at least twice.

[26] We rely on geodata released by the Swiss Federal Office of Topography (2022), which allow us to compute the distance between the centroid of the municipality and the nearest border crossing office for 96.5% of observations in our sample.

Appendix Table B.9. In line with the findings of Beerli et al. (2021), our estimates show that wage gains for employees aged 30–49 in treated sectors have been far larger close to the border (Panel A, Column 3). Moreover, both the drop in real wages (Panel A, Column 2) and the increase in the likelihood of inactivity (Panel B, Column 2) experienced by young Swiss (new-entrant) employees after the enactment of the AFMP have been more pronounced in border municipalities.

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.

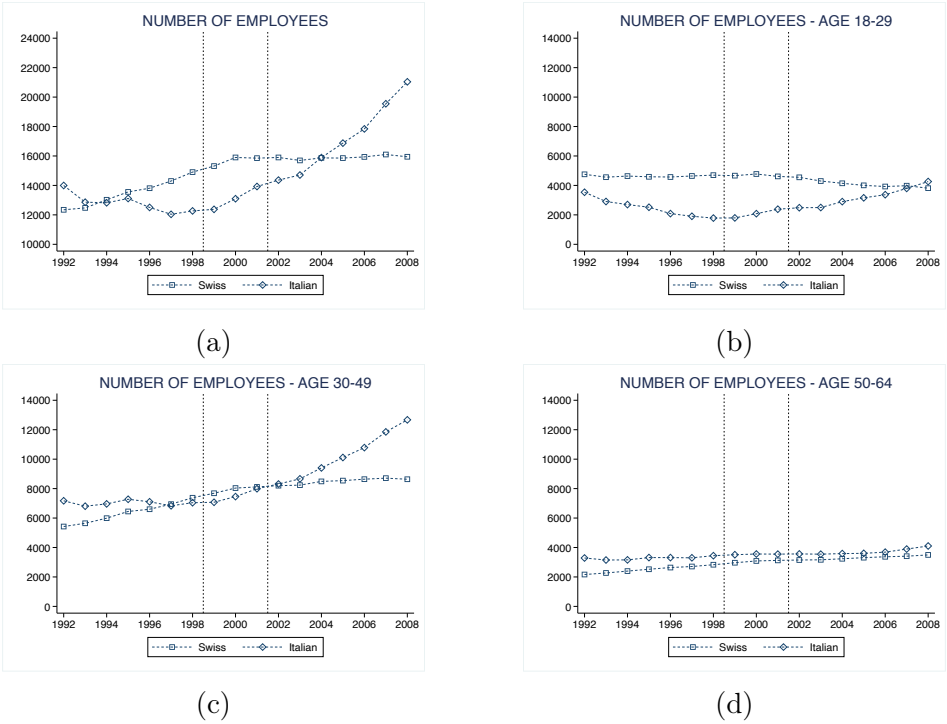


Figure 6: Number of employees by nationality and age group

Notes: This figure shows the evolution over time (1992-2008) of the number of male employees in private sector firms with at least two employees. Each panel compares the number of Swiss and Italian employees. Panel (a) refers to the whole sample, while panels (b)–(d) refer to specific age groups (18–29; 30–49; 50–64). The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

Figure 6 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 6a). The breakdown by age group shows that not only the number of young Italian employees aged 18–29 exhibits sizeable growth (panel 6b), but there is an even steeper increase in the number of Italians aged 30–49, while the number of Swiss employees rises before 1999 and then flattens out (panel 6c). Finally, there are no visible effects among older employees (panel 6d). All in all, Figure 6 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 employees, a subsequent steeper growth took place, driven by Italian immigrants.

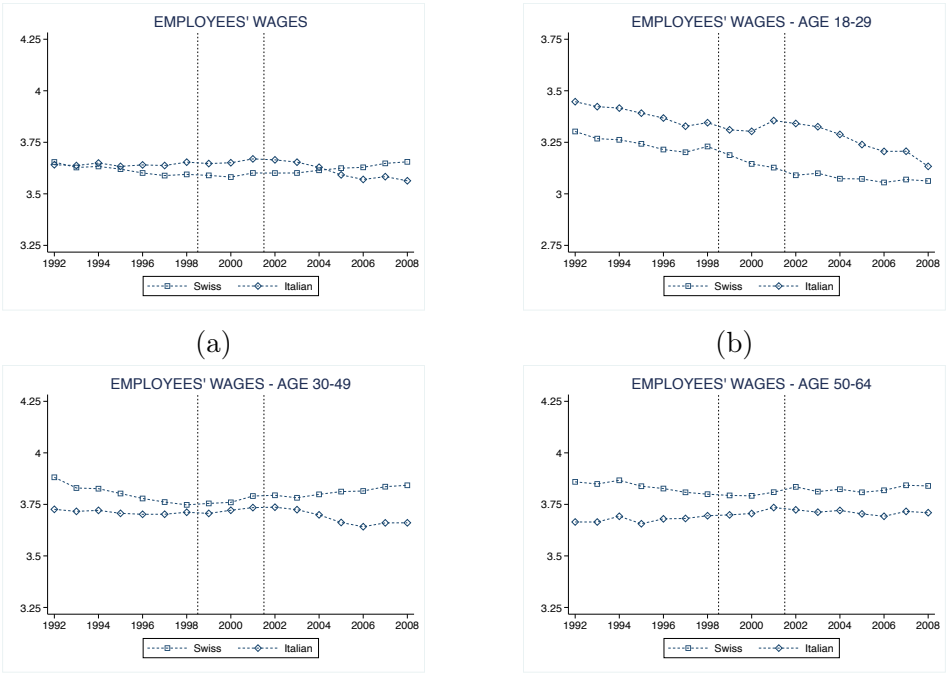


Figure 7: Employees' (log) real wages by nationality and age group

Notes: This figure shows the evolution over time (1992-2008) of the average (log) real monthly wage of male employees in private sector firms with at least two employees. Each panel compares the evolution of wages for Swiss and Italian employees. Panel (a) refers to the whole sample, while panels (b)–(d) refer to specific age groups (18–29; 30–49; 50–64). The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

Next, Figure 7 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 7a). However, for young natives (panel 7b) 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 7c),[27] while there is no relevant change for older employees (panel 7d).

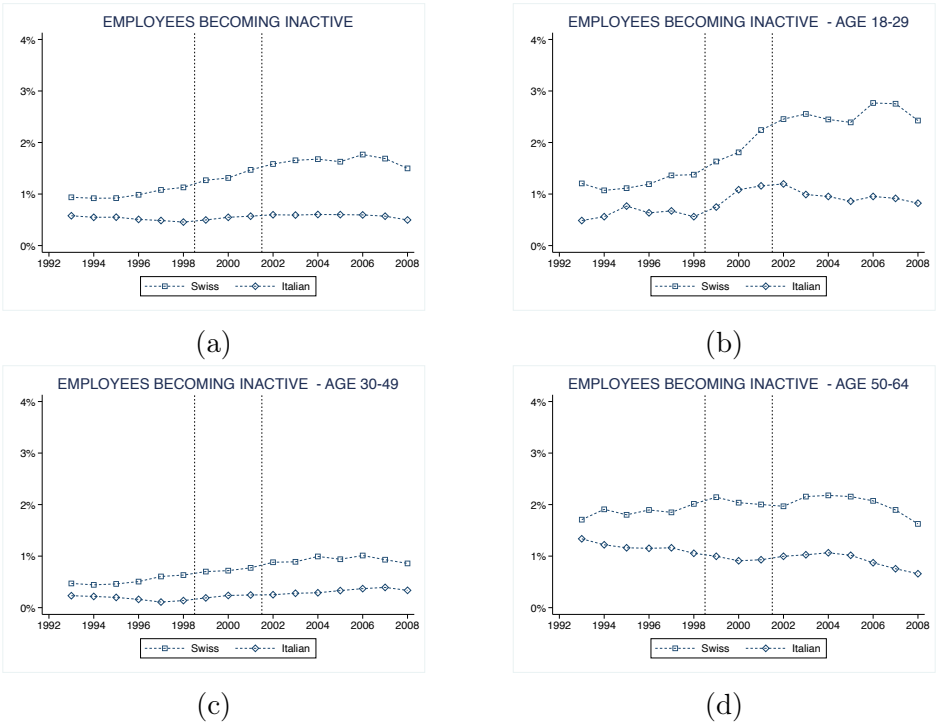


Figure 8: Share of employees becoming inactive by nationality and age group

Notes: This figure shows the evolution over time (1993-2008) of the average share of male employees becoming inactive (i.e., inactive, long-term unemployed, or early retired) in private sector firms with at least two employees, holding the denominator fixed in 1998. Each panel compares the evolution of transitions to inactivity between Swiss and Italian employees. Panel (a) refers to the whole sample, while panels (b)–(d) refer to specific age groups (18–29; 30–49; 50–64). The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

Finally, Figure 8 reports the evolution of the average shares of Swiss employees in different age groups who leave the labor force, holding the denominator fixed in 1998. Consistently with our micro empirical results, the share of Swiss employees who become inactive exhibits a growing tendency after 1999 (panel 8a). This pattern is driven by a sizeable increase for young employees (panel 8b), while we do not observe any relevant change for their middle-aged counterparts (panel 8c). On the

[27] 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.

contrary, the average share of older people becoming inactive decreases more sharply after the reform (panel 8d), 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 wages and employment opportunities for same-language natives with comparable certifications.

However, a growing strand of literature has proposed an alternative class of models that predicts a positive effect of immigration on labor market outcomes (Pissarides, 2000). In this setting, the inflow of high-skilled immigrants leads to an expansion of the labor market, thanks to the attraction of new previously scarce skills and to the opening of new job positions. This leads not only to a positive effect on employment, but also to an increase in wages if the production function exhibits increasing returns to education, especially when combined with experience, because of the positive externalities induced by qualified workers.

Our empirical results can be rationalized in light of both types of models. First, differently from the expectations based on a standard competitive model, we show that 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' outcomes. As reported in Figure 1, this is likely the result of a labor market expansion, especially in sectors such as IT.

Yet, we document that this overall result masks an important heterogeneity across age (i.e., experience) groups. While Swiss incumbent experienced employees enjoyed a wage gain and a decrease in the likelihood of becoming inactive, the opposite happened for young inexperienced citizens entering the labor market after the reform.

These results can be interpreted in the context of a model 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 a higher degree of complementarity with available physical capital.[28]

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 native employees 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, the only Italian-speaking Swiss canton, where Italian (cross-border) 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 native employees' 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) employees. 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. We show that part of this negative effect can be explained by the growing share of (college educated) Swiss residents aged 25–29 moving to other cantons, which changes the skill composition of the young new employees entering the local labor market.

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

[28] 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.

incumbents have become less likely to experience long-term unemployment or, more generally, to leave the 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 employees 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, with adverse consequences borne by young newcomers in the labor market and gains enjoyed by incumbents, ask for a deeper understanding of social welfare implications of immigration policies and for an evaluation of the most adequate interventions to compensate potential arising inequalities.

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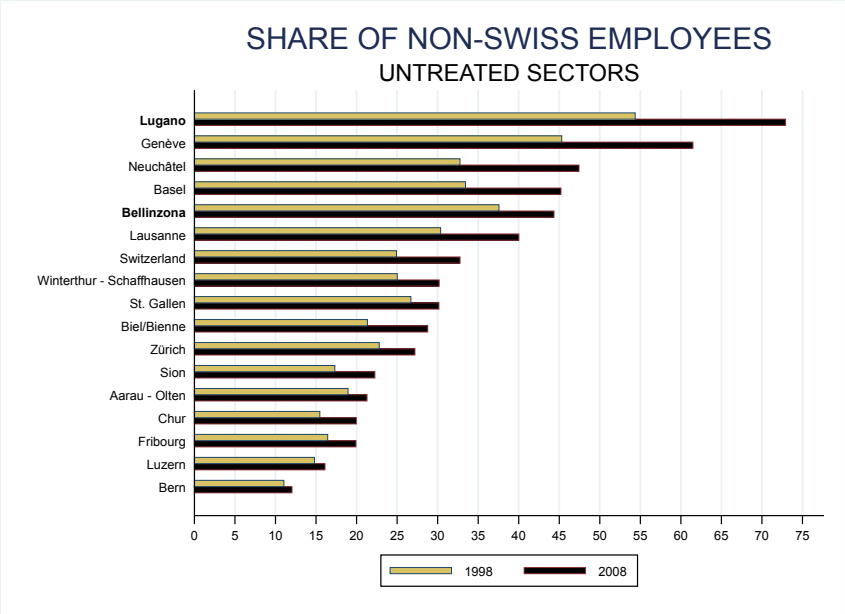
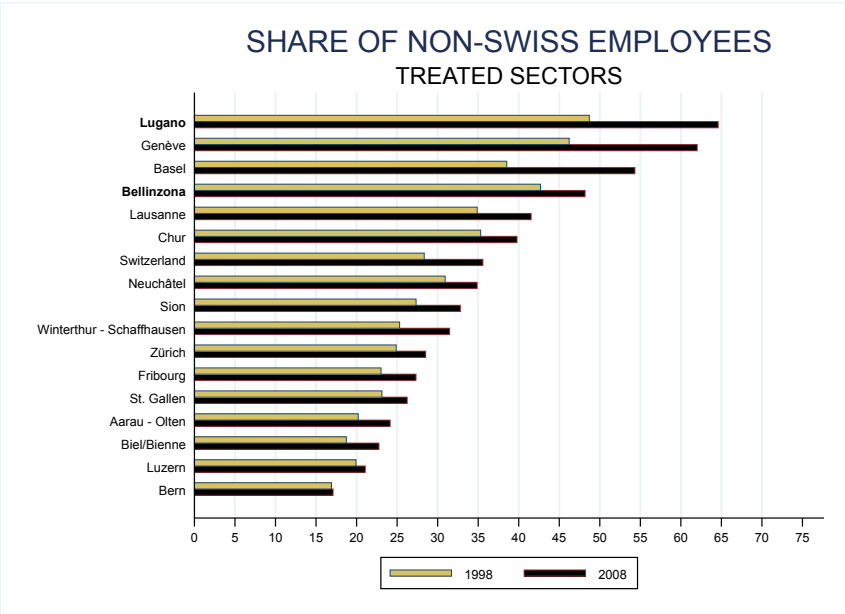
Appendix A Additional Figures



(a)



(b)

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

Notes: This figure represents the share of non-Swiss employees 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 sectors, respectively.
Source: Our calculations on *Business Census* data.

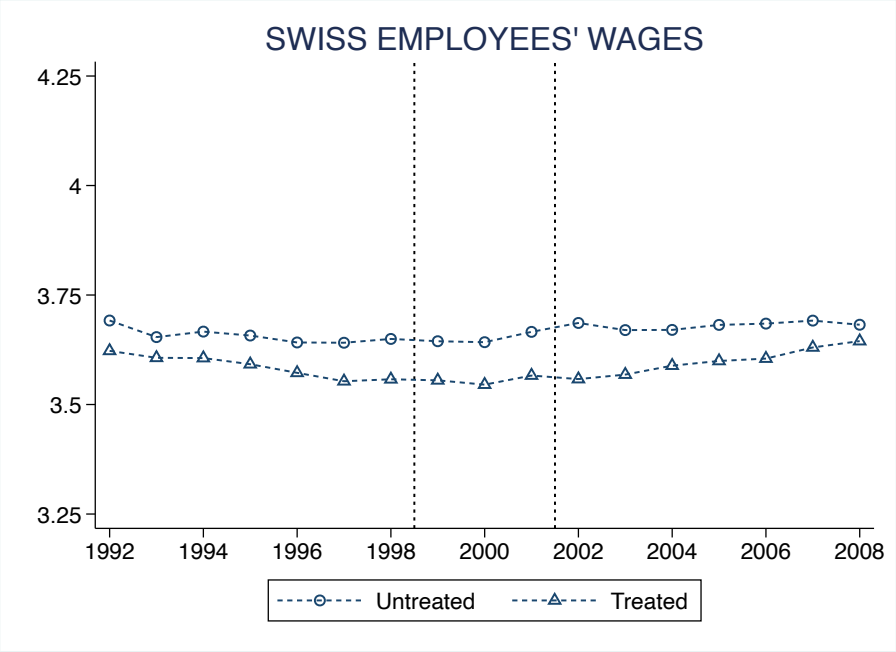


Figure A.2: Swiss employees' average (log) real monthly wages by

Notes: This descriptive figure shows the evolution over time (1992–2008) of the average value of the (log) real monthly wage earned by Swiss male employees in private sector firms with at least two employees, comparing treated and untreated sectors. The first vertical dashed line (between 1998 and 1999) indicates the beginning of the transitional phase following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

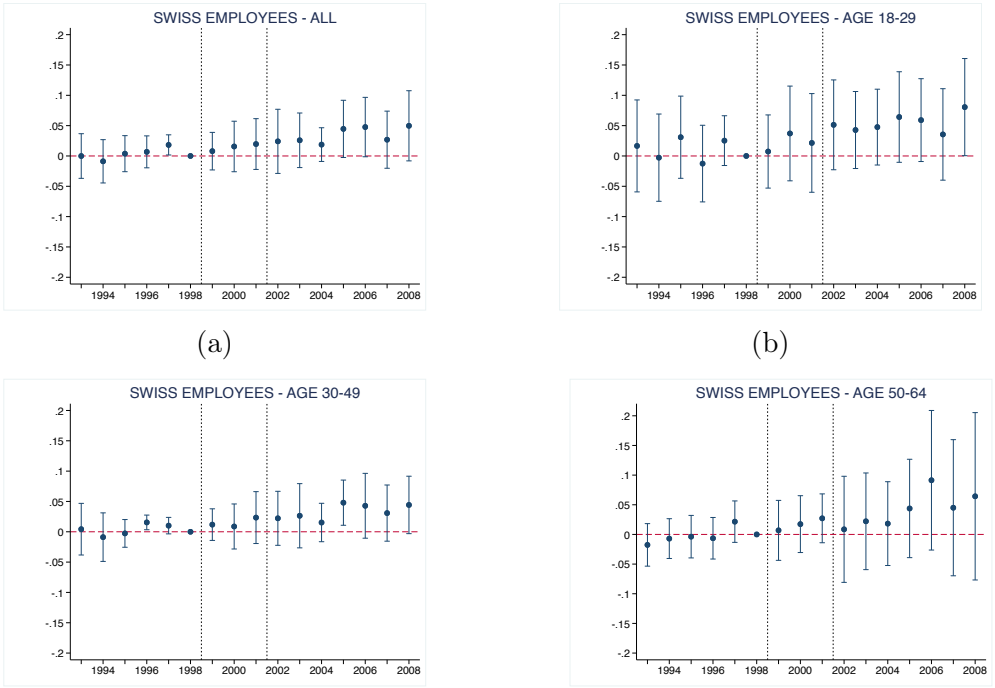


Figure A.3: Incumbent Swiss employees' (log) real monthly wages – Dynamic DiD model

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2), when treatment status and age are fixed in 1998 ("frozen" model). Panel (a) refers to the full sample of Swiss male employees in private sector firms with at least two employees, while panels (b)–(d) focus on different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients β_k (k = 1992,..., 1997, 1999, ..., 2008) 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) 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 following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

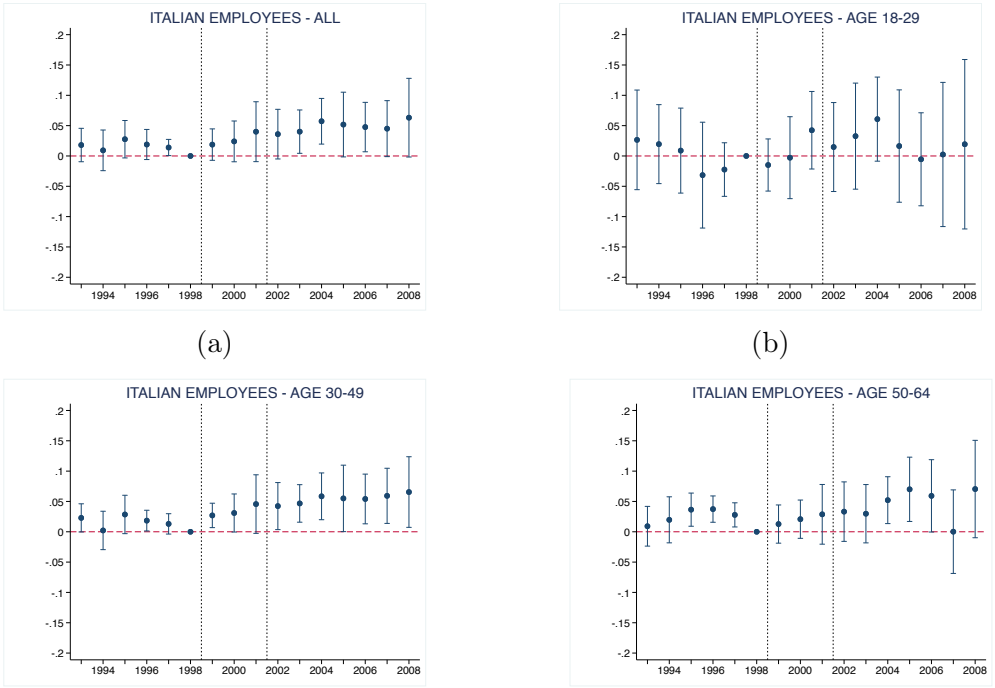


Figure A.4: Incumbent Italian employees' (log) real monthly wages – Dynamic DiD model

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2), when treatment status and age are fixed in 1998 ("frozen" model). Panel (a) refers to the full sample of Italian male employees in private sector firms with at least two employees, while panels (b)–(d) focus on different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients β_k (k = 1992,..., 1997, 1999, ..., 2008) 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) 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 following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

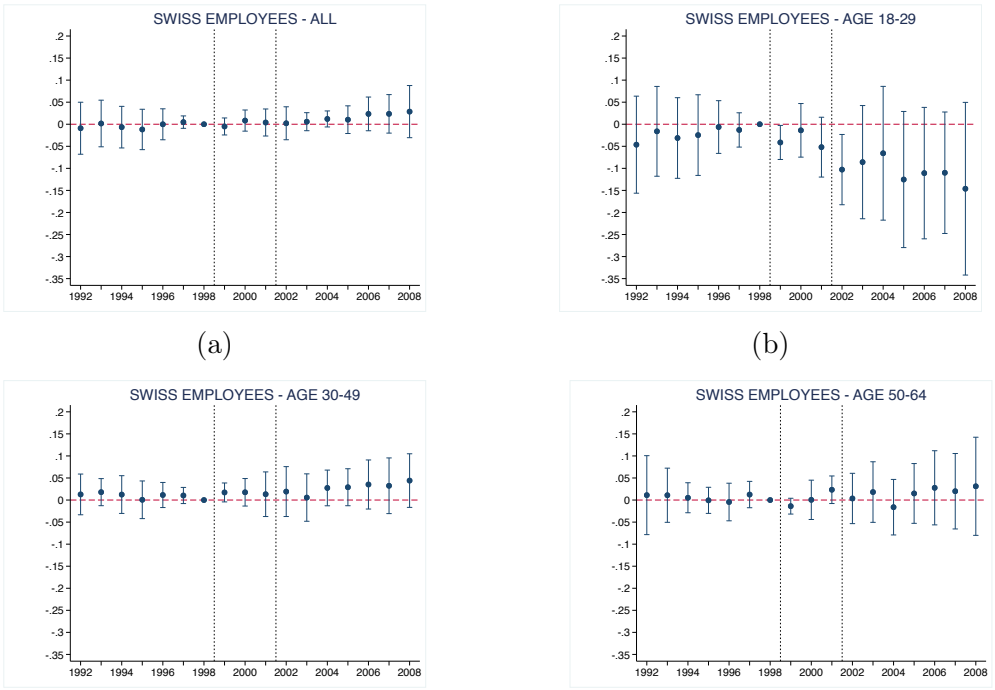


Figure A.5: Swiss employees' (log) real monthly wages – Dynamic DiD for employees who did not change treatment status

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2) excluding employees who change treatment status. Panel (a) refers to the full sample of Swiss male employees in private sector firms with at least two employees, while panels (b)–(d) focus on different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients β_k (k = 1992,..., 1997, 1999, ..., 2008) 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) 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 following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

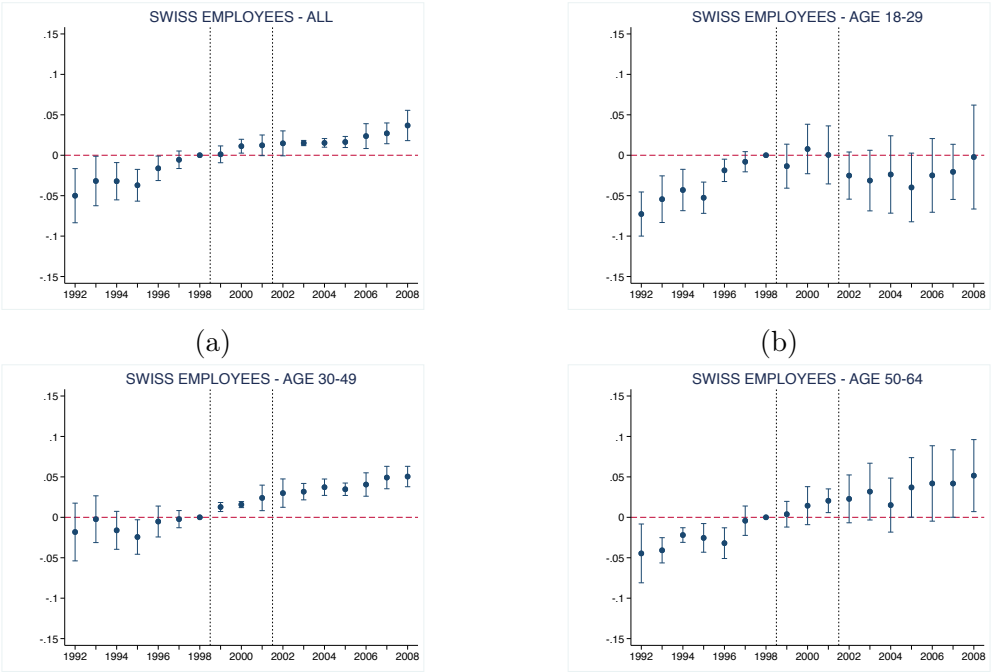
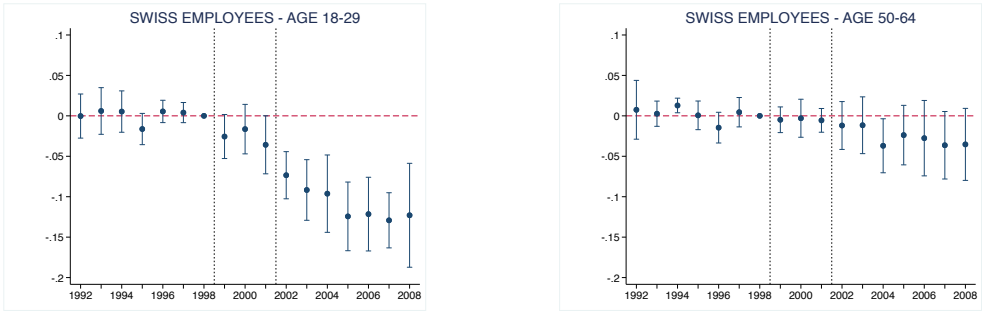


Figure A.6: Swiss employees' (log) real monthly wage – Dynamic DiD with continuous treatment

Notes: This figure shows the estimates from an alternative version of the dynamic difference-in-differences model (2), in which the dummy variable for each year is interacted with the continuous share of treated occupations in each sector. Panel (a) refers to the full sample of Swiss male employees in private sector firms with at least two employees, while panels (b)–(d) focus on different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients β_k (k = 1992,..., 1997, 1999, ..., 2008) 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) 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 following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.



(a) (b)

Figure A.7: Swiss employees' (log) real monthly wages – Dynamic DiD model with continuous treatment – Pre-trends correction

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2) where the outcome variable is the real monthly wage net of a linear pre-trend that varies with the intensity of the treatment, which has been estimated using only the pre-policy period (1992–1998). Panel (a) and (b) refer to the Swiss male employees in private sector firms with at least two employees aged, respectively, 18–29 and 50–64. Each graph shows the estimates of the coefficients β_k (k = 1992,..., 1997, 1999, ..., 2008) 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) 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 following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

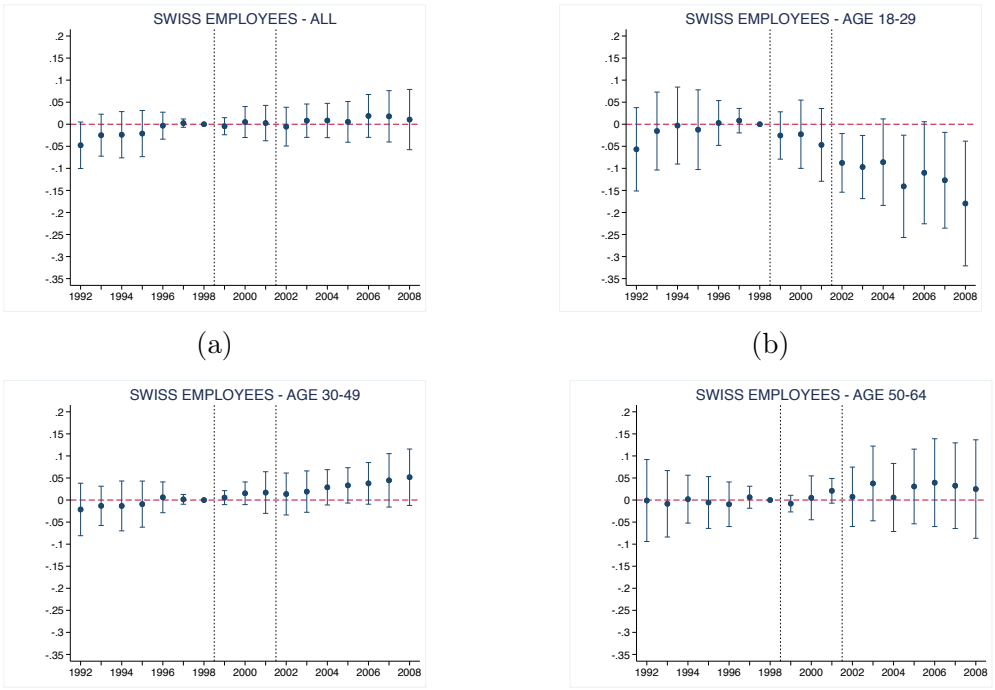


Figure A.8: Swiss employees' (log) real monthly wages – Dynamic DiD model with firm fixed effects

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2). Panel (a) refers to the full sample of Swiss male employees in private sector firms with at least two employees, while panels (b)–(d) focus on different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients β_k (k = 1992,..., 1997, 1999, ..., 2008) 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) 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 following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

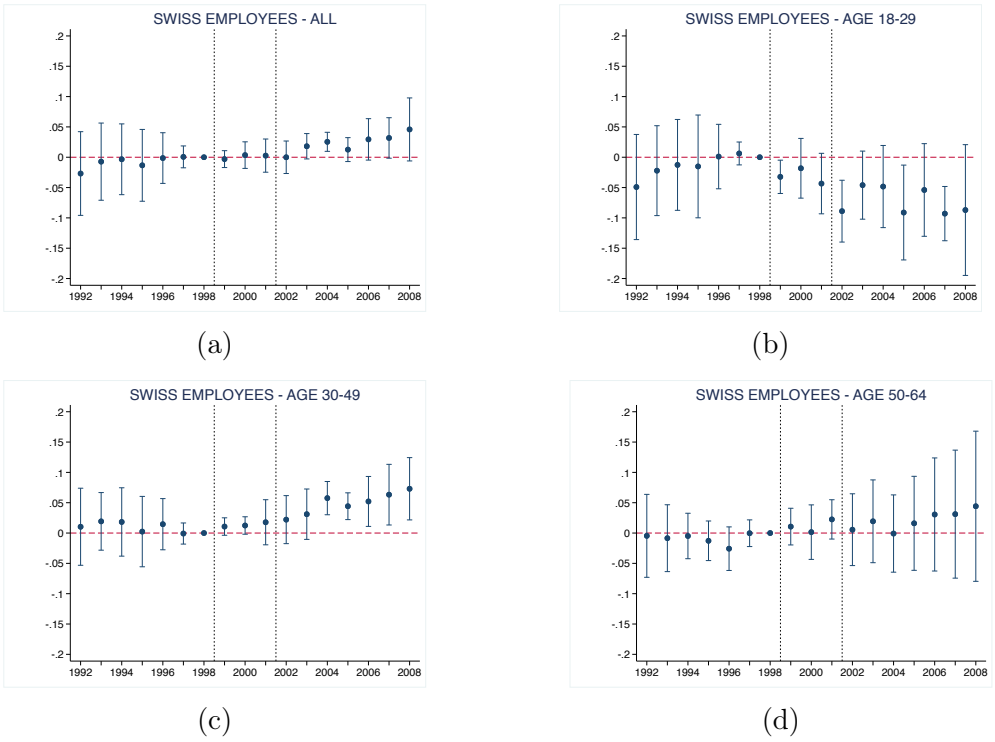


Figure A.9: Swiss employees' (log) real monthly earnings – Dynamic DiD model

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2), when the outcome variable is the logarithm of real total monthly earnings. Panel (a) refers to the full sample of Swiss male employees in private sector firms with at least two employees, while panels (b)–(d) focus on different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients β_k (k = 1992,..., 1997, 1999, ..., 2008) 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) 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 following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

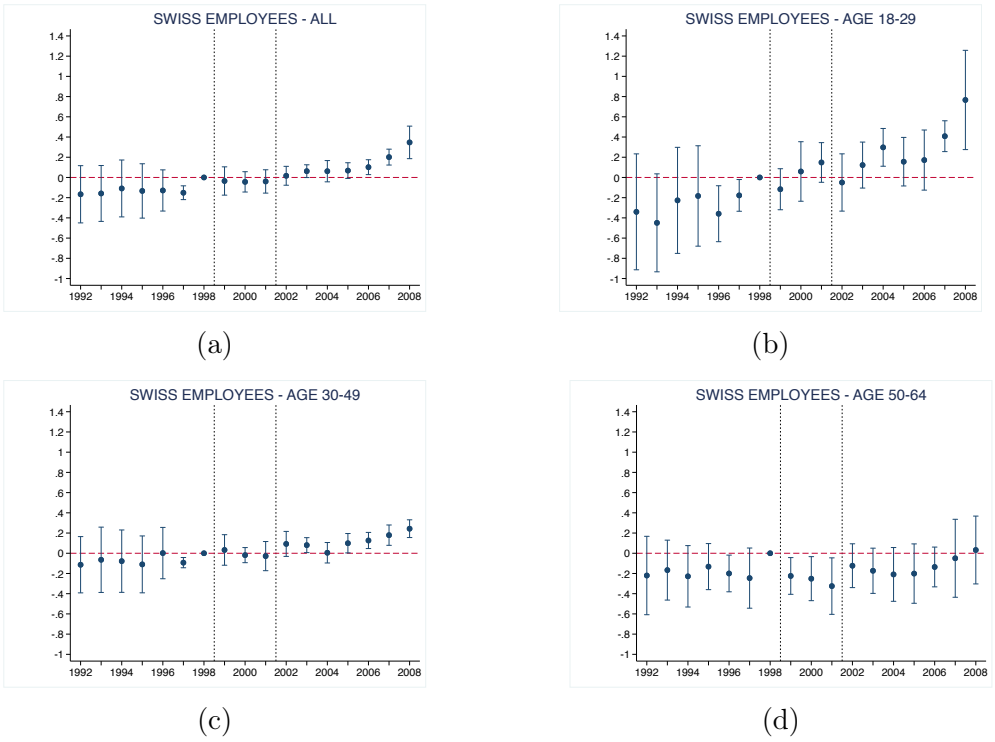


Figure A.10: Swiss employees' months worked – Dynamic DiD model

Notes: This figure shows the estimates from the dynamic difference-in-differences model (2), when the outcome variable is the number of months worked every year by each employee. Panel (a) refers to the full sample of Swiss male employees in private sector firms with at least two employees, while panels (b)–(d) focus on different age groups (18–29; 30–49; 50–64). Each graph shows the estimates of the coefficients β_k (k = 1992,..., 1997, 1999, ..., 2008) 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) 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 following the announcement of the AFMP, while the second line (between 2001 and 2002) identifies the period characterized by its full enactment.

Appendix B Additional Tables

Table B.1: Treated and untreated sectors

	Share treated occupations	Share of Italian employees 1992	1998	2002	2008
Panel A: Treated Sectors					
Information Technology and Auxiliary to Trade	78.05%	33.42%	32.00%	35.40%	51.57%
Leather Industry	65.97%	66.67%	52.44%	66.67%	56.25%
Legal Assistance	64.64%	8.63%	8.97%	9.52%	13.01%
Hotels, restaurants	59.90%	30.40%	24.95%	33.22%	41.30%
Art, Theater, Entertainment	50.33%	28.65%	26.29%	32.21%	53.73%
Chemical Industry	48.01%	46.41%	45.31%	54.14%	62.35%
Communication and Transports	43.61%	42.70%	38.91%	40.82%	40.76%
Construction, Engineering and Architecture	36.19%	55.72%	48.76%	51.16%	52.85%
Panel B: Untreated Sectors					
Wholesale Trade	23.94%	32.87%	40.69%	43.71%	48.36%
Textile Industry	22.02%	68.20%	64.64%	63.47%	74.47%
Jewelry Industry	21.43%	47.98%	42.63%	42.27%	50.34%
Minerary Industry	20.15%	55.53%	48.95%	52.34%	58.54%
Metallurgic Industry	19.67%	54.17%	47.92%	52.82%	56.63%
Graphic Industry	18.92%	32.44%	31.32%	26.00%	33.33%
Retail Trade	8.64%	45.99%	41.36%	42.27%	50.39%
Domestic Services	5.74%	39.13%	43.21%	39.53%	39.32%
Wood Industry	1.26%	47.32%	36.61%	35.06%	32.83%
Wine and Drinks Industry	0.00%	49.09%	58.06%	55.56%	35.71%

Notes: This table reports the share of employees in treated occupations in each sector according to data from the Swiss Labor Force Survey (first column) and the share 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:* Our calculations on data from *SLFS* and *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
Panel A: Treated Sectors												
Swiss Employees												
Share	50.37%	53.32%	45.29%	63.42%	65.60%	49.58%	46.35%	50.33%	42.87%	44.11%	47.44%	47.23%
(Log) Real Monthly Wage	3.58	3.56	3.60	3.22	3.09	3.02	3.76	3.74	3.80	3.78	3.76	3.79
	(0.91)	(1.01)	(1.02)	(0.82)	(0.97)	(0.97)	(0.85)	(0.92)	(0.91)	(0.98)	(1.06)	(1.05)
(Log) Entry Wage at New Job	3.48	3.51	3.45	3.21	3.24	3.08	3.68	3.68	3.68	3.69	3.63	3.60
	(0.86)	(0.87)	(0.95)	(0.79)	(0.82)	(0.89)	(0.82)	(0.82)	(0.87)	(1.02)	(0.99)	(1.12)
Transitions to Inactivity	1.55%	1.67%	2.02%	1.99%	2.95%	4.55%	0.81%	0.78%	0.99%	2.75%	2.32%	2.03%
Italian Employees												
Share	41.21%	38.27%	45.50%	28.27%	26.34%	39.54%	43.28%	39.91%	47.81%	52.17%	47.23%	45.83%
(Log) Real Monthly Wage	3.64	3.65	3.58	3.39	3.28	3.20	3.71	3.73	3.67	3.66	3.70	3.71
	(0.61)	(0.71)	(0.78)	(0.66)	(0.76)	(0.78)	(0.55)	(0.66)	(0.75)	(0.66)	(0.73)	(0.76)
(Log) Entry Wage at New Job	3.57	3.60	3.53	3.31	3.31	3.28	3.65	3.66	3.61	3.63	3.67	3.59
	(0.63)	(0.70)	(0.71)	(0.71)	(0.70)	(0.69)	(0.55)	(0.65)	(0.68)	(0.66)	(0.75)	(0.77)
Transitions to Inactivity	0.78%	0.75%	0.64%	0.85%	1.60%	0.83%	0.26%	0.30%	0.37%	1.85%	1.23%	1.30%
Panel B: Untreated Sectors												
Swiss Employees												
Share Swiss	43.71%	45.47%	41.00%	56.40%	60.48%	50.92%	38.86%	41.34%	38.11%	38.67%	39.83%	38.77%
(Log) Real Monthly Wage	3.66	3.65	3.68	3.28	3.25	3.19	3.85	3.82	3.85	3.90	3.87	3.89
	(0.74)	(0.77)	(0.79)	(0.71)	(0.74)	(0.78)	(0.62)	(0.65)	(0.67)	(0.77)	(0.83)	(0.82)
(Log) Entry Wage at New Job	3.47	3.47	3.48	3.29	3.33	3.23	3.67	3.62	3.66	3.59	3.40	3.63
	(0.70)	(0.72)	(0.79)	(0.64)	(0.64)	(0.70)	(0.64)	(0.72)	(0.78)	(0.90)	(0.88)	(0.91)
Transitions to Inactivity	1.00%	1.21%	1.41%	1.15%	1.44%	2.44%	0.54%	0.78%	0.75%	1.86%	1.91%	1.89%
Italian Employees												
Share	49.18%	47.36%	51.39%	36.72%	31.21%	38.15%	52.65%	50.42%	54.36%	57.31%	56.62%	56.53%
(Log) Real Monthly Wage	3.64	3.66	3.64	3.40	3.38	3.33	3.71	3.71	3.70	3.70	3.73	3.71
	(0.48)	(0.50)	(0.56)	(0.52)	(0.57)	(0.60)	(0.41)	(0.43)	(0.49)	(0.53)	(0.55)	(0.61)
(Log) Entry Wage at New Job	3.54	3.60	3.57	3.33	3.36	3.35	3.61	3.69	3.63	3.64	3.59	3.63
	(0.52)	(0.53)	(0.53)	(0.60)	(0.58)	(0.56)	(0.43)	(0.47)	(0.47)	(0.55)	(0.58)	(0.61)
Transitions to Inactivity	0.43%	0.42%	0.24%	0.20%	0.58%	0.37%	0.16%	0.19%	0.08%	1.25%	0.82%	0.56%

Notes: This table shows descriptive statistics for our sample of private sector male employees in firms with at least two employees. 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: Our calculations on data from 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)
Panel A: (Log) real monthly wages				
treated × transition	0.015	0.010	0.022	0.001
	(0.024)	(0.040)	(0.022)	(0.024)
treated × post2002	0.035	0.024	0.042	0.023
	(0.029)	(0.055)	(0.028)	(0.030)
N	134455	16667	83170	34617
Mean in 1998 (T)	3.64	3.31	3.71	3.67
Mean in 1998 (U)	3.66	3.38	3.71	3.72
Panel B: Probability of inactivity				
treated × transition	-0.005	-0.013*	-0.003	-0.003
	(0.003)	(0.007)	(0.002)	(0.006)
treated × post2002	-0.001	-0.010	-0.000	0.011
	(0.003)	(0.007)	(0.001)	(0.010)
N	132954	16367	81877	34709
Mean in 1998 (T)	0.78%	1.46%	0.10%	1.91%
Mean in 1998 (U)	0.41%	0.00%	0.13%	1.23%

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) when treatment status and age are fixed in 1998 ("frozen" model). Column (1) reports the estimates for the full sample of Italian male employees in private sector firms with at least two employees, while Columns (2)-(4) focus on different age groups (18–29; 30–49; 50–64). Panel A refers to wages, while panel B to the probability of becoming inactive. All models include sector, district, year, and (only for 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 (log) 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 average shares of Italian employees becoming inactive in Ticino. 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 × transition	-0.005	0.001	0.011
	(0.042)	(0.012)	(0.030)
treated × transition × high	-0.004	0.081**	0.052
	(0.046)	(0.038)	(0.066)
treated × post2002	-0.021	0.031	0.096
	(0.037)	(0.040)	(0.073)
treated × post2002 × high	0.132**	0.046	-0.076
	(0.054)	(0.032)	(0.062)
N	33505	76354	27525
Mean in 1998 (T)	3.31	3.78	3.83
Mean in 1998 (U)	3.38	3.85	3.92

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) when treatment status and age are fixed in 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 employees active in 1998. Columns (1)-(3) report the estimates for Swiss male employees in private sector firms with at least two employees, distinguishing between 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 (log) real monthly wages of Swiss employees by age group in 1998 in treated (T) and untreated (U) sectors, respectively.
Significance levels: *** $p < 0.01$; ** $0.01 \leq p < 0.05$; * $0.05 \leq p < 0.10$.

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)
Panel A: At same firm as 1998				
treated × transition	0.001	-0.004	0.012	-0.008
	(0.024)	(0.039)	(0.022)	(0.024)
treated × post2002	0.020	0.027	0.016	0.034
	(0.041)	(0.064)	(0.032)	(0.060)
N	82404	15292	45618	21494
Panel B: Changing employer				
treated × transition	0.022	0.008	0.020	0.122***
	(0.018)	(0.029)	(0.025)	(0.031)
treated × post2002	0.051***	0.040	0.070**	0.097**
	(0.017)	(0.030)	(0.024)	(0.039)
N	65760	23776	34943	7041
Mean in 1998 (T)	3.56	3.20	3.70	3.74
Mean in 1998 (U)	3.65	3.28	3.82	3.88

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) when treatment status and age are fixed in 1998 ("frozen" model). Column (1) reports the estimates for the full sample of Swiss male employees in private sector firms with at least two 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 (log) real monthly wages of Swiss employees by age group in 1998 in treated (T) and untreated (U) sectors, respectively. Significance levels: *** $p < 0.01$; ** $0.01 \leq p < 0.05$; * $0.05 \leq p < 0.10$.

Table B.6: 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 × transition	0.001	-0.045*	0.014	0.009	-0.019	0.022
	(0.013)	(0.022)	(0.015)	(0.016)	(0.027)	(0.013)
treated × post2002	-0.007	-0.026	0.008*	0.015	0.013*	0.014
	(0.020)	(0.028)	(0.004)	(0.010)	(0.006)	(0.010)
N	194171	87740	102370	182654	84022	94378
Mean in 1998 (T)	3.47	3.22	3.76	3.61	3.49	3.72
Mean in 1998 (U)	3.56	3.32	3.79	3.62	3.47	3.69

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 male employees in private sector firms with at least two employees, while Columns (4)-(6) refer to Italian 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 (log) 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.7: 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)
Panel A: Employee in Private Sector					
treated × transition	-0.002	0.001	-0.001	0.004	0.042**
	(0.011)	(0.007)	(0.007)	(0.007)	(0.020)
treated × post2002	-0.023***	0.008**	0.010**	0.013***	0.067***
	(0.006)	(0.004)	(0.004)	(0.005)	(0.012)
Mean in 1998 (T)	83.85%	90.47%	90.12%	90.26%	77.93%
Mean in 1998 (U)	89.38%	92.20%	94.62%	94.55%	78.21%
Panel B: Inactive					
treated × transition	0.002	-0.001	-0.004***	-0.004*	-0.006
	(0.003)	(0.001)	(0.001)	(0.002)	(0.006)
treated × post2002	0.008***	-0.001	-0.003***	-0.006***	-0.019***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.004)
Mean in 1998 (T)	2.25%	0.66%	1.30%	0.76%	4.73%
Mean in 1998 (U)	1.00%	0.54%	0.70%	0.72%	4.36%
Panel C: Exit					
treated × transition	-0.001	-0.001	0.002	-0.001	-0.035**
	(0.009)	(0.007)	(0.007)	(0.006)	(0.016)
treated × post2002	0.015***	-0.004	-0.004	-0.005	-0.046***
	(0.005)	(0.003)	(0.003)	(0.004)	(0.011)
Mean in 1998 (T)	8.45%	5.56%	5.50%	6.49%	15.76%
Mean in 1998 (U)	6.03%	5.48%	3.59%	3.59%	16.95%
Panel D: To Public Sector					
treated × transition	0.001	0.001	0.003	0.002	-0.001
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
treated × post2002	-0.000	-0.002	-0.003	-0.002	-0.002
	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Mean in 1998 (T)	5.45%	3.31%	3.08%	2.48%	1.58%
Mean in 1998 (U)	3.60%	1.79%	1.10%	1.15%	0.48%

Notes: This table shows the estimates of the marginal effects of the difference-in-differences coefficients of the multinomial logit model (4) (see Appendix C) for the probability of changing labor market status for Swiss male employees in private sector firms with at least two employees. According to this model specification, a private sector employee can remain employed, become inactive (i.e., out of the labor force or long-term unemployed in Ticino), leave the dataset, or move to the public sector. The model includes sector, district, and year fixed effects. Robust standard errors are two-way clustered at sector and year level. The last two rows of each panel display the shares of employees remaining employed (Panel A), becoming inactive (Panel B), leaving the dataset (Panel C), or moving to the public sector (Panel D) in 1998 by age group in treated (T) and untreated (U) sectors, respectively.
Significance levels: *** $p < 0.01$; ** $0.01 \leq p < 0.05$; * $0.05 \leq p < 0.10$. $N = 238,131$ observations.

Table B.8: Swiss employees' (log) real monthly wages upon changing firm (1992-2008)

	All	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)	(4)
treated × transition	0.038	0.006	0.083	0.164***
	(0.043)	(0.039)	(0.049)	(0.050)
treated × post2002	0.066	0.003	0.097*	-0.004
	(0.050)	(0.054)	(0.047)	(0.092)
N	11890	4323	5144	942
Mean in 1998 (T)	3.49	3.21	3.63	3.76
Mean in 1998 (U)	3.48	3.37	3.65	3.39

Notes: This table shows the estimates of the difference-in-differences coefficients of model (3) for the wages earned by Swiss employees in the first year after moving to a different (private sector) firm. Column (1) reports the estimates for the full sample of Swiss male employees in private sector firms with at least two 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 value of the average (log) real monthly wages earned by Swiss employees upon arrival at a new firm 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.9: Swiss employees' labor market outcomes (1992-2008) - Triple difference-in-differences model

	All	Age 18-29	Age 30-49	Age 50-64
	(1)	(2)	(3)	(4)
Panel A: (Log) real monthly wages				
treated × transition	-0.017	-0.027	-0.029	0.021
	(0.019)	(0.040)	(0.026)	(0.020)
treated × transition × border	0.041***	0.005	0.065***	-0.012
	(0.009)	(0.031)	(0.018)	(0.048)
treated × post2002	0.002	-0.042	-0.011	0.021
	(0.025)	(0.053)	(0.029)	(0.037)
treated × post2002 × border	0.021	-0.045	0.074***	-0.025
	(0.014)	(0.054)	(0.023)	(0.056)
N	243250	68546	122433	47710
Mean in 1998 (T)	3.56	3.20	3.70	3.74
Mean in 1998 (U)	3.65	3.28	3.82	3.88
Panel B: Probability of inactivity				
treated × transition	-0.000	0.007*	-0.004***	-0.002
	(0.001)	(0.004)	(0.001)	(0.004)
treated × transition × border	-0.003**	-0.007	0.002	-0.004
	(0.001)	(0.005)	(0.002)	(0.003)
treated × post2002	-0.001	0.005	-0.001	-0.007
	(0.002)	(0.005)	(0.002)	(0.005)
treated × post2002 × border	0.003***	0.008***	0.002	0.002
	(0.001)	(0.002)	(0.001)	(0.005)
N	227844	61432	119735	46677
Mean in 1998 (T)	1.73%	2.61%	1.00%	2.46%
Mean in 1998 (U)	1.11%	1.10%	0.64%	2.29%

Notes: This table shows the estimates for an alternative version of model (3), in which we consider also the role of distance from the border using a triple difference-in-differences estimator. Border municipalities are those whose distance from the nearest border crossing office is at most 5 km. Column (1) reports the estimates for the full sample of Swiss male employees in private sector firms with at least two employees, while Columns (2)-(4) focus on different age groups (18–29; 30–49; 50–64). Panel A refers to wages, while panel B to the probability of becoming inactive All models include sector, district, year, and (only for wages) individual fixed effects, plus a linear and a quadratic age term and all the further interaction terms. Robust standard errors are two-way clustered at sector and year level. 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, leaving the dataset, or moving to the public sector:

$$S_{iast} = \alpha + \sum_{a=0}^{4} \eta_{1,a} treated_{it} \times transition_t \times age_a + \sum_{a=0}^{4} \eta_{2,a} treated_{it} \times post2002_t \times age_a + \chi_d + \lambda_s + \mu_t + \epsilon_{iast} \tag{4}$$

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 (λ_s), year (μ_t), and district (χ_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 $treated_{it} \times transition_t$ and $treated_{it} \times post2002_t$ 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 employees entering the labor market after the policy change and further reducing the sample size.

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