The Equilibrium Effects of Workers' Outside Employment Options: Evidence from a Labour Market Integration *

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Abstract

We study a reform that eased cross-border commuting from France to the high-wage Swiss labour market. Using a difference-in-differences strategy comparing the French border region with the unaffected French inland, we find that cross-border commuting increases, in particular among high-skill workers, while wages of mid- and low-skill workers in the French border region rise and employment increases for low-skill workers. Increased labour supply more than offsets the commuting outflow: the labour force grows by about four per cent through population growth and higher participation. On the demand side, firms' sales, material costs and labour costs increase in tandem, leaving the labour share unchanged. Sales growth is strongest in sectors serving local customers, but a subset of tradable industries expand near the Swiss border, pointing to cross-border complementarities. The results show that local labour markets can expand when exposed to increased competition for workers as both labour supply and demand for firms' output adjust.

JEL classification: J08, J21, J31, J60, J64, R23.

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1 Introduction

In most theories of the labour market, better outside employment options increase workers' wages. How outside options impact aggregate employment, however, is ambiguous. Access to jobs with higher wages can raise labour supply. Labour demand, however, faces countervailing forces: tighter labour markets may reduce hiring at incumbent firms, but can also trigger industry reallocation and expansion from higher local spending. Empirically disentangling these adjustment channels is crucial for understanding how local labour markets react to shocks and policy changes. For example, these channels matter for analysing labour market policies like minimum wages (Dube and Lindner, 2021) and immigration restrictions (Dustmann et al., 2017), as well as changes in mobility costs through improved transport infrastructure (Baum-Snow, 2007; Bütikofer et al., 2022) or cross-border commuting restrictions (Beerli et al., 2021).

In the present paper, we study the effects of a labour market integration between France and Switzerland's border regions. The reform, announced in 1998, removed several restrictions on cross-border commuting between the two countries. For French workers, this meant better access to nearby Swiss jobs, allowing them to boost their wages by 20 per cent when switching from a French to a Swiss job. As a result of the reform, between 1999 and 2007, the number of French residents with Swiss jobs increased by around 40,000—almost four per cent of the workforce in the French areas whose residents were eligible to work in Switzerland.

Using a difference-in-differences research design, we study the effects of the reform by comparing treated French labour markets in the border region to a matched set of control labour markets in the unaffected French inland.

Our matching strategy assumes the reform was exogenous conditional on pre-reform wage trends in the treated region. The assumption is plausible because the reform was decided between Switzerland and the European Union—there was no room for local interests to shape the policy details. We provide three pieces of supporting evidence. First, an alternative matching approach that assumes exogeneity only with respect to cross-sectional variables produces similar results and shows no evidence of pre-trends. Second, results are robust to an alternative control group

based solely on distance to Switzerland. Third, a placebo analysis at the French-Spanish border reveals no effects.

We document the reform's effect on i) cross-border commuting, ii) the equilibrium change in wages and employment in France, iii) the adjustment of labour supply in France, and iv) the adjustment of French firms' sales and input costs.

Even though residents with different education levels had substantial wage gains from getting a Swiss job, it is mainly the highly educated ones who start commuting more: their commuting propensity increases by 2.8 percentage points in eligible labour markets—a 30 per cent increase relative to the pre-period.

We estimate the effects of the reform on wages paid in the treated French labour markets with two methods that are robust to compositional changes in the French workforce. We document a robust increase of wages between 1 and 2.2 percent in the first eight years of the reform. The wage effects are concentrated among low- and mid-skill workers (roughly 2 to 2.5 per cent), while high-skill workers' wages do not rise on average.

Despite the increase in cross-border commuting and higher wages in the treated region, we find no evidence of declining employment at French firms. If anything, there is an imprecise increase in employment of around 1.5 per cent. This stems from an increase in low-skill employment of four to six per cent, while there is no evidence of declining mid- and high-skill employment.

The results thus raise two key issues. First, why did employment in the French border region not fall despite higher wages and increased commuting to Switzerland? Second, there is a disconnect between wage increases and commuting patterns: high-skill workers increase their commuting, while wage effects are concentrated among low- and mid-skill workers.

Before turning to adjustment mechanisms, we disaggregate results by industry skill intensity, which reveals that the aggregate patterns mask offsetting forces across sectors. High-skill intensive industries both expand employment and raise wages for high-skill workers. Low-skill intensive industries both expand employment and raise wages for low-skill workers. In contrast, mid-skill intensive industries contract: mid-skill employment falls, with mid-skill workers reallocating toward high-skill and low-skill intensive sectors where their employment rises. In

particular, the absence of high-skill wage gains on average masks rising wages in expanding high-skill intensive industries, offset by stagnation in mid- and low-skill intensive sectors.

To understand how wages and employment can rise together despite the commuting outflow, we examine the adjustment of labour supply and demand. On the supply side, the labour force increases by about four percent—amounting to almost 100,000 workers. This vastly overcompensates for the outflow of commuters to Switzerland and explains why both commuting to Switzerland and local French employment increase. The increase in the local labour force reflects two margins. First, population rises, driven by workers with tertiary and mandatory education. Second, labour force participation increases, driven mainly by workers with mandatory education and women, with a smaller rise among workers with secondary education.

On the demand side, we examine firms' balance sheets. Sales, material costs, and labour costs all rise roughly in proportion to each other, indicating a stable labour share alongside increased production rather than higher prices. The stability of the labour share holds across nearly all sectors and skill intensity groups. Sales growth is strongest in sectors that primarily serve local and regional customers. In the tradable sector, sales grow in both low- and high-skill intensive industries, with growth concentrated near the Swiss border. Productivity gains appear not in expanding industries but in mid-skill intensive industries with stable sales, where firms rationalised employment rather than expanded output.

Overall, despite increased commuting to Switzerland, the labour market integration led to a local boom in output and employment in France. The commuting outflow was more than offset by population and participation responses, and the resulting increase in local demand—fuelled by population growth and higher commuter earnings—enabled sectors primarily serving local markets to expand. In tradable industries, the concentration of growth near the Swiss border points to cross-border complementarities with expanding Swiss industries. The stability of the labour share across nearly all sectors and skill intensity groups suggests that adjustment occurred through output demand growth shifting labour demand, rather than through competition for workers compressing firms' wage markdowns.

Underlying the overall growth of the border region was substantial reallocation. High- and low-skill intensive industries expanded and deepened their specialisation in labour inputs, while mid-skill intensive industries stagnated and rationalised production, achieving higher productivity. The sectoral disaggregation also shows that high-skill wage gains are not absent, but appear in expanding high-skill intensive industries.

Our paper contributes to the literature on the effects of workers' outside options. Caldwell and Danieli (2024) and Caldwell and Harmon (2018) study the effects at the level of individual workers. Schubert et al. (2021) and Beaudry et al. (2012)—exploiting within-location, cross-industry variation—study the partial equilibrium effects. Our paper—exploiting cross-location variation—studies the local general equilibrium effects, similar to Green et al. (2019) and Dodini et al. (2022). The latter shares many institutional similarities with our setting—such as that the employment options improve in nearby jobs, and affect a broad set of workers. Despite this, we document substantially different results, which we argue stem from i) a strong labour supply response, ii) an expansion of local demand, and iii) cross-border complementarities in tradable industries. Documenting these adjustments is possible from our combined use of employer-employee records, survey data, and firm balance sheets. The survey data capture population and labour force participation, which registry data alone would miss. Firm balance sheets allow us to examine how firms adjusted sales and input costs. However, a shortcoming of our setting is the lack of full-count registry data with a longitudinal link, which limits our ability to track individuals.

Our paper further contributes to recent work on commuting policies. The same policy in Switzerland was analysed by Beerli et al. (2021), Dumeignil (2021), and Dicarlo (2022). Compared to these studies, our paper focuses on aggregate effects at the commuters' origin, and highlights the importance of the labour supply adjustment—similar to Dustmann et al. (2017). Closest to our paper is Bütikofer et al. (2022), who study the impact of the opening of the Öresund bridge between Malmö and Copenhagen—but there are two differences. First, in our case, new jobs became accessible much closer to the affected workers than in their case.[1]

[1]We cannot directly compare commute times for a representative sample of workers, but the

We will show that this led to a gender gap in commuting in their case but not in ours. Second, we provide new evidence on how labour demand responded to the increased outside options.

2 The labour market integration

In late 1998, Switzerland and the European Union (EU) announced seven bilateral agreements that were signed in June 1999. After passing the European and Swiss parliaments as well as a referendum in Switzerland, the agreements took effect in June 2002—but as we discuss below, there were anticipation effects starting from 1999. The focus of our analysis is the Agreement on the Free Movement of Persons, which granted EU and Swiss citizens the right to live and work across borders. In practice, given the substantially higher cost of living in Switzerland, French workers found it more attractive to commute across the border than to relocate.[2]

Even though the labour market integration was negotiated, it was unlikely to be driven by particular interests in the French-Swiss border region—because the EU's negotiating position was based on two principles: that all agreements became active at the same time, and that they were in line with existing rules within the EU (Bundesrat, 1999, p. 6139). Therefore, the integration was a consequence of the free movement of people that had already existed within the EU and that allows cross-border commuting.

A set of other agreements simultaneously increased mutual market access in specific sectors:[3] Air and land traffic were liberalized; Swiss public entities were required to tender internationally; and in some manufacturing sectors, product approval processes were eased, reducing the fixed cost of trade. The trade reform covered sectors that already had similar agreements within the EU. This allows us to estimate differential effects by exposure to the reform and test directly whether

minimum commute time is lower for the French border region, as commuters from Malmö always have to cross the Öresund bridge, while large parts of the French border region to Switzerland does not face such a physical barrier.

[2]This difference in cost of living led to a higher number of French commuters than migrants in Switzerland even before the labour market integration, and that gap widened afterwards.

[3]See Table A1 for details.

the trade agreement had a confounding effect on border labour markets.

Cross-border commuting was possible before the reform, but there were two main restrictions. The first restriction was geographic: a border region, primarily consisting of municipalities within a 10 km buffer of the border,[4] was established in 1946. Since then, only residents of these border municipalities were eligible to work in Switzerland as cross-border commuters. The second restriction required Swiss firms to first seek a worker within Switzerland before hiring a cross-border commuter.[5][6]

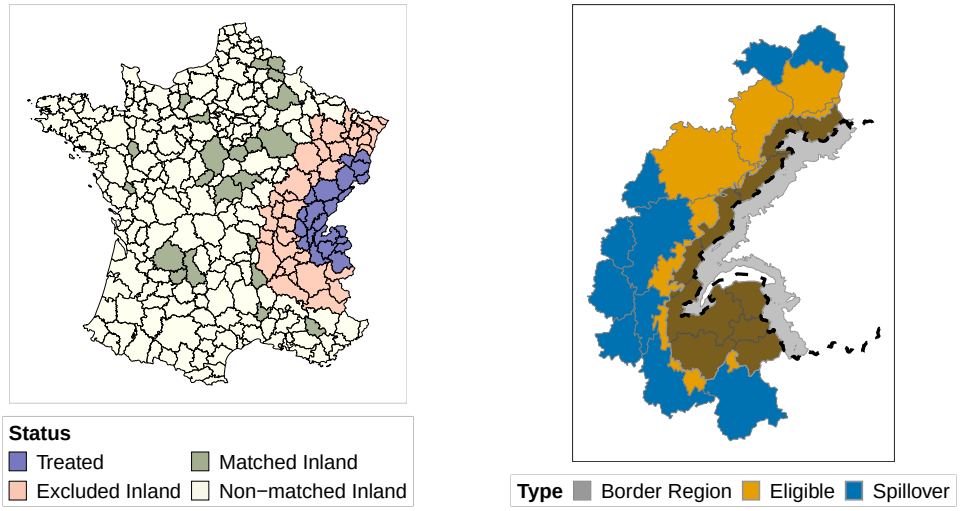
The restrictions were removed in three steps.[7] First, the transition phase from 1999 to 2003 eased labour mobility in the border region: Weekly instead of daily commuting became possible; the duration of a work permit was extended from one to five years; and it became possible to change workplaces in Switzerland. Further, internal migrants moving to the border region from other parts of France no longer had to wait six months before they could get a Swiss job. During this transition phase, anticipation effects were likely: Swiss authorities handled permit applications more leniently following the integration announcement (Beerli et al., 2021), and French residents were aware of the integration by late 1999 (Merckling, 1999). Second, in June 2004, mobility within the border region became fully free as Swiss firms were no longer required to search for a suitable worker in the Swiss labour market before hiring a cross-border commuter. Third, in June 2007, the border region was abolished, allowing workers to commute from anywhere in France to anywhere in Switzerland.

[4]The exception was the department of Haute Savoie, which also belonged to the border region.

[5]Firms had to submit an application to the cantonal authorities, and the whole process could take several months; see Beerli et al. (2021, p. 983) for more details.

[6]Although it was theoretically possible to commute from Switzerland to France, few Swiss did so: In 2000, approximately 0.03 per cent of the Swiss labour force in the border region worked in France. From 2002 to 2008, the number of Swiss border workers living in Switzerland and working abroad increased from 6000 to 9000 (Beerli et al., 2021, table A.2). This includes commuters to all countries neighbouring Switzerland and is an order of magnitude smaller than the increase in the number of commuters from France to Switzerland.

[7]Other regulations did not change. In particular, regulations for unemployment insurance and pension contributions remained the same, but cross-border commuters were required to register with Swiss health insurance after the reform. The taxation of commuters also remained unchanged, as it is based on older treaties between Switzerland and France: French commuters pay taxes in France unless they work in Geneva. See Appendix A.2.2 for details.



(a) The treated and matched labour markets (b) Border Region

Figure 1
The Swiss and French labour markets

Notes: Panel 1a shows the local labour markets in France by treatment status. *Treated* markets are shown in more detail in Panel 1b. *Excluded inland* refers to labour markets excluded from the pool of potential controls. *Non-matched Inland* are labour markets from the pool of potential controls that were not matched, and *Matched Inland* represents the control labour markets selected through the matching strategy.
Panel 1b shows the labour markets along the Swiss-French border. The black dashed line represents the border between France and Switzerland. The grey area includes the French and Swiss border municipalities where cross-border commuting is allowed. Labour market types are color-coded based on exposure to the integration: yellow indicates markets directly exposed to integration by having at least one municipality in the border region, and blue indicates neighbouring markets potentially affected by spillovers.

Figure 1a presents local labour markets in mainland France, coloured by matching status. The four groups are treated markets (purple, along the Swiss border), matched inland controls (green), excluded inland (rose), and non-matched inland (beige).

Figure 1b provides a more detailed view of the treated labour markets along the French-Swiss border. The black dashed line represents the Swiss border. The border region where cross-border commuting is permitted is shown in grey. French labour markets that include at least one municipality within the border region—the eligible labour markets—are shown in yellow. In addition, French labour markets within 84 km of the Swiss border, likely affected by spatial spillover effects but not eligible for cross-border commuting, are shown in blue. Together, the eligible (yellow) and spillover (blue) areas constitute the treated labour markets in France.

Our analysis focuses on the years up to 2007, capturing the long-term restructuring of the local labour market following the reform. We exclude the period after 2007, when the appreciation of the Swiss Franc further amplified cross-border wage differences.

3 Data and Empirical design

3.1 The data sources

Our analysis relies on microdata aggregated at the labour market cell level, where a cell is defined by local labour market,[8] year, demographics (e.g., skill, education, and/or gender), and—in some specifications—industry type. We classify industries along two dimensions: broad sector—tradable (e.g., manufacturing and business services), construction, non-tradable (e.g., retail), and other (e.g., utilities)—and skill intensity, defined as the share of high-skill workers at the 4-digit industry level in the pre-treatment period. Appendix B provides details on both industry classifications and summary statistics on employment shares and skill composition.

We use a range of data sets and describe below the main variables we construct from the microdata. More details on sample selection and variable construction are provided in Appendix B.

Matched employer-employee data The main data to measure employment and wages come from social security declarations by employers (*DADS*) from 1995 to 2007. For each year, the data report employment spells at the worker-establishment level. For each spell, the data report salary, hours worked, gender, age, occupational category, municipality of work and residence, and each spell's start and end date.

We construct hourly wages from salary and hours, winsorised at the 1st and 99th percentiles. We define skill groups based on workers' two-digit occupational classification. High-skill occupations include managers, executives, scientists, engineers, and lawyers; mid-skill occupations include technicians, foremen, skilled

[8] There are 297 local labour markets in France.

blue-collar workers and administrative employees; low-skill occupations include unskilled blue- and white-collar workers (craft, manufacturing, sales clerks).

We measure cell-level employment as the count of workers employed on June 30 each year, including part-time workers.

Because the reform likely impacts who works in France, we measure wages paid in France in two ways that are robust to compositional changes in the French workforce. In our main approach, we use the *DADS Postes* dataset, which has salary information on all workers employed in year t. However, the salary information for $t-1$ is only available if the worker was employed at the same establishment in both $t-1$ and t.[9] Given this restriction, we construct an index of within-worker, within-establishment wage growth at the cell level. To compute this index, we first residualise wages with respect to gender, age, and calendar year. Then, we measure the average change in residual wages of workers employed at the same establishment in two consecutive years, aggregate at the cell level, and accumulate across years relative to 1998.

In the second approach, we use the *DADS Panel* dataset, a four per cent sample of the full-count DADS data. Rather than aggregating to the cell level, we estimate wage changes at the worker level, flexibly controlling for worker and firm fixed effects. The resulting sample of approximately 74,000 workers is too small to estimate effects in detailed subgroups, so we use the Panel only to complement our main results.

Census and Labour Force Survey While the administrative social security data only include workers who are employed in France, the Census and the Labour Force Survey cover the entire resident population, including cross-border commuters and persons out of the labour force. We restrict the sample to persons aged 16 to 64. We group workers into three education groups based on their highest degree: mandatory education, secondary education, and tertiary education.

[9] In later years the salary information from the previous year is also available if the employer changes, but not during our main analysis period.

Census We use data from the French *Census* from 1982, 1990, 1999, 2006, and 2007, where 1999 is the base year.[10] From the Census, we measure population, employment in France and Switzerland, unemployment, and labour force participation at the cell level.

Labour force survey We use the years from 1993 to 2002 to analyse the wage premium of Swiss jobs for French residents and to document cross-border commuting at an annual frequency. Because a survey redesign in 2002 breaks comparability with earlier years, we use the Labour Force Survey only to study the first years after the reform was announced.

Firm balance sheets We construct firm-level outcomes from the *FICUS* database, which contains detailed annual balance sheet data. Firm characteristics such as headquarters municipality, unique firm identifier, and five-digit industry classification (NACE) are also recorded. We follow the data cleaning and preparation of Gopinath et al. (2017) and use the balance sheet data to measure sales, value added, and input costs (materials and labour).

Swiss administrative data We also use Swiss administrative data on cross-border commuters in Switzerland to show annual trends in cross-border commuting near the French border.

3.2 Empirical design: Swiss side

We study how commuting in the border region of Switzerland with France evolves using a difference-in-difference strategy similar to Beerli et al. (2021). The Swiss border municipalities—the grey area, on the Swiss side in Figure 1b—constitute the treated group. We exclude Swiss municipalities in the Basel cantons located in the far north, as they are proximate to both Germany and France[11]. The control

[10] The data for 1999 were collected already in March 1999, shortly after the labour market integration was announced in December 1998. To the extent that the reform already had effects in this short time period, the estimates would understate the true effects.

[11] Commuters to Switzerland in Basel are likely to a large extent from Germany given the common language.

municipalities are located within the Swiss interior and are not part of any border region with neighbouring countries.

We estimate the annual impact of the integration on the number of cross-border commuters in Swiss municipalities at the border with France. Since we expect commuters to concentrate close to the border, we let the treatment effects vary by distance from the nearest border crossing:

$$\begin{aligned} y_{mt} = \alpha_m + \alpha_t + \sum_{\tau \neq 1998} \beta_{1,\tau} \text{treat}_{\text{dist}_m < 10} \times 1[t = \tau] \\ + \sum_{\tau \neq 1998} \beta_{2,\tau} \text{treat}_{\text{dist}_m \geq 10} \times 1[t = \tau] + v_{mt} \end{aligned} \tag{1}$$

where m indicates municipality, and t indicates the year. y_{mt} is the number of cross-border commuters in the municipality relative to employment in 1998. Treatment indicators vary by whether the municipality lies within 10km from the nearest border crossing—$\text{treat}_{\text{dist}_m<10}$—or more than 10km—$\text{treat}_{\text{dist}_m\geq 10}$. We are interested in the coefficients $\beta_{1,\tau}$ and $\beta_{2,\tau}$.

3.3 Empirical design: French side

This section presents our difference-in-differences design and the matching strategy used to select control labour markets.

3.3.1 Estimating the effect of the labour market integration

We estimate the reform's effects on the French side in a set of treated labour markets that includes both markets where cross-border commuting is permitted (eligible markets) and indirectly affected neighbouring markets (spillover markets). We include the latter because the impact of the reform likely extends to neighbouring labour markets through spillovers (Manning and Petrongolo, 2017; Monte et al., 2018; Nimczik, 2020). To define the spillover markets, we first draw a belt of $\bar{d}$ kilometres around the French-Swiss border, where $\bar{d} = 84$ is the distance to the municipality in the eligible labour markets furthest from Switzerland. Then, we

select all labour markets as spillover markets if they are not eligible markets, but lie within the belt.

Figure 1b shows the 22 treated labour markets. The eligible labour markets are marked in yellow, and the spillover labour markets in blue.[12]

We first present the regression models that compare outcomes over time between treated and matched control groups, then describe the matching procedure in Section 3.3.2.

Aggregate data To estimate the aggregate impact of the integration, we use a range of difference-in-difference regression models at the level of the local labour market m. The first model estimates annual treatment effects for each year $\tau \neq 1998$ for a group of workers g:

$$y_{mt}^{g} = \alpha_{m}^{g} + \alpha_{t}^{g} + \sum_{\tau \neq 1998} \beta_{\tau}^{g} treat_{m} \times 1[t = \tau] + \gamma^{g} X_{mt}^{g} + v_{mt}^{g}. \tag{2}$$

The models are estimated separately for each worker group g. α_{m}^{g} are fixed effects for labour market m of worker group g, which account for time-constant heterogeneity at the labour market $\times$ worker group level. α_{t}^{g} are fixed effects for year t $\times$ worker group g and account for time-varying shocks that impact worker group g in the same way in the treated and in the control labour markets. The coefficients of interest are β_{τ}^{g}: They estimate the effect of the reform on workers in group g for different years. X_{mt}^{g} is a set of additional controls. First, it includes a linear time trend that, for each skill group, is specific to the matched treated-control pair of labour markets. Including the trends improves the precision of the estimates; point estimates without the trends are very similar in magnitude. Second, in robustness checks, we add further labour-market-specific observables from 1998 interacted with a linear time trend. The error term v_{mt}^{g} is orthogonal to the treatment assignment.

[12] The treated labour markets lie within a 96-minute car drive from the next French-Swiss border crossing. The median commute in France in 2004 was 12 minutes. The treated labour markets, therefore, lie within ten times the median commute, which is the distance over which Manning and Petrongolo (2017) estimate ripple effects to extend. Data on the location of border crossings have been kindly provided by Henneberger and Ziegler (2011).

Some outcomes in the census data exhibit pre-existing trends between 1990 and 1999, driven by differences in demographic composition and internal migration rates unrelated to the reform. We account for these trends by controlling for migration rates from 1990 to 1999 and labour force entries and exits based on the age distribution, interacting each control with census year indicators. Appendix B.3 provides further details.

We modify model (2) to estimate treatment effects for the two periods of the labour market integration. Similar to Beerli et al. (2021) we estimate a treatment effect for the transition period ($1999-2003$) and for the free mobility period ($2004-2007$):

$$\begin{aligned} y_{mt}^{g} =& \alpha_{m}^{g} + \alpha_{t}^{g} + \beta_{\text{transition}}^{g} treat_{m} \times 1[1999 \leq t < 2004] \\ &+ \beta_{\text{free}}^{g} treat_{m} \times 1[2004 \leq t \leq 2007] + \gamma^{g} X_{mt}^{g} + v_{mt}^{g}. \end{aligned} \tag{3}$$

where the coefficients of interest are now $\beta_{\text{transition}}^{g}$ and β_{free}^{g}. For census outcomes, this model estimates a single coefficient for the free mobility period, as the data are only available for 2006 and 2007 in the post-reform period.

We weight regressions for employment and wages by cell-level employment in 1998, and regressions for census data by cell-level resident population in 1999.

Worker-level panel data Adapting the regression models from the aggregate data to the worker panel, we estimate annual treatment effects as follows:

$$\begin{aligned} y_{it} =& \alpha_{i} + \alpha_{t}^{G(i)} + \phi_{j(i)} + \sum_{g} \sum_{\tau \neq 1998} \beta_{\tau}^{g} treat_{m(i,t)} \times 1[G(i) = g] \times 1[t = \tau] \\ &+ \sum_{g} \gamma^{g} X_{m(i,t)}^{G(i)} \times 1[G(i) = g] + v_{it}. \end{aligned} \tag{4}$$

$G(i)$ denotes the skill group g of worker i, defined by the occupation in the current spell. The labour market $m(i,t)$ is likewise defined by the worker's current spell and thus varies over time. We select workers who have at least one employment spell in a treated or control labour market during the sample period. Treatment effects are specific to the worker group g. Unlike equations (2) and (3), the parameters for different worker types are estimated in a single equation, and both the year

fixed effects and the linear time trends in $X^{G(i)}_{m(i,t)}$ are specific to the worker group $\times$ matched labour market pair. The reason for the joint estimation is to accommodate specifications that progressively add the worker fixed effect α_i and the firm fixed effect $\phi_{j(i)}$.

The fourth model is adapted from (3) for the worker-level data:

$$\begin{aligned} y_{it} =& \alpha_i + \alpha_t^{G(i)} + \phi_{j(i)} \\ &+ \sum_g \beta^g_{\text{transition}} treat_{m(i,t)} \times 1[1999 \leq t < 2004] \times 1[G(i) = g] \\ &+ \sum_g \beta^g_{\text{free}} treat_{m(i,t)} \times 1[2004 \leq t \leq 2007] \times 1[G(i) = g] \\ &+ \sum_g \gamma^g X^{G(i)}_{m(i,t)} \times 1[G(i) = g] + v_{it}. \end{aligned} \tag{5}$$

Inference We cluster the standard errors at the labour market level. In both France and Switzerland, these are defined as commuting zones by the respective statistical agencies.[13] On the French side, there are 44 clusters in the main specification. As a robustness check, we also report standard errors clustered at the next higher sub-national unit—the department. This approach results in 27 clusters, and we apply the Imbens and Kolesar (2016) correction for small numbers of clusters. In practice, the standard errors from the two approaches are very similar.

3.3.2 Matching to find a suitable control group

Equations (2) through (5) compare how outcomes evolve in areas affected by the reform, relative to areas not affected by it. Because the reform was not randomly assigned across labour markets, differences between the treatment and control groups may bias the estimated effect. To find control units[14] that are as similar as possible to the treated labour markets we use Mahalanobis matching. We match on a limited set of covariates that could influence potential outcomes after 1998.[15]

[13] *Zone emploi* in France and *ms-region* in Switzerland.

[14] To minimize the risk that spillovers across areas contaminate the control group, we consider as potential controls only labour markets that are at least 150 kilometres away from the Swiss border.

[15] Mahalanobis matching is relatively robust in various settings, in particular in small samples. However, the set of included covariates should not be too large (Zhao, 2004; Stuart, 2010). We have

To account for different labour market dynamics before the reform, we match on the index of wage growth for the three skill groups between 1995 and 1998. To account for other unobserved heterogeneity, we also match on the following covariates in the cross-section in 1998: the employment shares of the four sectors, the employment shares of the three skill groups, and the share of residents who live and work in the same labour market as opposed to other French labour markets. We refer to the latter as the own commuting share. For simplicity, we refer to the full set of variables—both levels and pre-trends—as covariates.

The resulting status of local labour markets is shown in Figure 1a. The treated markets are shown in purple, the matched control markets in green, and the excluded inland labour markets in light pink.

Table 1 presents summary statistics for the sample before and after matching. Panel A compares the treated units to all potential control units for each covariate,[16] while Panel B compares them to the matched control units. The first four columns show the means and standard deviations of the variables by treatment status. The last four columns show different overlap measures: The normalized differences and the log ratio of standard deviations indicate that the matching strategy yields control units that are more similar to the treated units than the complete set of potential controls (see also Figure A1 in Appendix C.2). Columns 7 and 8 report $\pi(c)$ and $\pi(t)$, the share of control and treated units, respectively, that fall outside the central 95% of the other group's distribution. In Panel A, $\pi(c)$ is substantial for several covariates, indicating limited overlap between the full set of potential controls and the treated units. Panel B shows that matching substantially reduces $\pi(c)$, while $\pi(t)$ increases somewhat when comparing to a smaller number of control units.

To summarize covariate balance in a single number, the second-to-last row in each panel reports the multivariate distance between treated and control units—defined as the variance-weighted difference between covariate means. Matching reduces this distance from 1.19 to 0.22, suggesting good overall balance.[17]

also experimented with adding more variables but the overall match quality worsens.

[16] We have not matched on the average log wage in 1998 but include it in the table as additional information.

[17] As a benchmark, Imbens and Rubin (2015) characterize a multivariate distance of 1.78 as substantial imbalance and 0.44 as excellent balance.

Table 1. Balance Before and After Matching

	Controls		Treated		Overlap measures			
	Mean (1)	(S.D.) (2)	Mean (3)	(S.D.) (4)	Nor Dif (5)	LRSD (6)	$\pi(c)$ (7)	$\pi(t)$ (8)
Panel A. Controls: All								
Log employment	9.84	(1.05)	10.04	(0.79)	0.22	−0.28	0.13	0.00
Share high-skill	0.14	(0.08)	0.10	(0.01)	−0.83	−1.84	0.30	0.00
Share mid-skill	0.61	(0.04)	0.62	(0.04)	0.28	−0.10	0.07	0.00
Share low-skill	0.24	(0.06)	0.28	(0.04)	0.73	−0.34	0.12	0.00
Share tradable	0.40	(0.08)	0.50	(0.11)	0.94	0.31	0.05	0.18
Share non-tradable	0.13	(0.03)	0.12	(0.03)	−0.43	0.03	0.10	0.14
Share construction	0.11	(0.02)	0.10	(0.02)	−0.05	0.19	0.06	0.14
Share other	0.36	(0.06)	0.28	(0.07)	−1.22	0.11	0.08	0.14
Wage growth high-skill	0.07	(0.02)	0.06	(0.01)	−0.51	−0.51	0.12	0.00
Wage growth mid-skill	0.07	(0.02)	0.07	(0.01)	−0.28	−0.59	0.17	0.00
Wage growth low-skill	0.07	(0.02)	0.06	(0.01)	−0.44	−0.76	0.23	0.00
Own commuting share	0.74	(0.15)	0.85	(0.06)	0.90	−1.00	0.15	0.05
Mean log wage	2.36	(0.14)	2.30	(0.04)	−0.58	−1.21	0.14	0.00
Multivariate distance					1.19			
N	238.00		22.00					
Panel B. Controls: Matched								
Log employment	9.87	(0.75)	10.04	(0.79)	0.18	0.05	0.05	0.05
Share high-skill	0.09	(0.02)	0.10	(0.01)	0.15	−0.38	0.18	0.09
Share mid-skill	0.62	(0.03)	0.62	(0.04)	0.01	0.36	0.00	0.14
Share low-skill	0.29	(0.04)	0.28	(0.04)	−0.19	0.03	0.00	0.14
Share tradable	0.47	(0.09)	0.50	(0.11)	0.32	0.25	0.00	0.14
Share non-tradable	0.12	(0.02)	0.12	(0.03)	−0.09	0.33	0.05	0.14
Share construction	0.11	(0.02)	0.10	(0.02)	−0.21	0.19	0.09	0.00
Share other	0.31	(0.06)	0.28	(0.07)	−0.37	0.14	0.05	0.09
Wage growth high-skill	0.06	(0.02)	0.06	(0.01)	−0.05	−0.03	0.05	0.05
Wage growth mid-skill	0.06	(0.01)	0.07	(0.01)	0.34	0.40	0.00	0.18
Wage growth low-skill	0.06	(0.01)	0.06	(0.01)	0.11	0.29	0.00	0.18
Own commuting share	0.86	(0.06)	0.85	(0.06)	−0.08	−0.07	0.09	0.00
Mean log wage	2.26	(0.06)	2.30	(0.04)	0.34	−0.34	0.05	0.14
Multivariate distance					0.22			
N	22.00		22.00					

Notes: The table shows balancing statistics between treatment and control for two samples. In Panel A controls are all potential controls. In Panel B controls are the matched controls. The overlap measures are: Nor Dif = normalized differences, LRSD = log ratios of standard deviations, and $\pi()$ for control and treated units. Normalized differences use the population standard deviation in the full sample in the denominator. $\pi(t)$ ($\pi(c)$) measures the probability mass of units of the treatment (control) group that lie outside the interval between the 0.025th and 0.975th quantile of the control (treatment) group. The multivariate distance is the variance-weighted difference between the vector of means for the treated and for the control group. It is calculated only for the variables used in matching, i.e. without the mean log wage. See Section 3.3.2 for details.

3.3.3 Identifying assumptions

To interpret results from estimating equations (2) through (5) as causal effects, we make three assumptions. First, we assume that the matched control areas are unaffected by the labour market integration. This assumption is violated if input or output markets transmit the local shock throughout the rest of the French economy.

Second, we assume that only the agreement on cross-border commuting had a differential impact on French border regions compared to other regions in France. This assumption is plausible because the other agreements targeted very specific sectors, making it unlikely that they impacted the aggregate labour markets in the border region.[18] Additionally, transporting people is costlier than transporting goods (Monte et al., 2018), which suggests that the effects of labour market integration decay more rapidly across space than those of the other agreements. Furthermore, available evidence supports this assumption: Since the trade reform affects a clearly defined set of industries, we drop these industries and find similar results. Similarly, Beerli et al. (2021, Table A.6, Panel E) find no evidence that the trade reform is driving their results.

Third, matching on pre-existing trends in wages prevents us from interpreting pre-event treatment effects as placebo tests; instead, we need to assume that the reform was exogenous to these matched trends. However, in our setting this appears plausible. Pre-trends could indicate policy endogeneity or anticipation. Policy endogeneity is improbable because the reform was not decided at the local level. Anticipation before 1998 is unlikely because the policy details were not publicly known, and it was uncertain whether the parties would reach an agreement.[19] Data limitations prevent a formal backdating placebo test.[20] As an alternative, we present results from a matching strategy that solely utilizes cross-sectional variables. We find similar effects to those in the main approach, along with parallel trends preceding the reform.

[18] Tariffs between Switzerland and the EU had been abolished in 1972.

[19] See also Beerli et al. (2021, pp. 980).

[20] Specifically, one could backdate the event to a pre-event year z, repeat the matching on trends before z and consider the period between z and 1998 as a placebo treatment period. Unfortunately, the earliest available data year is 1995.

4 Results

We first document that French workers can substantially boost their wages by finding a Swiss job and show that the policy reform increased cross-border commuting. We then present the impact on local labour markets in France, distinguishing between the easing of cross-border commuting in 1999 and the full liberalization in the border region in 2004.

4.1 The integration increases workers' access to highly paid jobs

Swiss wages were roughly twice as high as French wages along the border, but this raw gap may overstate the wage gains French residents actually realize from obtaining a Swiss job. To better measure those gains, we use the French Labour Force Survey and compare workers' wages when employed in France versus Switzerland.

Column 1 of Table 2 shows that workers in Swiss jobs earn, on average, 65 per cent (50 log points) more than workers in French jobs. In column 2, we introduce worker fixed effects, thereby comparing the same worker when employed in Switzerland and France. The wage gap reduces to 20 log points. This reduction in the wage gap between Switzerland and France indicates significant selection of workers into Swiss jobs based on the level of wages in France, as well as a substantial wage increase, conditional upon accepting a Swiss job—comparable to the education premium between workers with mandatory and secondary education. However, if cross-border workers are selected based on potential gains, this estimate represents an upper bound for the possible wage gains of the average French worker employed in French firms.[21]

[21] Table A4 shows the cross-border wage gap when including migrants—the results are virtually identical. Table A5 shows the average wages of commuters when employed in France are 28 log points higher than wages of non-commuters employed in France. This confirms the strong selection of commuters. The baseline wage gap is, however, substantially smaller for workers with tertiary education.

Table 2. Wage gap between French and Swiss jobs

	Log(hourly wage)					
	(1)	(2)	(3)	(4)	(5)	(6)
Swiss job	0.495	0.195				
	(0.014)	(0.047)				
Swiss job - Non-tertiary educ.			0.510	0.192		
			(0.018)	(0.055)		
Swiss job - Tertiary educ.			0.433	0.213		
			(0.014)	(0.119)		
Swiss job - Low skill occ.					0.526	0.116
					(0.016)	(0.059)
Swiss job - Mid skill occ.					0.494	0.204
					(0.014)	(0.047)
Swiss job - High skill occ.					0.292	0.281
					(0.015)	(0.039)
Labour market FE	Y	N	Y	N	Y	N
Worker FE	N	Y	N	Y	N	Y
Tenure and industry controls	N	Y	N	Y	N	Y
Observations	46620	46620	46620	46620	46620	46620
Number of years	10	10	10	10	10	10
R^2	0.43	0.93	0.43	0.93	0.60	0.93

Notes: The sample are residents in the treatment and control areas (see section 3.3.2) employed in the private sector and not moving across municipalities in two consecutive years. *Swiss job* indicates workers employed in Switzerland; non-tertiary education pools workers with less than tertiary education. *Labour market FE* are fixed effects for the labour market of residence. *Worker FE* are person fixed effects. *Tenure and industry controls* are a cubic in the number of months since the start of the employment spell and fixed effects for 30 broad industry groups. All regressions include fixed effects for year and a gender-specific cubic in age. Regressions are weighted using the survey weights. Standard errors clustered at the labour market level are in parentheses. *Data: Labour Force Survey 1993–2002.*

In columns 3 and 4, we estimate the wage gains separately for workers with and without a tertiary education.[22] Without worker fixed effects, the wage gap is larger for non-tertiary workers (0.51 versus 0.43 log points). With worker fixed effects, both groups show similar wage gains (0.19 and 0.21 log points), suggesting that stronger selection of less-educated workers into Swiss jobs accounts for most of the difference in the raw wage gap. The estimates for highly educated workers are less precise.[23]

[22]We pool workers with a mandatory and a secondary education for precision in the specifications with person fixed effects.

[23]This imprecision could result from a small sample size, or it may suggest that the gains from

Turning to occupation-based skill groups in columns 5 and 6, the raw wage gaps vary more widely across groups than by education group. In column 5, the gap is largest for low-skill workers (0.53), intermediate for mid-skill workers (0.49), and smallest for high-skill workers (0.29). This ranking reverses when adding worker fixed effects in column 6: the gap for low-skill workers falls to 0.12 and is only marginally significant, the mid-skill gap falls to 0.20, while the high-skill gap changes little (0.28).

Comparing wages within workers across Swiss and French jobs, those in high-skill occupations had the largest wage gains from cross-border employment, while workers in low-skill occupations had small gains, if any. Because the workers who selected into Swiss jobs were disproportionately high-ability within their skill group, this sorting also changes the composition of workers remaining in French firms. Our empirical strategy for estimating the wage impact on these remaining workers must therefore be robust to such compositional shifts.

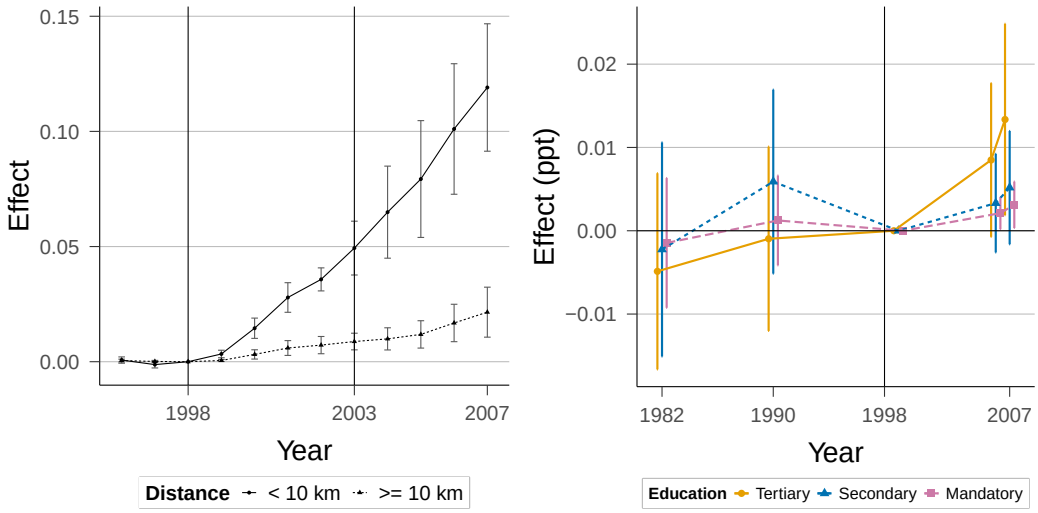
4.2 More people commute from France to Switzerland

We first assess the impact on commuting from France to Switzerland using data from both France and Switzerland.

The results from estimating equation (1) are in Figure 2a. The number of commuters who work in Switzerland close to the French border barely changes from 1996 to 1999, but then starts increasing substantially. The increase is highest closest to the border: In municipalities up to 10 km from the nearest border crossing, the number of commuters relative to employment in 1998 increases by more than 10 percentage points. In municipalities further from the border, the impact is smaller; it is around 2 percentage points.[24]

obtaining a Swiss job are highly heterogeneous for these workers.

[24] In online Appendix D.1, we show some evidence on yearly commuting from French data until 2002.



(a) Commuters in Switzerland close to French border

(b) Share of Residents in France with a Swiss job

Figure 2
Impact on cross-border commuting

Notes: Figure 2a shows estimated impacts from equation (1). The coefficients estimate the impact of the labour market integration on the presence of commuters in Switzerland along the French border relative to employment in the municipality in 1998. *Distance* indicates the distance to the next border crossing in kilometres. The error bars represent 95% confidence intervals, calculated from standard errors clustered at the commuting zone level. Figure 2b shows the point estimates from equation (2). The treatment indicator is whether the labour market is in the treatment group or not. Regression models include controls for the entry and exit of the working-age population and pre-existing migration patterns (see Section 3.3.1 for details). *Data: BFS; Population census 1982–2007.*

We now turn to the evidence from the French census. Figure 2b shows estimated coefficients from equation (2), where the outcome is the share of residents employed in Switzerland. The longer time series allows us to highlight that cross-border commuting between the countries has a long history. With the French data, we focus on the commuting propensity instead of the total number of commuters in order to provide evidence of changes in commuting patterns at the individual level.

From 1982 to 1990, the fraction of cross-border commuters shows a small and statistically insignificant increase, somewhat larger for workers with a secondary education than for other groups. This trend likely stems from fluctuations in Swiss labour demand, with Switzerland experiencing a recession in 1982 and reaching the peak of an economic boom by 1990. In this time period, the number of valid commuting permits grew from 100,000 to 175,000 (Kreis, 2007). The substan-

tial pre-existing stock of commuters is also reflected in the 1999 data reported in Table 3: In French markets historically eligible for commuting to Switzerland, 8 to 9 per cent of workers with secondary and tertiary education, and 4 per cent of workers with mandatory education, were employed in Switzerland. Moreover, the time trends documented in Figure 2b indicate that from 1990 to 1999, these percentages remained stable for workers with mandatory and tertiary education and showed a minor decrease for workers with secondary education.

Despite the long history, the labour market integration in 1999 led to substantially more commuting, but in line with findings in Beerli et al. (2021)—mainly among workers with tertiary education. For these workers, Figure 2b shows an increase in commuting propensity of roughly 1 to 1.5 percentage points across all treated labour markets.[25]

Table 3 shows that, in line with the policy, this increase in commuting propensity is concentrated in the eligible labour markets (see Appendix D.4 for details on the regression specification). The results from the baseline specification appear in columns 1 to 4, while columns 5 to 8 present the results from our preferred specification, which includes controls for exogenous changes in the size of the working-age population. We focus on this latter set of results.

Across all workers, the commuting propensity increases by 1.5 percentage points (column 5); among workers with tertiary education, the increase is 2.8 percentage points (column 6). This increase among workers with tertiary education corresponds to about one-third of the 1999 level. Among workers with secondary and mandatory education, columns 7 and 8 show small and statistically insignificant increases in the commuting propensity. In Appendix Figure A3 we further show evidence indicating that most of the commuters had resided in the French border region before securing employment across the border.

[25]Treated labour markets include both markets eligible for cross-border commuting and neighbouring spillover markets.

Table 3. Impact on propensity to commute from France to Switzerland

	Baseline				Controls			
	All	Tertiary	Secondary	Mandatory	All	Tertiary	Secondary	Mandatory
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$spillover \times post$	0.001	0.002	0.001	0.000	-0.005	-0.004	-0.001	0.002
	(0.000)	(0.001)	(0.000)	(0.000)	(0.003)	(0.004)	(0.004)	(0.002)
$eligible \times post$	0.023	0.036	0.011	0.002	0.015	0.028	0.007	0.003
	(0.006)	(0.008)	(0.004)	(0.003)	(0.005)	(0.007)	(0.006)	(0.002)
Observations	220	220	220	220	220	220	220	220
R^2	0.45	0.52	0.22	0.37	0.67	0.72	0.43	0.43
Outcome mean in 1999 (eligible)	0.07	0.087	0.089	0.041	0.07	0.087	0.089	0.041

Notes: Results from estimating equation (3). The outcome is the fraction of residents with a job in Switzerland. Columns 5 to 8 additionally include controls for entry and exit of the working-age population and pre-existing migration rates (see section 3.3.1 for details). The regressions are weighted by the cell-level resident population size in 1999. Standard errors clustered at the labour market level are in parentheses. The reported outcome mean is from the treated eligible markets. The outcome mean in the treated spillover markets is 0. *Data: Population census 1982–2007.*

Appendix Figure A4 also shows that the impact on commuting is similar for men and women within education groups. This contrasts with the results of Bütikofer et al. (2022) who find, in response to the Öresund bridge opening, a larger rise in commuting to Denmark by Swedish men than women. This difference can be explained by the fact that women are more sensitive to commuting time than men (Le Barbanchon et al., 2020), and by the commuting distances involved in each case: distances are small between France and Switzerland—see Figure A2b—but substantial between Malmö and Copenhagen. Thus, women reacted less to the new employment options than men in the Danish-Swedish case but not in the French-Swiss case.

Because the increase in cross-border commuting was concentrated among highly educated workers, we next examine both the overall and skill-specific effects on wages and employment in French labour markets.[26]

4.3 French employment and wage growth

We now present the results on employment and wages in France. Figure 3 presents annual estimates of the effect of the labour market integration on wage growth (both within-firm within-worker and average) and on employment in France. Table 4 presents estimates for the transition and free period. Standard errors that are robust to clustering at the labour market level are shown in the table and used for the error bars in the figure, representing 95 per cent confidence intervals.

All results are relative to the matched inland control regions and only include workers employed in France. To ensure our results on wages are not driven by selection into commuting on the level of baseline wages, our main analysis focuses on within-firm within-worker wage growth.

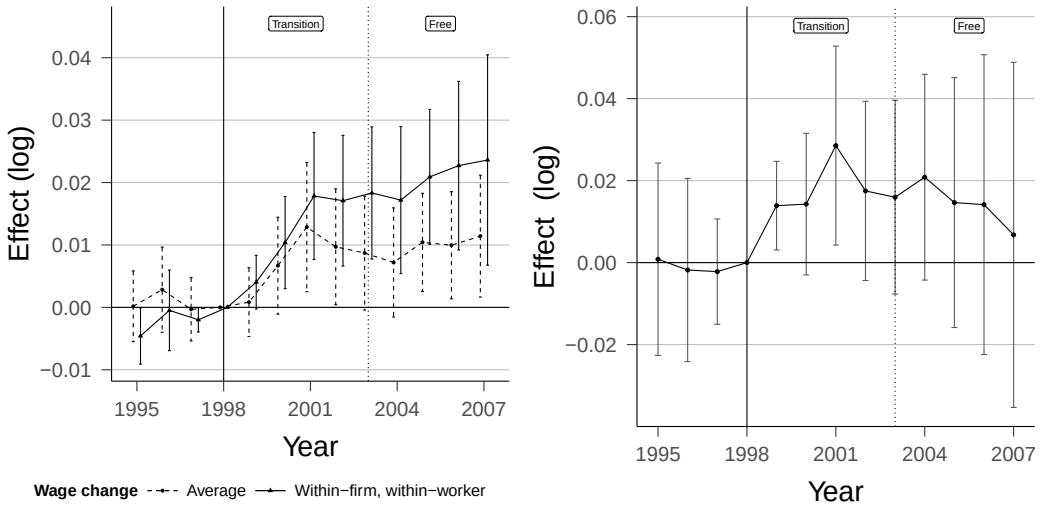
Figure 3 presents the annual estimates from equation (2), while Table 4 reports estimates from equation (3) for the transition and free mobility periods.

After the labour market integration, wages grow faster in the French border region and, despite the outflow of commuters, there is no evidence of lower employment. Compared to the years before 1999, wages are 1.5 per cent higher during

[26]Because education is not available in the DADS data, we report differential impacts by skill category of the job.

the transition phase and 2.3 per cent higher during the free mobility phase (Table 4, column 1). Figure 3a shows that wages rise most strongly in the first three years of the transition phase and then stabilize at that higher level. Average wages grow similarly initially but stabilize at a lower level than within-firm within-worker wage growth after 2001. Economically, both measures indicate modest wage gains in the French border region. The average wage gains are lower than wage growth conditional on worker and firm; this difference is consistent with commuters to Switzerland being positively selected on wage levels.

While the point estimates for total employment are positive, they are imprecisely estimated (Table 4, column 5). In the transition phase, employment is 1.9 per cent higher than before 1999 (standard error: 1.0). The point estimate remains similar in the free mobility phase, but the standard error doubles. The yearly estimates in Figure 3b are consistent with this pattern. Employment rises by a statistically significant 1.4 per cent between 1998 and 1999, reaches 2.9 per cent in 2001, and then gradually declines towards zero with widening confidence intervals through 2007. Nevertheless, the results rule out a substantial fall in overall employment alongside the observed rise in wages. Before exploring the underlying mechanisms, we show the results for different skill groups.



(a) Wage growth (b) Employment

Figure 3
Wage and employment effects in France

Notes: Figures 3a and 3b show the annual point estimates from equation (2). The error bars are confidence intervals clustered at the local labour market level. *Data: DADS Postes 1995–2007.*

4.3.1 Across skill groups

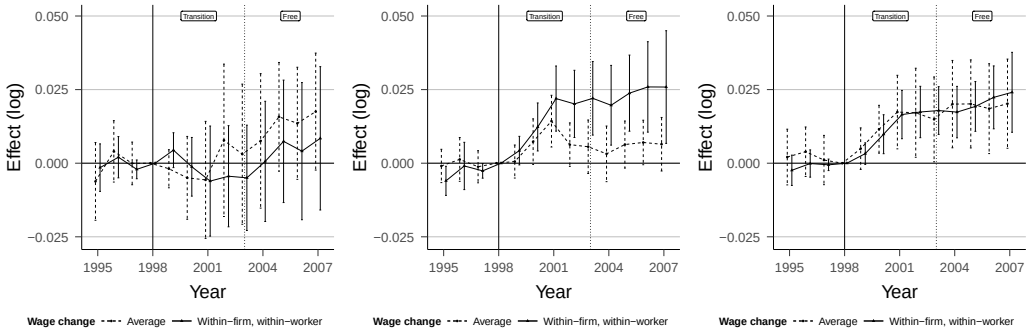
The skill-specific results are in Figures 4 and 5 for the annual estimates, and in Table 4 for the effects in the transition and free mobility periods. Columns 2 to 4 in the table show that the wage increases are concentrated among low- and mid-skill workers. In the transition phase, their wages rise by 1.4 and 1.8 per cent, respectively, and in the free mobility phase by another 0.7 and 0.8 per cent, respectively. For high-skill workers, the point estimates are small and not statistically significant in either period. This occurs despite the commuting propensity increasing most strongly among high-skill workers.

Table 4. Impact on within-worker, within-firm wages and employment

	Within-firm, within-worker wage growth				Employment			
	All professions	High skill	Mid skill	Low skill	All professions	High skill	Mid skill	Low skill
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$treat \times transition$	0.015	-0.002	0.018	0.014	0.019	0.019	0.012	0.038
	(0.004)	(0.006)	(0.004)	(0.003)	(0.010)	(0.024)	(0.013)	(0.013)
	[0.004]	[0.005]	[0.004]	[0.003]	[0.009]	[0.023]	[0.011]	[0.013]
$treat \times free$	0.023	0.006	0.026	0.021	0.015	0.021	-0.006	0.058
	(0.006)	(0.011)	(0.007)	(0.005)	(0.019)	(0.039)	(0.024)	(0.022)
	[0.007]	[0.009]	[0.008]	[0.006]	[0.019]	[0.039]	[0.023]	[0.021]
Observations	572	572	572	572	572	572	572	572
R^2	0.48	0.41	0.47	0.47	0.47	0.51	0.49	0.59

Notes: Results from estimating equation (3). Employment is in logs, the wage growth index in levels. Wage growth is calculated from changes in log residual wage of workers that remain employed at their firm in two consecutive years (see text for details). The regressions are weighted by cell-level employment in 1998. Standard errors clustered at the labour market level are in parentheses; standard errors clustered at the department level are in brackets. *Data: DADS postes 1995–2007.*

Columns 6 to 8 of Table 4 show the employment effects for each skill group. Low-skill employment grows by 3.8 per cent in the transition period and by an additional 2 per cent in the free mobility period, to an overall increase of 5.8 per cent. The time pattern in Figure 5c suggests an immediate increase in employment from 1998 to 1999 and then another jump from the transition to the free mobility phase, although the point estimate declines again thereafter. The point estimate for high-skill employment is positive but imprecisely estimated in both periods (1.9 per cent in the transition phase and 2.1 per cent in the free mobility phase, with standard errors of 2.4 and 3.9, respectively).

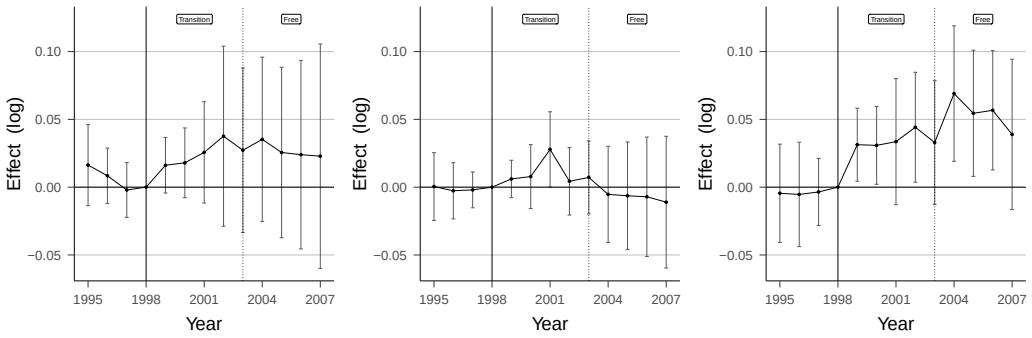


(a) High-skill professions (b) Mid-skill professions (c) Low-skill professions

Figure 4
Wage effects by skill

Notes: The figures show the skill-specific effects on the wage growth index from equation (2). The error bars are 95% confidence intervals based on standard errors clustered at the local labour market level. *Data: DADS Postes 1995–2007.*

In Figure 4 we show the average wage changes alongside our main wage measure. For low-skill workers, the average wage change and the within-firm, within-worker wage changes are very similar. In contrast, for mid-skill workers, average wages increase by less, and for high-skill workers, average wages increase by more towards the end of the sample period. These results together suggest that the overall lower increase in average wages, compared to within-firm within-worker wage changes, reflects two channels: the relative increase of low-skill employment, which mechanically lowers average wages, and a change in the composition of mid-skill workers that depresses their average wages relative to within-worker wage growth.



(a) High-skill professions (b) Mid-skill professions (c) Low-skill professions

Figure 5
Employment effects, by skill groups

Notes: The figures show the skill-specific effects on the employment from equation (2). The error bars are confidence intervals clustered at the local labour market level. *Data: DADS Postes 1995–2007.*

We find that the total employment of high-skill workers and their wages have been stable despite a substantial rise in the commuting propensity to Switzerland. For low- and mid-skill workers, who do not become more likely to commute to Switzerland, the results are different. Wages rise faster than in the control region. In addition, the total employment of low-skill workers is increasing. These results by skill level cannot be easily explained by Swiss competition for French workers, as we would have expected a rise in wages and fall in employment for high-skill workers. However, the substantial standard errors suggest potential heterogeneity in effects. To explore this heterogeneity, we further disaggregate the analysis by industry skill intensity.

4.3.2 Heterogeneity by skill intensity of industries

To examine whether wage and employment results vary by high-skill specialization of firms, we divide 4-digit industries into three similarly sized groups based on their pre-treatment high-skill employment share. Table 5 shows that high-skill intensive industries actually expand in terms of employment alongside a rise in wages; low-skill intensive industries expand similarly. In contrast, mid-skill intensive industries decline. Thus, industries employing the highest share of high-skill workers—who increase commuting to Switzerland most—actually expand.

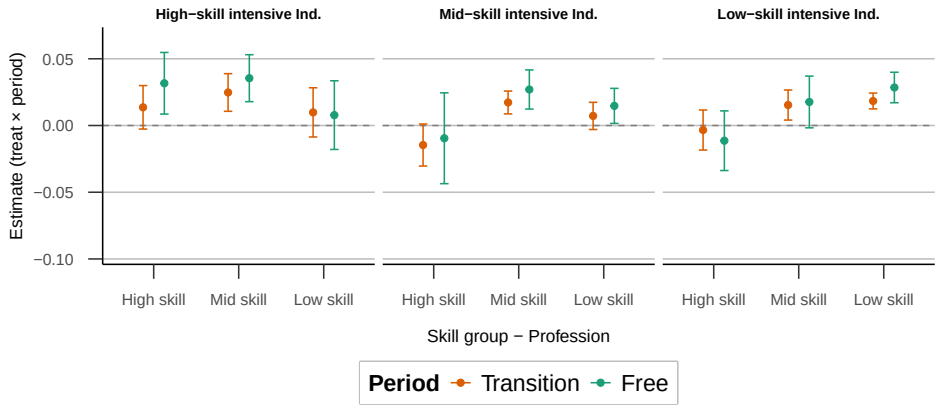
Figure 6 shows wage and employment effects by skill intensity of industry and skill level of workers to further clarify these results. We show coefficient estimates for the transition period and the free period alongside 95% confidence intervals.

Table 5. Impact on within-worker, within-firm wage changes and employment by skill intensity of industry

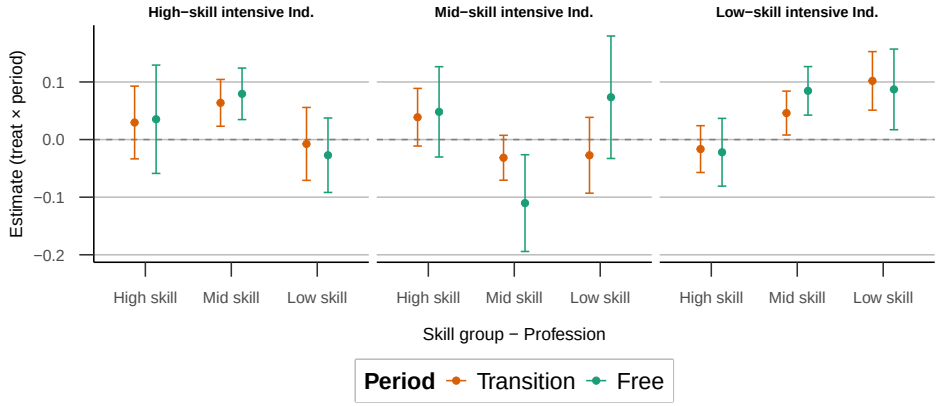
	Wages			Employment		
	High	Mid	Low	High	Mid	Low
	(1)	(2)	(3)	(4)	(5)	(6)
$treat \times transition$	0.021	0.012	0.016	0.048	-0.029	0.063
	(0.007)	(0.004)	(0.004)	(0.020)	(0.013)	(0.020)
$treat \times free$	0.031	0.020	0.021	0.057	-0.053	0.079
	(0.009)	(0.007)	(0.007)	(0.024)	(0.029)	(0.025)
Observations	572	572	572	572	572	572
R^2	0.52	0.40	0.43	0.35	0.44	0.45

Notes: Results from estimating equation (3) by skill intensity of industries. Employment is in logs, the wage growth index in levels. Wage growth is calculated from changes in log residual wage of workers that remain employed at their firm in two consecutive years (see text for details). The regressions are weighted by cell-level employment in 1998. Standard errors clustered at the labour market level are in parentheses. *Data: DADS postes 1995–2007.*

Panel 6a presents within-firm, within-worker wage growth. High-skill workers experience positive wage growth in high-skill intensive industries during both the transition and free movement periods, with the point estimate increasing over time. In contrast, their wage growth is close to zero or slightly negative in mid- and low-skill intensive industries. Mid-skill workers experience positive wage growth across all industry types, with the largest effects in high-skill intensive industries. Low-skill workers see significant positive wage growth in mid- and low-skill intensive industries, with the largest effects in low-skill intensive industries during the free movement period. Thus, the average wage effects by skill level mask substantial heterogeneity across industry types, with workers generally experiencing wage gains in industries that intensively use their skill type.



(a) Within-firm within-worker wage growth



(b) Employment

Figure 6
Wage and employment effects by Skill intensity of industry and Skill level

Notes: The error bars are confidence intervals clustered at the local labour market level. *Data: DADS Postes 1995–2007.*

Panel 6b shows employment changes. The patterns suggest reallocation of workers across industry types, though the estimates are noisier than for wages. High-skill workers show positive but imprecisely estimated employment gains in high-skill and mid-skill intensive industries, with little change in low-skill intensive industries. Disaggregating by distance to the border reveals that this employment increase is significant in spillover markets, with null effects in eligible areas closer to the border (Appendix Figure A12). Mid-skill workers reallocate away from mid-skill intensive industries—where employment declines by approximately 11% in

the free movement period—toward both high-skill and low-skill intensive industries, where their employment increases by approximately 8% and 5% respectively. This reallocation occurs despite mid-skill workers not increasing their commuting propensity to Switzerland, indicating restructuring of employment within France. Low-skill workers increase employment in low-skill intensive industries, with a positive but noisily estimated effect in mid-skill intensive industries during the free movement period.

Together, these patterns suggest increasing industrial specialization based on the skill composition of their workforce. High-skill intensive industries expand employment of both high- and mid-skill workers while offering wage gains to these groups. Low-skill intensive industries expand employment of both low- and mid-skill workers while raising wages for these groups. Meanwhile, mid-skill intensive industries contract substantially, with remaining mid-skill workers receiving wage increases but overall employment declining markedly.

These results show that a subset of high-skill workers experience substantial and gradual wage gains parallel to those on the Swiss side of the border (Beerli et al., 2021). However, these gains are unlikely to be driven by a decline in labour supply to French firms due to Swiss competition for workers. Rather, in high-skill intensive industries, both employment and wages increase together. This joint expansion is consistent with either increased labour market competition from Swiss employers raising the labour share, or output growth driven by higher demand or productivity. We examine firm-level outcomes to distinguish these mechanisms in section 4.5.

4.3.3 Additional Heterogeneity

Wage growth index and employment by skill and gender Appendix Figure A18 further divides the skill-specific effects by gender. Among low-skill workers, wages increase more rapidly for men than for women during the initial period, though the coefficients converge between genders under free mobility; employment effects are also predominantly driven by men, especially during the free mobility period. For mid-skill workers, wages similarly grow more for men than women, whilst high-skill workers exhibit no gender differences in wage effects.

Effects across space Appendix D.4 discusses estimates for the eligible and spillover labour markets. The wage effects are stronger in magnitude in the eligible markets but also rise in spillover markets. The employment effects are more heterogeneous. During the transition phase, low-skill employment increases only in the eligible markets. During the free mobility phase, low-skill employment rises in both types of markets, while overall employment declines insignificantly in the eligible markets.

4.3.4 Robustness checks

Appendix D.2 assesses the sensitivity of the results by using alternative matching approaches, with a placebo test, and by accounting for exposure to national policies that could impact the treated and the control regions differently.

Alternative matching approaches The first alternative matching approach does not match on pre-existing wage trends but only on average wages in 1998. The second compares the treated labour markets to a weighted average of all potential control units, where the weights are such that covariates are perfectly balanced before the labour market reform (Hainmueller, 2012). The effects are comparable across the different approaches. When not matching on pre-trends, the wage effects are smaller, but the qualitative pattern across skill groups remains. Independently of the matching approach, low-skill employment increases. High-skill employment effects are similar to the main results in entropy balancing, but the annual effects indicate a decline in employment towards the end of the sample period when not matching on pre-trends.

Compare directly to dropped inland markets Instead of matching, we compare the treated labour markets to labour markets directly bordering them. We find qualitatively similar results, but the wage effects are more muted, possibly driven by spillover effects, as documented above.

Placebo check A placebo test that replaces the treated labour markets with French labour markets along the border to Spain, and reruns the matching algorithm, shows

no evidence of changes in employment or wages around the year of the reform. This underlines that our results are not driven by a shock to French border regions as a whole but by the shock to the French-Swiss border specifically.

Alternative controls and measurement The results are also robust to controlling for the labour markets' exposure to minimum wage changes and to the working week reform that started in 1998 (Askenazy, 2013). Further, we show that excluding pre-trends affects the precision of the estimates but not their magnitude, the effect on hours is similar to the effect on employment, and the impact on the wage index is not driven by skill upgrading.

4.4 Worker-level wages

Table 6 shows the wage effects at the worker level from estimating equation (5); Appendix Figure A20 shows the yearly effect for different skill groups. Columns 1 through 3 present pooled estimates with progressively richer fixed-effect specifications. Column 1, without worker or firm fixed effects, indicates that the wages of employees in treated regions grew by 0.8 per cent in the transition period and by 1.3 per cent in the free mobility period. Adding worker fixed effects in column 2 increases the transition effect to 1.0 per cent but reduces the free mobility effect to 1.0 per cent. The inclusion of both worker and firm fixed effects in column 3 keeps the transition effect at 0.8 per cent but reduces the free mobility effect to 0.6 per cent. This pattern suggests that a portion of the wage gains during the free mobility period reflects workers moving to higher-paying firms in addition to within-worker wage growth.

Columns 4 through 6 present skill-specific estimates with the same fixed-effect structure. High-skill workers' wages show small, statistically insignificant declines in the transition period (ranging from -0.4 to -0.7 per cent) and in the free mobility period (ranging from -0.7 to -1.0 per cent). Mid-skill workers experience wage gains between 0.9 and 1.2 per cent during the transition period and between 0.7 and 1.3 per cent during free mobility. Low-skill workers show wage gains of 0.8 per cent in the transition period in columns 4 through 6. Notably, the baseline

specification in column 4 estimates a large 2.2 per cent wage increase for low-skill workers during free mobility, which decreases to 1.0 per cent once worker fixed effects are included in column 5, indicating that compositional changes partly drive the wage increase, but that low-skill workers experience genuine within-worker wage gains.

Table 6. Wage impact DADS Panel

	Log(hourly wage)					
	Pooled			By skill		
	(1)	(2)	(3)	(4)	(5)	(6)
$treat \times transition$	0.008	0.010	0.008			
	(0.004)	(0.003)	(0.003)			
$treat \times transition \times high$				-0.007	-0.005	-0.004
				(0.011)	(0.010)	(0.007)
$treat \times transition \times mid$				0.010	0.012	0.009
				(0.002)	(0.003)	(0.003)
$treat \times transition \times low$				0.008	0.008	0.008
				(0.004)	(0.005)	(0.003)
$treat \times free$	0.013	0.010	0.006			
	(0.003)	(0.003)	(0.003)			
$treat \times free \times high$				-0.007	-0.010	-0.008
				(0.016)	(0.013)	(0.008)
$treat \times free \times mid$				0.011	0.013	0.007
				(0.004)	(0.004)	(0.003)
$treat \times free \times low$				0.022	0.010	0.010
				(0.007)	(0.007)	(0.004)
Observations	553980	553980	553980	538533	538533	538533
Worker fixed effects	N	Y	Y	N	Y	Y
Firm fixed effects	N	N	Y	N	N	Y
Number of workers	73390	73390	73390	72694	72694	72694
Number of years	13	13	13	13	13	13
R^2	0.07	0.88	0.91	0.44	0.72	0.91

Notes: Results from estimating versions of equation (5). Workers are sampled and treatment is assigned based on the labour market of the ongoing spell. Standard errors clustered at the labour market level are in parentheses. *Data: DADS Panel 1995–2007.*

Wages and Selection Comparing average wages with within-firm within-worker wages from *DADS Postes* (Figure 4), and comparing estimates with and without fixed effects in the *DADS Panel* (Table 6), allows us to assess the role of selection in driving our wage estimates. These comparisons reveal some selection on (unob-

servable) attributes. For high-skill and low-skill workers, within-firm within-worker wages and average wages increased similarly, suggesting limited selection effects. However, mid-skill workers show a notable divergence: while within-firm within-worker wages increased by 2.6 per cent, average wage growth was approximately zero, indicating negative selection. The *DADS Panel* results confirm that most wage changes occur within-worker, as estimates remain stable when adding worker and firm fixed effects.

In sum, we find limited evidence of selection effects driving our main results on wages. The exception is the negative selection on unobservables for mid-skill workers, which happens alongside substantial reallocation of employment across industries. In addition, the overall shift in workforce composition toward low-skill professions (Figure 5) further accounts for differences between average and within-worker wage changes at the aggregate level.

4.5 Adjustment margins

The previous results establish three key patterns. First, overall wages rise but total employment does not decline—and employment in low-skill jobs actually increases—which is difficult to reconcile with a simple model of downward-sloping labour demand. Second, high-skill workers experience the largest increase in commuting propensity—suggesting the strongest improvement in outside options—yet wages in high-skill jobs do not rise on average. Third, average effects mask substantial heterogeneity across industry types, suggesting increasing specialization: high-skill-intensive industries expand employment and raise wages for both high- and mid-skill workers; low-skill-intensive industries do the same for low- and mid-skill workers; while mid-skill-intensive industries contract, with remaining workers receiving wage increases but overall employment declining markedly.

To understand these patterns, we examine whether the labour market integration triggers adjustments in supply, demand, or both. These adjustments are important for understanding whether the integration mainly increased competition for workers, or whether it has broader general equilibrium effects. We focus on two main margins of adjustment:

- **Labour supply adjustment.** If population and labour force participation increase in response to improved outside options, this could offset the outflow of workers commuting to Switzerland. Such a supply response would explain how employment in France can rise despite the increase in cross-border commuting.

- **Labour demand adjustment.** Firms may respond to workers' improved outside options by having to reduce wage markdowns, which would raise labour costs relative to output—that is, the labour share would increase. Alternatively, output growth—driven by local demand (from higher population and Swiss earnings), productivity gains, or increased demand for tradable goods—could match rising labour costs, leaving the labour share stable.

4.5.1 Labour supply

We first examine whether labour supply adjusts in response to the labour market integration. If local population and participation rates increase, this can offset the outflow of workers commuting to Switzerland.

Table 7 shows the estimated effects on the log of population, labour force participation rate, employment rates in France and Switzerland, and unemployment. Column 1 indicates that the workforce increases by 4.3 per cent, driven by a 3.2 per cent increase in population (column 2) and a 1.1 per cent increase in the participation rate (column 3). For workers with tertiary education, the larger labour force appears driven entirely by a higher population (3.7 per cent), though imprecisely estimated, with no change in labour force participation. Among workers with secondary education, participation increases significantly (1.1 per cent), while the population estimate is similar in size (0.9 per cent) but imprecisely estimated. For workers with mandatory education the larger workforce results from both a significant increase in population (2.8 per cent) and higher participation (3.7 per cent).

These results are consistent with employment changes observed in the DADS data: the implied 2.4 per cent increase in high-skill employment from Census data aligns with the 2 per cent DADS estimate, and the 4.8 per cent rise in employment for workers with mandatory education matches the 5.8 per cent increase in low-skill

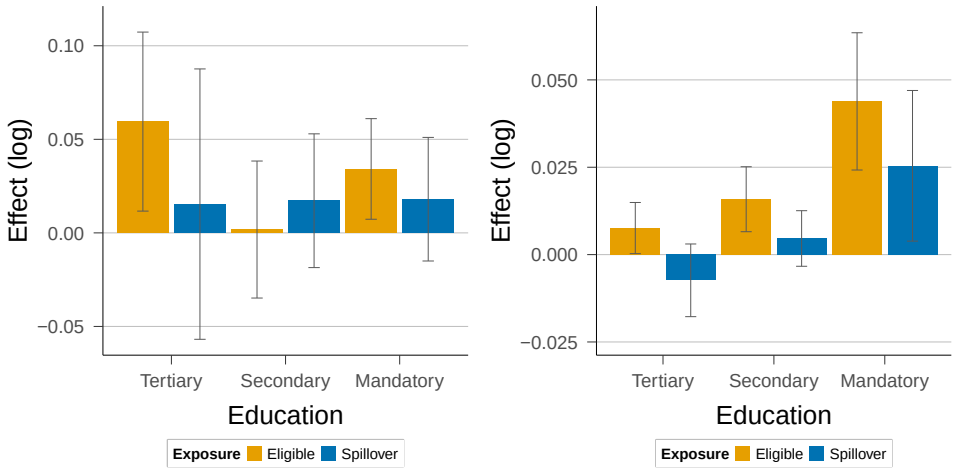
employment.[27]

The active labour force thus grows substantially following labour market integration, driven by increased population and higher labour force participation. Although the total number of commuters to Switzerland increases—as shown in Section 4.2—the employment rate in France declines only slightly for workers with tertiary education and even increases for those with mandatory education.

We further examine spatial heterogeneity by distinguishing between eligible and spillover labour markets. Figure 7 shows that labour supply responses are stronger in eligible labour markets close to the border. Panel 7a shows that the population of tertiary-educated workers increases by 6 per cent in eligible labour markets, compensating for the 2.8 percentage point increase in commuting propensity to Switzerland (Table 3). Panel 7b shows that participation among workers with secondary and mandatory education also rises more strongly close to the border.

Thus, while cross-border commuting to Switzerland increases substantially, the active workforce grows in eligible labour markets such that commuting rates remain unchanged for workers with less than tertiary education and rise only modestly among tertiary-educated workers. These results demonstrate that the substantial increase in labour supply is sufficient to absorb the additional labour demand from Switzerland. The concentration of these responses in eligible markets—where workers gain direct access to Swiss jobs—supports the interpretation that the labour market integration drives these adjustments.

[27] With the Census data, we find a 3.7 per cent increase in the population of workers with tertiary education, partially offset by a 1.3 per cent reduction in the employment rate in France. For workers with secondary education, employment in France did not change, consistent with stable mid-skill employment in the DADS data.



(a) Population (b) Participation rate

Figure 7
Impact on labour supply across space

Notes: Estimates from equation (A.2). Controls for entry and exit of the working-age population and pre-existing migration are included in the regressions (see section 3.3.1). The error bars are confidence intervals clustered at the local labour market level. *Data: Population census 1982–2007.*

The results on the unemployment rate provide further evidence that the increase in labour supply compensates for the outflow of workers. As the active labour force grows by more than total employment, we find an increase in the unemployment rate. The integration attracts new residents and raises labour force participation, expanding the labour force; since not all new entrants find employment immediately, the unemployment rate rises even as total employment does not fall. For tertiary-educated workers, the relative increase in the unemployment rate is about 6 per cent and is imprecisely estimated. For workers with secondary or mandatory education, the increase is larger at 11 per cent. These results indicate small increases in the unemployment rate in absolute terms; however, they clearly reject a tightening of the labour market.

Table 7. Impact on labour supply, unemployment and employment among residents

	Labour force			Employment rate			Unemployment	
	Total	Pop.	Part. rate	Total	France	CH	Rate	Counts
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: All Education groups								
treat × *post*	0.043	0.032	0.011	-0.005	-0.008	0.006	0.112	0.155
	(0.011)	(0.009)	(0.005)	(0.006)	(0.007)	(0.003)	(0.030)	(0.029)
Observations	220	220	220	220	220	220	220	220
R^2	0.86	0.91	0.62	0.61	0.54	0.62	0.58	0.64
Panel B: Tertiary education								
treat × *post*	0.037	0.037	0.000	-0.001	-0.013	0.012	0.059	0.096
	(0.023)	(0.023)	(0.004)	(0.004)	(0.007)	(0.005)	(0.054)	(0.047)
Observations	220	220	220	220	220	220	220	220
R^2	0.69	0.72	0.71	0.71	0.73	0.68	0.59	0.55
Panel C: Secondary education								
treat × *post*	0.020	0.009	0.011	-0.002	0.000	0.003	0.115	0.135
	(0.015)	(0.015)	(0.004)	(0.005)	(0.009)	(0.004)	(0.044)	(0.047)
Observations	220	220	220	220	220	220	220	220
R^2	0.70	0.73	0.58	0.59	0.55	0.43	0.58	0.56
Panel D: Mandatory education								
treat × *post*	0.065	0.028	0.037	0.019	0.020	0.003	0.109	0.174
	(0.015)	(0.011)	(0.008)	(0.011)	(0.011)	(0.002)	(0.035)	(0.042)
Observations	220	220	220	220	220	220	220	220
R^2	0.70	0.82	0.51	0.51	0.41	0.42	0.50	0.56

Notes: Results from estimating equation (3). Models include controls for entry and exit of the working age population and pre-existing migration (see section 3.3.1 for details). All outcomes are in logs. Standard errors clustered at the labour market level are in parentheses. The regressions are weighted by the cell-level resident population size in 1999. The labour force are all employed and unemployed workers from 16 to 64; the population are all residents from 16 to 64; the participation rate is the number of employed and unemployed workers relative to population; the employment rate is the number of employed workers relative to population, and the columns *France* and *CH* indicate the respective country of work; the unemployment rate is the number of unemployed workers relative to the participating labour force. *Data: Population census 1982–2007.*

Figure A19 in the Appendix presents the estimated treatment effects by gender and education. The increase in the population is similar for men and women, but the increase in participation is stronger for women. Appendix D.5 shows, using the Labour Force Survey, that women with mandatory education increase participation gradually in the first four years after the reform.

In light of the population response we document, the 2004 EU enlargement raises two concerns. First, due to continued Swiss migration restrictions on citizens of new EU member states, the enlargement likely increased labour supply in France more than in Switzerland. However, this should affect control and treated labour markets similarly and thus is consistent with our estimation strategy. Second, within treated areas, citizens of new EU member states did not gain the same commuting

access to Switzerland as French citizens. In Appendix Figure A14, we show that the population response is slightly stronger when restricting the sample to French citizens, suggesting the results are not driven by the migration of citizens of new EU member states.

To summarize, the labour market integration increases Swiss demand for French workers. Yet, overall employment in France does not decline—and even increases for low-skill workers. This is possible due to the strong labour supply response to the reform, largely driven by an increase in population and labour force participation in labour markets eligible for cross-border commuting.

4.5.2 Labour demand

We now examine firms' outcomes to understand whether French firms faced pressure from workers' improved outside options or whether they were able to expand production in response to the labour market integration. If competition for workers forced firms to reduce wage markdowns, labour costs should rise relative to output and other inputs—that is, the labour share should increase. If instead local demand or productivity gains enabled firms to expand, output growth would match the increase in labour costs, leaving the labour share stable.

To distinguish these mechanisms, we analyse sales, labour costs, material costs, employment, and labour productivity in treated firms. We report effects by broad economic sector—non-tradable, construction, tradable, and other—to assess whether local demand drives expansion, and by industries' skill intensity to test whether competition effects are strongest in industries that depend most on workers with the best outside options in Switzerland. Productivity gains would indicate that firms reorganised production in response to the labour market integration, as documented on the Swiss side by Beerli et al. (2021).

Table 8 shows the impact on sales, labour costs, material costs, and employment. In aggregate, sales (5.4%) and material costs (5.5%) rose by similar magnitudes during the free mobility period, while labour costs (4.0%) rose somewhat less—though the differences are not statistically significant. Employment increased only modestly (1.5%) and not significantly, suggesting that firms expanded output without proportionally increasing headcount. The near-equal rise in material costs

and sales indicates that firms expanded production rather than only raising prices. Importantly, there is no evidence that labour costs rose relative to sales or material costs, as would be expected if competition for workers were compressing wage markdowns. Instead, the stable labour share is consistent with demand for firms' output growing.

Table 8. Impact on Sales, Labour Cost, Material Costs, and Employment

					Tradable		
	All sectors (1)	Non-tradable (2)	Cons-truction (3)	Other (4)	All (5)	w/ trade reform (6)	w/o trade reform (7)
Panel A: Sales							
$treat \times transition$	0.038	0.028	0.043	0.052	0.029	0.033	0.026
	(0.009)	(0.012)	(0.013)	(0.011)	(0.015)	(0.017)	(0.020)
$treat \times free$	0.054	0.047	0.081	0.078	0.032	0.004	0.044
	(0.017)	(0.014)	(0.024)	(0.020)	(0.024)	(0.024)	(0.029)
Observations	572	572	572	572	572	572	572
R^2	0.51	0.44	0.50	0.39	0.33	0.32	0.29
Panel B: Labour Cost							
$treat \times transition$	0.029	0.032	0.019	0.033	0.032	0.043	0.025
	(0.010)	(0.014)	(0.011)	(0.011)	(0.016)	(0.020)	(0.018)
$treat \times free$	0.040	0.059	0.033	0.047	0.041	0.012	0.054
	(0.019)	(0.018)	(0.021)	(0.021)	(0.026)	(0.025)	(0.029)
Observations	572	572	572	572	572	572	572
R^2	0.55	0.49	0.47	0.32	0.50	0.39	0.46
Panel C: Material Costs							
$treat \times transition$	0.036	0.026	0.050	0.051	0.024	0.024	0.024
	(0.009)	(0.012)	(0.016)	(0.012)	(0.016)	(0.019)	(0.021)
$treat \times free$	0.055	0.048	0.086	0.085	0.024	-0.011	0.041
	(0.018)	(0.015)	(0.027)	(0.024)	(0.024)	(0.025)	(0.032)
Observations	572	572	572	572	572	572	572
R^2	0.49	0.41	0.45	0.38	0.30	0.28	0.26
Panel D: Employment							
$treat \times transition$	0.019	-0.002	0.008	0.023	0.022	-0.006	0.048
	(0.010)	(0.011)	(0.010)	(0.012)	(0.016)	(0.023)	(0.021)
$treat \times free$	0.015	0.004	0.009	0.043	0.008	0.015	0.029
	(0.019)	(0.013)	(0.020)	(0.013)	(0.028)	(0.039)	(0.034)
Observations	572	572	572	572	572	572	572
R^2	0.47	0.24	0.29	0.21	0.44	0.42	0.38

Notes: Results from estimating equation (3). All outcomes are in logs. The regressions are weighted by sector-level employment in 1998. Standard errors clustered at the labour market level are in parentheses. *Data: DADS postes 1995–2007; Ficus 1995–2007.*

The sector-level results point to local demand as a driver of this expansion. Non-tradable and construction sectors—where firms sell mostly locally—show large increases in sales (4.7% and 8.1%) and material costs (4.8% and 8.6%), with labour costs rising by 5.9% and 3.3% respectively. The "Other" sector comprises industries

such as utilities, transport, financial services, and health services—while these serve largely local and regional customers, some output may also be traded at further distances. This sector also expands substantially (7.8% in sales, 4.7% in labour costs, 8.5% in material costs). Tradable sectors show smaller effects (3.2% in sales, 4.1% in labour costs). Notably, even in tradable and "Other" sectors—where local demand plays a smaller role—labour costs did not rise disproportionately relative to sales, providing little evidence that competition for workers compressed wage markdowns. Firms facing concurrent trade reforms show almost no change, confirming that our results are not driven by trade liberalisation.

We next split by skill intensity of industries (Table 9). If competition for workers compresses markdowns, we would expect labour costs to rise relative to output, particularly in high-skill intensive industries that rely on workers with the best outside options in Switzerland. Moreover, if these firms were losing workers to Swiss employers, they might need to scale down production—though the employment gains for high-skill workers concentrated in high-skill intensive industries documented in Figure 6 make such contraction unlikely.

The results on firm outcomes do not support these predictions either. High-skill intensive industries expanded rather than contracted, with sales rising by 9.4% and material costs by 9.7%. Labour costs rose by 7.5%—less than output growth. Although the differences across outcomes are not statistically significant, the point estimates suggest that output growth outpaces labour cost growth, inconsistent with competition compressing markdowns. The gradual expansion of sales alongside the increase in input costs suggests that the labour market integration enabled firms to expand operations in parallel with the growth of high-tech and knowledge-intensive services on the Swiss side of the border (Beerli et al., 2021).

Table 9. Impact on Sales, Labour Cost, Material Costs, and Employment by industry skill intensity

	High-skill intensive ind. (1)	Mid-skill intensive ind. (2)	Low-skill intensive ind. (3)
Panel A: Sales			
$treat \times transition$	0.079	0.011	0.040
	(0.015)	(0.014)	(0.011)
$treat \times free$	0.094	0.024	0.067
	(0.025)	(0.022)	(0.023)
Observations	572	572	572
R^2	0.39	0.36	0.38
Panel B: Labour Cost			
$treat \times transition$	0.064	-0.002	0.044
	(0.017)	(0.015)	(0.011)
$treat \times free$	0.075	-0.018	0.091
	(0.025)	(0.023)	(0.026)
Observations	572	572	572
R^2	0.41	0.38	0.44
Panel C: Material Costs			
$treat \times transition$	0.082	0.009	0.033
	(0.016)	(0.015)	(0.011)
$treat \times free$	0.097	0.030	0.055
	(0.026)	(0.023)	(0.022)
Observations	572	572	572
R^2	0.39	0.35	0.35
Panel D: Employment			
$treat \times transition$	0.048	-0.029	0.063
	(0.020)	(0.013)	(0.020)
$treat \times free$	0.057	-0.053	0.079
	(0.024)	(0.029)	(0.025)
Observations	572	572	572
R^2	0.35	0.44	0.45

Notes: Results from estimating equation (3). All outcomes are in logs. The regressions are weighted by cell-level employment in 1998. Standard errors clustered at the labour market level are in parentheses. *Data: DADS postes 1995–2007; Ficus 1995–2007.*

Low-skill intensive industries show strong expansion, with employment rising by 7.9% and labour costs by 9.1%—exceeding sales growth of 6.7%. This pattern is consistent with increased competition for workers raising the compensation of labour as a share of total output and of costs. Mid-skill intensive industries show the weakest response: sales rose modestly (2.4%), while employment (-5.3%) and labour costs (-1.8%) declined. This aligns with worker reallocation patterns in

Figure 6, where mid-skill workers shifted toward high-skill and low-skill intensive sectors within France.

Within each industry group, the difference between labour cost and sales growth is not statistically significant, providing no evidence for an increase in the labour share. The point estimates differ across skill intensity groups: for high-skill and mid-skill intensive industries, point estimates suggest stronger sales growth than labour cost growth, while for low-skill intensive industries, point estimates indicate larger labour cost growth than sales growth.

The sector- and skill intensity analyses highlight two key results. First, output growth matches or exceeds labour cost growth across most sectors and industry groups, inconsistent with improved outside options compressing markdowns. The one exception—low-skill intensive industries—shows a rise in labour costs relative to output and material inputs, but the differences are imprecisely estimated. Second, local demand can explain the expansion in non-tradable and construction sectors alongside stagnation in the tradable sector. The strong growth in the "Other" sector may reflect demand from the broader border region or from Switzerland itself. Appendix Figure A15 provides complementary evidence, splitting firm outcomes by industry skill intensity and by eligible versus spillover labour markets; the results show broadly similar co-movement of output, material costs, and labour costs across space.

However, the weak aggregate tradable response conceals opposing dynamics across skill intensity groups. Appendix Figure A16 decomposes the tradable sector by skill intensity. The weak aggregate response masks an expansion of high- and low-skill intensive industries alongside a contraction in mid-skill intensive industries. Both patterns are spatially concentrated near the border: in eligible markets, sales and material costs rise by approximately 10 percent in high-skill intensive and 5–7 percent in low-skill intensive industries, while spillover market effects remain close to zero. Mid-skill intensive employment falls by approximately 17 percent in eligible markets during the free movement period. The concentration of tradable sales growth near the border is consistent with demand or productivity spillovers from the expansion of knowledge-intensive business services and high-tech manufacturing on the Swiss side (Beerli et al., 2021).

The preceding analysis examines total sales and labour costs, which combine employment changes with per-worker changes. To isolate more directly labour productivity, we examine per-worker outcomes in Table 10, where column 1 reports aggregate results. If improved outside options were the main driver, wages should rise without corresponding productivity gains. Instead, labour productivity, measured by value added per worker, rises by 3.1%, exceeding wage growth of 2.3%, though the difference is not statistically significant. Material costs per worker also rise, consistent with firms expanding output per worker rather than simply raising prices. These patterns are again consistent with firms scaling up production, rather than merely competing on wages.

Table 10. Impact on labour productivity, material costs and wages

					Tradable		
	All sectors (1)	Non-tradable (2)	Cons-truction (3)	Other (4)	All (5)	w/ trade reform (6)	w/o trade reform (7)
Panel A: Labour productivity							
$treat \times transition$	0.014	0.035	0.017	0.022	0.008	0.041	-0.024
	(0.007)	(0.015)	(0.007)	(0.011)	(0.011)	(0.018)	(0.014)
$treat \times free$	0.031	0.044	0.057	0.012	0.027	-0.001	0.021
	(0.010)	(0.021)	(0.012)	(0.012)	(0.019)	(0.031)	(0.018)
Observations	572	572	572	572	572	572	572
R^2	0.34	0.30	0.28	0.23	0.36	0.34	0.26
Panel B: Material Cost per worker							
$treat \times transition$	0.017	0.028	0.042	0.028	0.002	0.023	-0.024
	(0.008)	(0.015)	(0.013)	(0.015)	(0.014)	(0.019)	(0.017)
$treat \times free$	0.040	0.044	0.078	0.042	0.016	-0.022	0.019
	(0.013)	(0.019)	(0.016)	(0.019)	(0.028)	(0.036)	(0.028)
Observations	572	572	572	572	572	572	572
R^2	0.33	0.24	0.30	0.30	0.38	0.32	0.30
Panel C: Wages							
$treat \times transition$	0.015	0.013	0.022	0.009	0.017	0.008	0.019
	(0.004)	(0.007)	(0.008)	(0.004)	(0.005)	(0.007)	(0.005)
$treat \times free$	0.023	0.025	0.025	0.022	0.021	0.015	0.024
	(0.006)	(0.014)	(0.015)	(0.004)	(0.007)	(0.010)	(0.008)
Observations	572	572	572	572	572	572	572
R^2	0.48	0.48	0.36	0.54	0.35	0.26	0.39

Notes: Results from estimating equation (3). All outcomes are in logs. The regressions are weighted by sector-level employment in 1998. Standard errors clustered at the labour market level are in parentheses. *Data: DADS postes 1995–2007; Ficus 1995–2007.*

Productivity gains vary substantially across sectors—highest in construction (5.7%) and non-tradables (4.4%), modest in tradables (2.7%)—yet wage increases are uniform (2.0–2.6%). This disconnect suggests that productivity gains were not

fully passed through to workers.

Table 11. Impact on labour productivity, material costs per worker, and wages by industry skill intensity

	High-skill intensive ind. (1)	Mid-skill intensive ind. (2)	Low-skill intensive ind. (3)
Panel A: Labour Productivity			
$treat \times transition$	0.019	0.038	-0.028
	(0.016)	(0.014)	(0.017)
$treat \times free$	0.016	0.056	0.005
	(0.026)	(0.023)	(0.015)
Observations	572	572	572
R^2	0.27	0.33	0.30
Panel B: Material Cost per Worker			
$treat \times transition$	0.032	0.037	-0.032
	(0.019)	(0.015)	(0.016)
$treat \times free$	0.036	0.080	-0.018
	(0.022)	(0.027)	(0.014)
Observations	572	572	572
R^2	0.26	0.31	0.24
Panel C: Wages			
$treat \times transition$	0.021	0.012	0.016
	(0.007)	(0.004)	(0.004)
$treat \times free$	0.031	0.020	0.021
	(0.009)	(0.007)	(0.007)
Observations	572	572	572
R^2	0.52	0.40	0.43

Notes: Results from estimating equation (3). All outcomes are in logs. The regressions are weighted by cell-level employment in 1998. Standard errors clustered at the labour market level are in parentheses. *Data: DADS postes 1995–2007; Ficus 1995–2007.*

The productivity response shows sharper heterogeneity by skill intensity than by economic sector. Table 11 shows per-worker outcomes by industry skill intensity. Productivity gains are concentrated in mid-skill intensive industries (5.6%), which are stagnating rather than expanding—reflecting rationalization as firms maintain sales with fewer workers. In contrast, high-skill intensive and low-skill intensive industries, which expanded employment substantially, show at most modest productivity gains per worker (1.6% and 0.5% respectively). Thus, productivity gains reflect rationalization in stagnating industries rather than broad-based efficiency improvements: expanding industries grew primarily by adding workers, consistent with increased output demand, while contracting industries maintained output with fewer workers. Average wages increase similarly across all skill intensity groups (2.0–3.1%).

In summary, labour productivity increased by 3.1% in the aggregate, exceeding

wage growth (2.3%). The pattern of productivity gains—concentrated in locally-exposed sectors and in stagnating mid-skill intensive industries—indicates two distinct responses: expanding industries grew through hiring, while stagnating industries rationalized production.

Overall, the evidence on firms' outcomes does not support competition for workers as the dominant mechanism. Competition for workers would raise labour costs relative to output—especially in high-skill intensive industries—yet the labour share remained unchanged across almost all sectors and skill intensity groups. Instead, the strong sales growth in locally-exposed sectors, combined with productivity gains in stagnating rather than expanding industries, points toward demand-driven expansion: growing industries hired more workers, while stagnating industries rationalized production. Even within the tradable sector, high- and low-skill intensive industries expanded near the border while mid-skill intensive industries contracted, consistent with demand or productivity spillovers from Switzerland.

4.5.3 Discussion

The results reveal adjustments on several margins following the labour market integration. French workers took up higher-paying jobs in Switzerland while continuing to reside in the border region; the increase in commuting was concentrated among tertiary-educated workers (Section 4.2). At the same time, the active labour force grew by over 4 per cent, driven by population growth and higher labour force participation (Section 4.5.1). The response differed across skill levels: for tertiary-educated workers, population growth in eligible labour markets compensated the increase in cross-border commuting; for workers with mandatory education, both population growth and higher participation expanded the labour force. On average, wages rose for low- and mid-skill workers but not for high-skill workers; their wage gains were limited to high-skill intensive industries.

The bigger population and the increased number of high-earning cross-border commuters suggest a rise in local demand: Non-tradable and construction sectors expanded substantially, as did the "Other" sector—which comprises largely local and regional services such as utilities, transport, and financial services. In these sectors, output growth matched or exceeded the rise in labour costs, consistent

with demand-driven expansion rather than competition for workers compressing markdowns.

The expansion of tradable industries is harder to attribute to local consumer demand alone. Both high-skill intensive and low-skill intensive tradable industries grew, while mid-skill intensive tradables stagnated. Separating eligible from spillover labour markets provides additional insight: tradable sales growth was concentrated in eligible markets close to the Swiss border (Figure A16), with high-skill intensive tradables expanding by roughly 10 per cent near the border but showing only small, imprecisely estimated effects farther away. This spatial pattern is consistent with cross-border complementarities. As knowledge-intensive services and high-tech industries expanded on the Swiss side (Beerli et al., 2021), French firms in high-skill intensive tradable industries may have grown alongside them—providing complementary business services or specialised inputs. Low-skill intensive tradable industries also expanded predominantly near the border, consistent with demand for ancillary services linked to the broader economic expansion.

Beyond the reallocation of output across industries, the joint pattern of wages and employment points to adjustment of factor intensities within industries: high- and low-skill intensive industries expanded employment and wages of workers in their respective specialization. This is consistent with firms adjusting their production techniques toward their skill specialization, absorbing mid-skill workers from stagnating mid-skill intensive sectors in the process[28].

Overall, the commuting outflow was more than offset by population and participation responses, and the resulting increase in local demand—accompanied by cross-border complementarities in tradable industries—enabled firms to expand. The integration set off a broader adjustment in which overall supply and demand of labour grew together, but with substantial reallocation of workers across industries and increasing specialization of labour inputs within industries.

[28] See the introduction of Dustmann and Glitz (2015) for a discussion of labour demand with a simple CES production technology.

5 Conclusion

We study the effects of integrating local labour markets between France and Switzerland. The 1999 reform provides plausibly exogenous variation in the outside options of French workers. Wages rise by 1.5 to 2.3 per cent, employment remains stable, and low-skill employment increases by nearly 6 per cent.

Although the propensity to commute to Switzerland rises only among tertiary-educated workers, wage gains accrue to low- and mid-skill workers—inconsistent with Swiss employers simply bidding up wages for workers with the best outside options. In addition, workers reallocate from stagnating mid-skill intensive industries toward expanding high- and low-skill intensive sectors, where wages and employment rise.

Wages and employment in France rise together because both labour supply and demand adjust. The labour force grows by over 4 per cent through population growth and higher labour force participation, concentrated in eligible markets closest to the border.

On the demand side, sales growth keeps pace with rising labour costs—with no evidence of a rising labour share—consistent with output demand-driven expansion rather than compression of wage markdowns. Sectors more exposed to local demand expand substantially, while in the tradable sector, high-skill intensive and low-skill intensive industries expand near the Swiss border as mid-skill intensive industries stagnate—consistent with cross-border complementarities with expanding Swiss industries.

Overall, the integration led to a local boom despite increased competition for workers from Switzerland. Our results demonstrate that when labour supply is sufficiently elastic—through population and labour force participation responses—markets can absorb additional demand for workers without employment losses. Population growth and higher participation offset the additional demand for workers, while increased demand for output lets firms expand. Underlying this growth was substantial skill-biased reallocation across industries, with high- and low-skill intensive sectors deepening their specialisation in labour inputs.

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Appendix

Appendix A Institutional Setting

A.1 Wage setting in France

Wages are set at three different levels. The government defines a national minimum wage. Bargaining at the industry level between employers and trade unions defines minimum wages at the industry-occupation level.[29] In 1992, these agreements covered around 90% of workers. Since the agreements only define wage floors, single employers keep considerable room to pay higher wages. As a result, an important fraction of wages are set at the company-level (OECD, 2004, p. 151), either through bargaining with unions or through individualised pay rises. For instance, 75 percent of large firms (above 50 employees) granted their workers individualised pay rises in the year 1998 (Barrat et al., 2007). As the French labour market is similarly decentralised as the German or the Dutch market, studies have found wage dispersion across employers and that employer competition is important in determining French wages (Abowd et al., 1999; Cahuc et al., 2006) .

A.2 Details on the bilateral treaties

A.2.1 All agreements

The agreements between Switzerland and the EU from 1999 cover a range of areas. Table A1 shows for each agreement the relevant change and its effects if they are known.

[29] The majority of these agreements are at the national level.

Table A1. The Content of the Bilateral Treaties between Switzerland and the EU

Agreement	Change	Effects
Free movement of people	Access to labour markets without restrictions	Expansion of local labour markets
Mutual recognition agreement	lower administrative costs for approval of products for some manufacturing sectors	Cost savings of 0.5 – 1 % of product value per year. Corresponds to less than 0.2% of trade volume between EU and Switzerland. Increased mostly imports to Switzerland at the intensive margin.
Land traffic	Higher weight limit on carriages, tax on alp-crossing transport	By 2006, accumulated reduction in cost for transports between Switzerland and EU of 8.3%
Air traffic	More competitive pressure for airlines	More and cheaper connections from Geneva Airport
Public procurement	Swiss purchasers (municipalities, utilities, rail, airports, local traffic) need to tender internationally	Unknown (10% of bidders for municipal purchases were foreign)

Notes: The treaties on cooperation on research and on agriculture were excluded from the table. *Sources: Eidgenösisches Aussendepartement (EDA) (2016), Hälg (2015), Staatsekretariat für Wirtschaft (SECO) (2008).*

A.2.2 Other regulations for cross-border commuters

The labour market agreement made it easier for French residents to get a job in Switzerland as a border commuter. There was only a change in health insurance coverage, while taxation, unemployment insurance and the way pensions are calculated did not change with the bilateral agreements.

Taxation The bilateral agreements explicitly do not touch the existing accords on double taxation between Switzerland and other EU member states (European Union and Swiss Government, 1999, Article 21). This also includes the definition of a cross-border commuter for tax purposes. The treaty on double taxation between France and Switzerland from 1966 makes it possible for the earnings of French

residents in Switzerland to be taxed in Switzerland (French and Swiss Government, 1966). This is the case in Geneva, where the canton of Geneva transfers 3.5 per cent of the gross earnings of French commuters in Geneva to French authorities. In contrast, other Swiss cantons close to the French border do not tax the earnings of French border commuters (French and Swiss Government, 1983).[30] In particular, French residents who work in these cantons pay their taxes in France, and the French authorities transfer 4.5 per cent of the gross earnings of border commuters to Switzerland.

Unemployment insurance French residents who work in Switzerland contribute to the Swiss unemployment insurance both before and after the bilateral treaties with the EU. Until 2009, Switzerland transferred the contributions of French commuters employed in Switzerland to France. Unemployment benefits are paid by the system of the country of residence, except for short-time work, where they are paid by the country of work. Employment spells in Switzerland and France count equally towards the calculation of how long the worker receives unemployment benefits, and this was also the case before 1999 (French and Swiss Government, 1978).

Health insurance With the bilateral treaties, it becomes mandatory for cross-border commuters to register with the Swiss health insurance system, and they can choose whether they want to be treated either in the country of residence or in the country of work. Before 1999, cross-border commuters could voluntarily register with the Swiss health insurance system (Swiss Federation, 1995; Bundesrat, 1999).

Pensions Contributions to pension schemes in each country are derived from the relative contributions to the system in either country, both before 1999 (French and Swiss Government, 1975, Article 18) and thereafter (European Council, 2004, Article 46 2a).

[30] The cantons are: Bern, Solothurn, Basel-Stadt, Basel-Landschaft, Vaud, Valais, Neuchâtel, Jura.

Border controls During the sample period, the Swiss border was an external border to the Schengen area. While traffic that crosses external Schengen borders is subject to border controls, "cross-border commuters who are well-known to the border guards are subject to only random checks" (European Commission, 2006). Anecdotal evidence suggests that border guards on both sides of the Swiss border had a similar practice until Switzerland joined the Schengen area in 2008. In particular, around two per cent of cross-border commuters were checked by Swiss guards (Aeschlimann, 2004), and their peers across the border were similarly lenient (Bischoff, 1997; Saameli, 2002; Kislig, 2004).

Appendix B Further Information On The Data

B.1 General data processing

Sample restrictions We focus on firms and workers in the private sector, excluding agriculture. We keep workers that are at least 16 and at most 64 years old. We drop apprentices, interns, and workers with missing data on occupation or place of work.

Local labour markets Large parts of the analysis rely on data aggregated at the cell level. A labour market cell is defined as a combination of the local labour market, year, demographics (e.g., skill, education, and/or gender), and—in some specifications—industry type. Local labour markets are defined by the French Statistical Office. There are 297 units in France and their average size and commuting patterns are comparable to counties in the United States.

Skill and education groups Skill groups are defined based on workers' two-digit occupational classification.[31] High-skill occupations include managers, executives, scientists, engineers, and lawyers. Mid-skill occupations include technicians, foremen, skilled blue-collar workers and administrative employees. Low-skill occupations include unskilled blue and white-collar workers (craft, manufacturing, sales clerks). When possible, we group workers into three education groups based on their highest degree[32]; the education groups are mandatory education, secondary education and tertiary education.

[31] The classification is similar to Combes et al. (2012) and Cahuc et al. (2006). There was a major revision of occupational classifications in 2002, but the 2-digit variable used for the skill assignment ("socioprofessional category") was reported with almost no change until 2008. It changed in 2002 for some managers, but both their old and their new two-digit socioprofessional categories lie in the high-skill group.

[32] The administrative datasets do not report workers' education. But there is a reasonable correspondence between skill and education groups: According to the labour force survey in 1998, in the treated labour markets, 60 per cent of high-skill employees had a tertiary education, 57 per cent of mid-skill employees had a secondary education, and 55 per cent of low-skill employees had a mandatory education.

Sectors and skill intensity of industries We define four economic sectors: *Tradable sectors* are all manufacturing sectors and business services as in Combes et al. (2012); *construction* and *non-tradable* sectors are defined as in Mian and Sufi (2014); the remaining sectors are classified as *other*. The *other* sectors contain, for example, utilities, transport, and financial services. For some results we further separate sectors by whether they were exposed to the trade agreements or not. The list of four-digit sectors is taken from Bello and Galasso (2020).

We also classify industries by skill intensity—the share of high-skill workers at the 4-digit industry level in the pre-treatment period. Industries are split into three groups of roughly equal size: high, mid, and low skill intensity.

Tables A2 and A3 show the employment shares and skill composition by sector and skill intensity group in the pre-treatment period (1996–1998). The tradable sector accounts for more than half of employment and has a similar skill composition to the overall sample. Non-tradable sectors have the highest share of low-skill workers. Regarding skill intensity groups, high-skill-intensive industries are underrepresented in the treated labour markets compared to all of France, which was used to define the tercile cutoffs. By construction, high-skill workers are concentrated in high-skill-intensive industries and low-skill workers in low-skill-intensive industries.

Table A2. Employment share by sector and within-sector skill composition (1996–1998)

	Non-tradable	Construction	Other	Tradable
Employment share (%)	10.7	10.2	24.9	54.2
Within-sector skill shares (%)				
High skill	9.5	8.1	11.3	8.5
Mid skill	35.2	74.8	69.3	62.6
Low skill	55.3	17.1	19.4	28.9

Table A3. Employment share by skill intensity and within-industry skill composition (1996–1998)

	High-skill intensive	Mid-skill intensive	Low-skill intensive
Employment share (%)	23.4	38.9	37.7
Within-industry skill shares (%)			
High skill	17.4	8.5	5.2
Mid skill	68	66.4	55.2
Low skill	14.6	25.1	39.6

B.2 Matched employer-employee data

The main data come from social security declarations by employers ("DADS") from 1995 to 2007. For each year, the data report employment spells between workers and establishments. For each spell, the data report salary, hours worked, gender, age, occupational category, municipality of work and residence, the start and end date, as well as an indicator of whether it is the worker's main spell in that year.[33] We use two versions of the DADS data: The *DADS Postes* (Insee [Producer], 1995) that has limited longitudinal information on workers and the *DADS Panel* (Insee [Producer], 2017) where we observe workers across years but only a subset of them.

B.2.1 Sample selection and wage calculation

The *DADS* record all spells that are subject to social security, including many small spells and salary payments at the beginning of the year that refer to the previous year if, for instance, the worker left the firm. We follow the recommendation by Insee to retain the relevant workers. First, we drop so-called "anecdotal employment". The definition is also from Insee, and it aims to further retain only actual spells in any year. The definition is as follows:

1. The worker works at least 78 hours for the establishment.

[33] The definition is provided by Insee and is based on the spell's duration and total compensation.

2. During the whole spell, the worker works at least 4.9 hours per week on average.

3. The salary is at least 381 Euros (as of 1999; we adjusted the threshold for inflation).

4. During the whole spell, the average monthly salary is at least 381 Euros (also inflation-adjusted).

To calculate employment levels, we only keep the main spell of worker in any given year. This variable is calculated by Insee and reported in the data.

To calculate the wage growth of establishment stayers (see below) in the *DADS Postes*, we keep workers if they have a non-anecdotal spell at the same establishment in both years. We do not impose the restriction of having the main spell in both years at the same establishment, as this would drop workers who get hired late in the preceding year or separate early in the current year. Among non-anecdotal spells in a given year, this procedure keeps 70 per cent of high-skill spells, 67 per cent of mid-skill spells and 55 per cent of low-skill spells during the full sample period in all of metropolitan France. In the *DADS Panel*, we keep worker spells when they are not anecdotal and when they are the worker's main spell.

While salaries are not per se top- or bottom-coded, we winsorise hourly wages at the first and 99th quantiles.

B.2.2 DADS Postes

We use the full-count records for measuring employment and wage growth at the cell level. Employment is the count of workers in employment on June 30 each year; this includes part-time workers because the reporting of part-time employment changes during the sampling period.[34]

Index of wage growth The wage in a cell is an index of workers' wage growth relative to 1998 that is robust to changes in the composition of the workforce.

[34] We find similar effects for employment and hours which reassures that the employment effects are not driven by more part-time work.

It is based on the cumulated change in residual wages of workers who work at the same establishment for two consecutive years. In any given year, the *DADS Postes* reports wages and hours from the preceding year only if the worker was employed at the same establishment in the preceding year. The following procedure calculates the average wage growth of establishment stayers in four steps. First, in any given year, we select all workers who are employed at the same employer in the current and in the previous year. This is the only sampling condition; i.e., a worker in 2002 is included independently of whether she was employed in any of the years besides 2001 and 2002. This also means that we can only shut down worker selection on their level of wages, but not on their wage growth over time. Second, we residualised their wages with respect to gender, age and year using a regression model estimated on a ten per cent subsample of the French workforce. Third, we calculate a worker's wage growth as the change in the log residual hourly wage between the previous and the current year. Because worker-level growth rates exhibit large tails, we winsorise them at the first and 99th percentile. Fourth, we aggregate workers' wage growth. We aggregate within a cell where the skill of the worker is measured in the preceding year. Cumulating across years gives the final index of wage growth in a cell relative to 1998. For instance, the outcome in 2002 is the sum of the average worker-level wage growth in the cell for the years from 1998 to 2002.

Wage measures when workers self-select to Switzerland The index of wage growth and the worker-level wage regressions with worker fixed effects are based on worker-level variation in wages over time. They are thus robust to worker selection if workers select into Swiss jobs based on their average wage in the two countries. But we need to assume that there is no worker selection based on future wage growth. This assumption is not testable but it is weaker than in existing work on the aggregate effect on outside options. For instance, the idea in Beaudry et al. (2012) is that a construction worker in New York can ask for a higher wage than a construction worker in Miami when labour demand in manufacturing is stronger in New York than in Miami. As their empirical strategy relies on changes in cross-sectional wages in construction in New York versus Miami, it assumes that

labour demand growth in manufacturing has no direct impact on the composition of workers in construction in terms of unobservables, e.g. ability. Despite this, it is possible that some of the skill differences in the wage impact we find are driven by differential selection across skill groups. However, that selection has to happen on expected wage growth. Given the results, the most plausible scenario is that new high-skill commuters are positively selected with respect to future wage growth, which would imply that we underestimate the impact on wages in France.

B.2.3 DADS Panel

The main analysis focuses on the wage index that captures within-worker, within-firm wage growth. To capture wage growth both within and across firms, we also estimate worker-level wage effects using the *DADS Panel* dataset, which is a four per cent sample of the full-count DADS data. The panel structure allows us to control for worker and firm fixed effects. The data are at the spell-year level; a spell that lasts five years therefore contributes five observations to the data. We select workers who during the sample period have an employment spell in one of the treated or control labour markets.[35] We assign workers to skill groups based on the occupation in the current spell. This yields a sample of approximately 74,000 workers. This sample size is too small to precisely estimate effects in detailed subgroups, so we use the Panel only to complement the main results.

B.3 Population census

The census (Insee [Producer], 1990) is representative of the entire population at the place of residence and includes cross-border workers as well as non-employed persons. The relevant census years are 1982, 1990, 1999, 2006 and 2007. The cell-level outcomes we measure are population, the propensity to commute to Switzerland and labour market status: the participation, employment and unemployment rate. We assign the census data from 1999 to the pre-period since the data were collected already in March 1999—shortly after the labour market integration was

[35] The data only report employment spells; information on unemployment receipts is not available in the sample years.

announced in December 1998. To the extent that the reform already has effects in this short time period, the estimates would understate the true effects.

For 1982, 1990 and 1999, we use the 25% sample of the population census, which reports the labour market variables relevant to the paper. Since 2006, the census is conducted on an annual rolling basis but on a smaller scale. We use the data for 2006 and 2007 which were collected in a 5-year window around the respective year. We separate unemployed from inactive persons based on the labour market status they report.

Accounting for demographic trends The treated and control labour markets differ in population dynamics before the labour market integration. First, the out-migration rate is lower in the treated than in the control labour markets. This holds for the $1982-1990$ and for the $1990-1999$ census periods. Second, the working-age population is growing in the treated labour markets because of differences in entry to and exit from the working-age population. We account for these trends as follows. The first set of controls are the in- and out-migration rate of group g between 1990 and 1999 in labour market m, normalized to reflect annual rates. We interact these migration rates with a full set of year dummies, which allows the migration rates to have a different impact on the outcome in each year. The second set of controls are the flows into and out of the working-age population in year t. The outflows from the working-age population for $1990-1999$ are the number of workers in 1990 that are 56 to 64 years old, relative to the working-age population in year 1999. The inflows into the working age population for $1990-1999$ are the number of workers in 1999 that are 16 to 24 years old, relative to the working-age population in year 1999. We define inflows to and outflows from the working-age population between 1999 and 2006 and 2007 in a similar way. Figure A10 compares the results for the models with and without these demographic controls.

Alternative specifications that extrapolate the 1990 to 1999 trend in the outcome yield very similar results.

B.4 Labour Force survey

The survey (Insee [Producer], 1993) is also collected at the place of residence, but the sample size is much smaller than the census and the collection methodology changed in 2003. It is collected in March of each year, except for 1999, when it was collected in January because of the census. Persons are included in the sample for three consecutive years. We use the survey to study the change in the propensity to commute. We include all persons if they satisfy the age restriction. The data report the country of the workplace, allowing the identification of cross-border commuters.

The labour force survey was redesigned in 2003. Many variables can be corresponded between the two surveys, but there is a sharp drop in the measured number of cross-border commuters from 2002 to 2003 inconsistent with the Swiss data. This is why we only use the data from the old survey until 2002. We calculate transitions between employment states and employment in Switzerland based on the retrospective monthly diaries that workers fill out. The diaries report the labour market status, but the country of work is only reported yearly. If a new cross-border worker reported having been unemployed in one of the twelve months preceding the survey, she is classified as having transitioned to Switzerland from unemployment.

Data for estimating the wage gains from getting a Swiss job We focus on employees in the private sector. Because the survey does not follow persons when they move house and to make sure the worker fixed effect captures the same person in different years, we focus on persons who report having lived in the same municipality in the last year. The data do not report whether the worker changed house or not, but since French municipalities are small, the fraction of within-municipality movers is likely small.

B.5 Firm-level data from tax declarations

The firm-level balance sheet data are drawn from *FICUS* (Insee and Ministère des Finances (DGFiP) [Producer], 1995). The data contain annual information on the total wage bill, the book value of capital, sales, material use as well as other

observables such as the municipality of the headquarters, a unique firm identifier and the five-digit industry of economic activity (NACE classification). The data are quasi-exhaustive and exclude very small firms with annual sales of less than 80'300 Euros[36] as well as finance and insurance companies. The data cleaning and preparation follows Gopinath et al. (2017), and nominal variables are deflated at the two-digit industry level with deflators from EU-KLEMS.

B.6 Swiss data on commuters

The data report, since 1996, the counts of cross-border commuters by municipality of work (Federal Statistical Office, 2017). The counts are estimated based on commuting permits issued by Switzerland and other administrative and survey data. Because the data do not report in which country the commuter lives, we use the work municipality's closeness to the French border as a proxy for the country of residence.[37] We use these data to document the time trend in cross-border commuting—there is no French data set that reports commuter counts from a large sample at a high frequency, and that covers the full sample period.[38]

[36] This threshold is from 2010, but only changes marginally over time (Di Giovanni et al., 2014).

[37] Specifically, closeness for a municipality is defined by the country to which the closest border crossing connects.

[38] The Swiss data are collected at a higher frequency than the French census and cover more years than the French labour force survey.

Appendix C Treatment Group And Matching

The border municipalities were all French municipalities within 10 km from the French-Swiss border and the municipalities in Haute Savoie and Pays Gex. They were defined in an earlier treaty between France and Switzerland from 1946 that regulated the mobility of residents in the border area (Swiss Federation, 1946).

C.1 Defining the treated labour markets

Each labour market i consists of a set of municipalities $\{j\}_{j=1}^{J_i}$. Let B_F denote the set of border municipalities on the French side.[39]

We call a labour market *eligible* if it contains at least one border municipality, i.e. $\{j\}_{j=1}^{J_i} \cap B_F \neq \emptyset$. This yields 12 eligible labour markets; denote this set L_E.

For each labour market i, let d_i be the distance to the nearest Swiss border crossing of its farthest municipality:

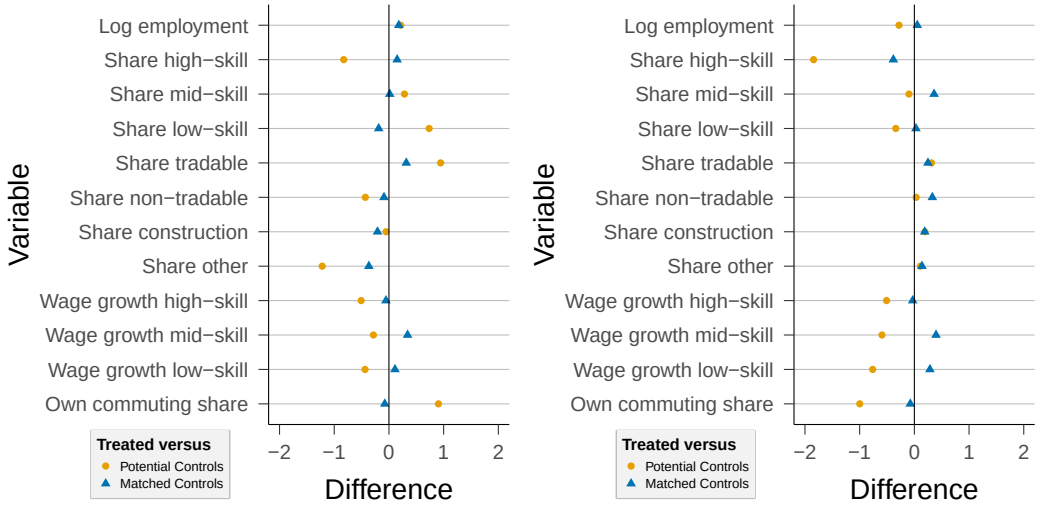
$$d_i = \max_{j \in \{1,\ldots,J_i\}} dist_{j,\text{Switz}}.$$

The treatment cutoff is the largest such distance among eligible labour markets, $\bar{d} = \max_{i \in L_E} d_i$, which yields $\bar{d} = 84$ km. A labour market is *treated* if $d_i \leq \bar{d}$, i.e. all its municipalities lie within 84 km of the nearest Swiss border crossing. Among treated labour markets, those in L_E are called *eligible* and the remaining ones—which are treated but contain no border municipality—are called *spillover* markets.

C.2 Balance before and after matching

Figure A1 provides a graphical view of covariate balance before and after matching. Yellow dots compare the treatment group to all potential controls; blue triangles compare the treatment group to the matched controls. Matching substantially improves balance across all covariates.

[39] Recall that this is the grey area on the French side of the border in Figure 1b.



(a) Normalized Differences

(b) Log Ratio of S.D.

Figure A1
Balance Before and After Matching

Notes: The figure shows the normalized differences and log ratio of standard deviations between the treatment group and the control group for each variable as indicated on the y-axis. Normalized differences are the differences in means between the treated and the control units, normalized with respect to the standard deviations of the treated and control units. Controls are all potential controls for the yellow dots and the matched controls for the blue triangles. The variables refer to: log employment, employment share of workers in high, mid and low-skill occupations, employment share in tradable, non-tradable construction and other sector, all in 1998. Wage growth for high, mid and low-skill is cumulative residual wage growth of firm stayers in two consecutive years from 1995 to 1998. Own commuting share is the share of employees in the labour market that also live in that market in 1998. See the Table 1 and text for details.

Appendix D Additional Results

D.1 Further evidence on commuting

D.1.1 Recent migrants and the wage premium of Swiss Jobs

Table A4 replicates Table 2 while including recent migrants in the sample. The estimated cross-border wage gap is virtually identical, confirming that the exclusion of migrants does not drive our results.

Table A4. Wage gap between French and Swiss jobs: not dropping migrants

	Log(hourly wage)					
	(1)	(2)	(3)	(4)	(5)	(6)
Swiss job	0.497	0.190				
	(0.013)	(0.046)				
Swiss job - Non-tertiary educ.			0.512	0.188		
			(0.017)	(0.054)		
Swiss job - Tertiary educ.			0.437	0.199		
			(0.014)	(0.114)		
Swiss job - Low skill occ.					0.529	0.117
					(0.013)	(0.059)
Swiss job - Mid skill occ.					0.497	0.201
					(0.014)	(0.046)
Swiss job - High skill occ.					0.296	0.274
					(0.014)	(0.041)
Labour market FE	Y	N	Y	N	Y	N
Worker FE	N	Y	N	Y	N	Y
Tenure and industry controls	N	Y	N	Y	N	Y
Observations	50162	50162	50162	50162	50162	50162
Number of years	10	10	10	10	10	10
R^2	0.43	0.93	0.43	0.93	0.59	0.93

Notes: The sample are residents in the treatment and control areas (see section 3.3.2) employed in the private sector. *Swiss job* indicates workers employed in Switzerland; non-tertiary education pools workers with less than tertiary education. *Labour market FE* are fixed effects for the labour market of residence. *Worker FE* are person fixed effects. *Tenure and industry controls* are a cubic in the number of months since the start of the employment spell and fixed effects for 30 broad industry groups. All regressions include fixed effects for year and a gender-specific cubic in age. Regressions are weighted using the survey weights. Standard errors clustered at the labour market level are in parentheses. *Data: Labour Force Survey 1993–2002.*

D.1.2 Positive selection into cross-border commuting

Table A5 documents the positive selection of cross-border commuters. When employed in France, commuters earn 22 to 28 log points more than comparable non-commuters (columns 1–3), confirming that commuters were already positively se-

lected before obtaining a Swiss job. This selection premium is substantially smaller for workers with tertiary education (columns 4–6).

Table A5. Gap in French wages between commuters and non-commuters

	Log(hourly wage)					
	(1)	(2)	(3)	(4)	(5)	(6)
Commuter	0.216	0.261	0.275			
	(0.053)	(0.048)	(0.053)			
Commuter - Non-tertiary educ.				0.231	0.276	0.297
				(0.052)	(0.050)	(0.050)
Commuter - Tertiary educ.				0.120	0.160	0.128
				(0.163)	(0.158)	(0.143)
Secondary educ.	0.175	0.169	0.150	0.175	0.169	0.150
	(0.006)	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)
Tertiary educ.	0.490	0.500	0.435	0.490	0.500	0.435
	(0.010)	(0.010)	(0.011)	(0.010)	(0.010)	(0.011)
Tenure controls	N	Y	Y	N	Y	Y
Industry controls	N	N	Y	N	N	Y
Observations	47161	47161	47161	47161	47161	47161
Number of years	10	10	10	10	10	10
R^2	0.36	0.41	0.47	0.36	0.41	0.47

Notes: The sample are residents in the treatment and control areas (see section 3.3.2) employed in the private sector in France and not moving across municipalities in two consecutive years. *Commuter* indicates workers that will be or were employed in Switzerland after or before the observed French wage; non-tertiary education pools workers with less than tertiary education. *Secondary educ.* and *Tertiary educ.* are dummies for the two education levels. *Tenure controls* and *Industry controls* are a cubic in the number of months since the start of the employment spell and fixed effects for 30 broad industry groups, respectively. All regressions include fixed effects for year, for labour market of residence, and a gender-specific cubic in age. Regressions are weighted using the survey weights. Standard errors clustered at the labour market level are in parentheses. *Data: Labour Force Survey 1993–2002.*

D.1.3 Commuting patterns near the border in Switzerland

Here we closely follow Beerli et al. (2021, figure 2, panel A), but we use a different dataset[40] and we report the annual count of commuters rather than the share of commuters in total employment in Switzerland. The count is more relevant for understanding the magnitude of commuting from France to Switzerland.

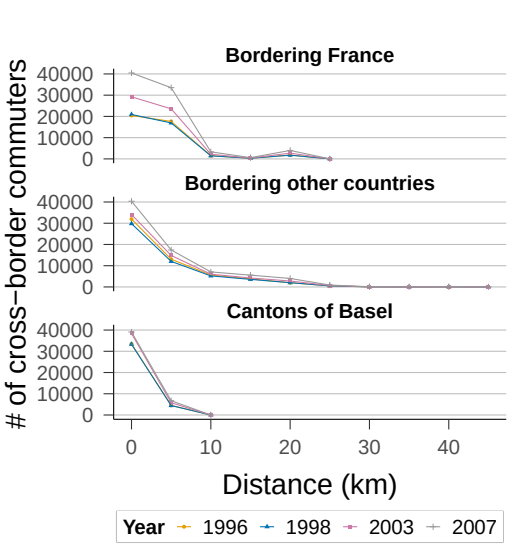
Figure A2a shows the number of commuters in Swiss municipalities in the border region for different distance bins from the next border crossing. The panels split the data into three broad groups, proxying for the likely country of origin of the cross-border commuters: municipalities close to France, municipalities in the Basel area which is close to Germany and France, and municipalities close to other regions.[41] Comparing the counts in 1996 and 1998 indicates no pre-trend in commuting during that time period. Consistent with the results in the paper, the figure shows that French residents already started commuting substantially more to Switzerland during the transition period from 1999 to 2003. In fact, the change in the number of commuters is almost the same in the transition and in the free mobility period.[42]

Figure A2b shows a similar picture of the place of residence of the commuters in eligible municipalities. In the municipalities closest to the border, cross-border commuters already made up more than a fourth of the population in 1999 and before. Again the figure does not indicate any pre-trend in the fraction of commuters, except for a drop between 1990 and 1999 in the municipalities closest to the border. From 1999 to 2007, the fraction of commuters increases in almost all eligible municipalities, but most strongly closest to the border.

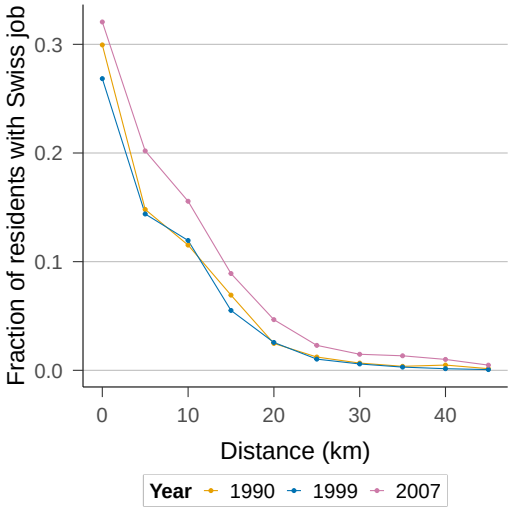
[40] The survey data they use is not available anymore at the municipality level, preventing us from exactly reproducing their figures.

[41] Closeness is defined by the country to which the closest border crossing connects. The data do not report the place of residence of the commuters.

[42] When pooling all groups together, the increase is also evident already in the transition period. This is in some contrast to the evidence in Beerli et al. (2021), who find no increase in the fraction of commuters from 1998 to 2004 in Swiss municipalities closest to the border. The difference could stem from the different measure or from the different dataset used.



(a) Number of commuters in Switzerland



(b) Fraction of French residents with a job in Switzerland

Figure A2
Residence and workplace of cross-border commuters

Notes: Panel A2b shows, for different years, the fraction of residents in the French border region who have a job in Switzerland. The sample are all eligible French municipalities. Panel A2a shows the number of commuters by year, by the distance to the next border crossing, and region. The sample are all Swiss municipalities that are in either of the border regions to France, Germany, Italy or Austria. The regions proxy for the likely country of residence. *Cantons of Basel* refers to Swiss side of the Basel Metropolitan area (cantons Basel-Stadt and Basel-Landschaft), bordering both Germany and France. *Bordering France* are all other municipalities whose closest border crossing is to France. *Bordering other countries* are municipalities whose closest border crossing is to Germany, Italy or Austria and are not in either of the Basel cantons. In both panels, municipalities are grouped by 5 km-distance bins. The bin at 10 km, for instance, refers to municipalities that are between 10 and 15 km away from the next border crossing. *Data: BFS (Switzerland); Population census (France) 1982–2007.*

D.1.4 Additional evidence on commuting with French data

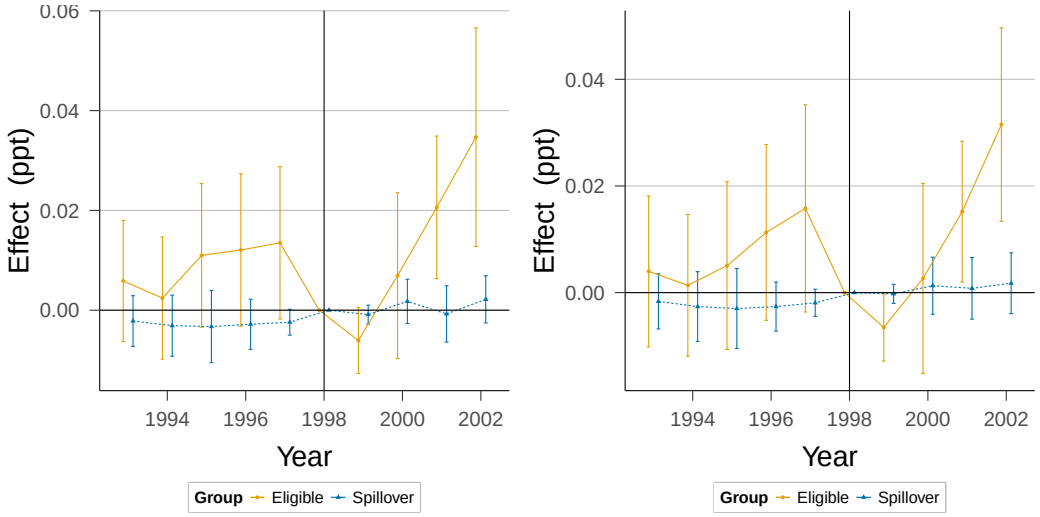
Here we estimate the impact of the labour market integration on cross-border commuting in the labour force survey until 2002. Since commuting was initially restricted to residents from the border region, we compare the commuting behaviour of residents in the treated group with those of residents in the control group. Because the eligibility to commute varied by municipality, we estimate the following

regression for person i residing in municipality c in year t:

$$y_{ict} = \alpha_c + \alpha_t + \sum_{\tau \neq 1998} \beta_\tau treat_BordReg_c \times 1[t = \tau] + \sum_{\tau \neq 1998} \theta_\tau treat_noBordReg_c \times 1[t = \tau] + \gamma X_{ict} + v_{ict}. \quad \text{(A.1)}$$

Municipality fixed effects α_c absorb permanent differences in the commuting propensity across municipalities; year fixed effects α_t absorb differences in the commuting propensity across years that are common to all municipalities. $treat_BordReg_c$ is a dummy indicating whether the municipality belongs to the eligible area in the treated labour markets; $treat_noBordReg_c$ is a dummy indicating whether the municipality belongs to the non-eligible area in the treated labour markets. γX_{ict} includes personal covariates such as age, gender and education. The coefficients β_τ are of main interest since they measure the evolution of the commuting propensity to Switzerland relative to 1998. The coefficients θ_τ should be zero since the residents of these municipalities are not allowed to start commuting. The regressions are weighted using the survey weights. Because of the small sample size of the labour force survey, we cannot estimate equation (A.1) by subgroup—the municipality-group fixed effects would not be identified in many cases.

The results from the estimating equation (A.1) are shown in Figure A3. The results are similar regardless of whether we consider the whole population (as in panel A3a) or only people who lived in the same municipality in the previous year (panel A3b). While there is no significant trend in the propensity to commute to Switzerland from 1993 to 1998, this changed in the year 2000 when more and more residents started commuting to Switzerland. By 2002, the fraction of residents in the border municipalities with a job in Switzerland is 4 percentage points higher compared to 1998. The figure also confirms that residents in municipalities that were not eligible to commute did not do so. The standard errors for the eligible areas are large because the number of eligible municipalities is small and because the treatment likely varies across space—that is, stronger in areas closer to the Swiss border.

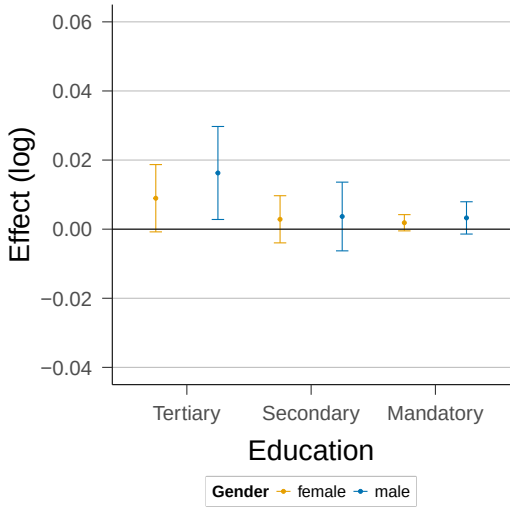


(a) All residents (b) No migrants

Figure A3
Commuting across French municipalities

Notes: The Figure shows the annual point estimates from equation (A.1). *Eligible* are municipalities in the border region; *Spillover* are other municipalities in the treated labour markets. Panel A3a shows the results with all residents; panel A3b shows the results when people are excluded that did not live in the same municipality in the previous year. *Data: Labour Force Survey 1993–2002.*

Figure A4 shows that the impact on commuting is similar for men and women within education groups. This contrasts with the results of Bütikofer et al. (2022) who find, in response to the Öresund bridge opening, a larger rise in commuting to Denmark by Swedish men than women. This difference can be explained by the fact that women are more sensitive to commuting time than men (Le Barbanchon et al., 2020), and by the commuting distances involved in each case: distances are small between France and Switzerland—see Figure A2b—but substantial between Malmö and Copenhagen. Thus, women reacted less to the new employment options than men in the Danish-Swedish case but not in the French-Swiss case.



(a) By education and gender

Figure A4
Heterogeneous impact on commuting propensity

Notes: Figure A4a shows the estimated impact of the labour market integration by education group (columns) and by gender (color) in the eligible markets, using equation (A.2) and including controls for exogenous changes in the size of the working-age population (see section 3.3.1 in the main text). The error bars are 95% confidence intervals clustered at the local labour market level. *Data: Population Census 1982–2007.*

D.2 Robustness checks

D.2.1 Alternative matching approaches

We use two alternative matching strategies. In the first, we do not match on pre-trends in wages and thus match on characteristics in the 1998 cross-section: wages by skill group, total employment, employment shares by skill group and by sector, the own commuting share and the number of establishments per worker. In the second, we use entropy balancing (Hainmueller, 2012); this matching approach calculates weights for all potential control units so that the first and second moments of the distribution of covariates in the treatment and the control areas are identical. We match on the following covariates: own commuting share, total employment, skill-specific employment shares, industry employment shares, average wages in 1998 and average wage growth from 1995 to 1998. We use total employment in 1998 as the starting weight of the algorithm. The method requires setting a

balancing constraint m so that the difference of (weighted) means and variances between the treatment and the control group is at most m. We use $m = 0.0001$.

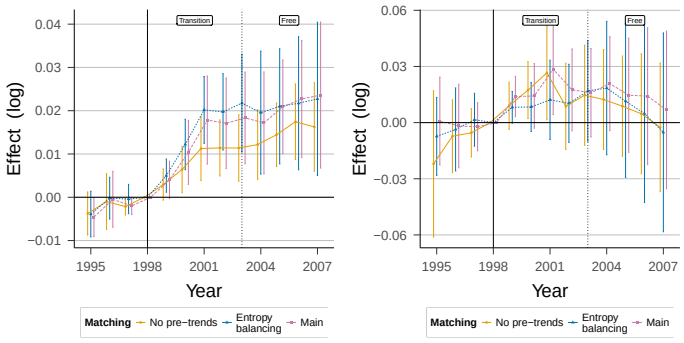
Both strategies use different units in the control group than the main matching strategy. When using cross-sectional characteristics only, 20 of 22 control units change compared to the baseline matching strategy. When using entropy balancing, the control units from the main matching strategy make up 25 per cent of the total weight.

Table A6. Robustness: alternative matching strategies

	Within-firm, within-worker wage growth				Employment			
	All professions	High skill	Mid skill	Low skill	All professions	High skill	Mid skill	Low skill
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Not matching on pre-trends								
$treat \times transition$	0.010	-0.004	0.014	0.008	0.024	-0.001	0.022	0.041
	(0.003)	(0.004)	(0.004)	(0.004)	(0.009)	(0.018)	(0.011)	(0.014)
$treat \times free$	0.017	-0.010	0.021	0.016	0.014	-0.024	0.008	0.045
	(0.004)	(0.006)	(0.005)	(0.006)	(0.014)	(0.024)	(0.018)	(0.021)
Observations	572	572	572	572	572	572	572	572
R^2	0.51	0.45	0.51	0.43	0.47	0.54	0.53	0.51
Panel B: Entropy balancing								
$treat \times transition$	0.017	-0.003	0.022	0.013	0.014	0.021	0.003	0.040
	(0.004)	(0.007)	(0.004)	(0.004)	(0.012)	(0.024)	(0.013)	(0.022)
$treat \times free$	0.022	-0.008	0.029	0.018	0.010	0.030	-0.016	0.069
	(0.008)	(0.010)	(0.009)	(0.008)	(0.026)	(0.043)	(0.037)	(0.040)
Observations	3380	3380	3380	3380	3380	3380	3380	3380
R^2	0.02	0.00	0.02	0.01	0.01	0.00	0.00	0.01

Notes: Results from estimating equation (3). Employment is in logs, the wage index in levels. The wage index is calculated from workers that remain employed at their firm in two consecutive years (see text for details). The results in panel A are estimated on a matched set of labour markets without matching on pre-existing trends. Regressions are weighted by cell-level employment in 1998. The results in panel B are estimated on the full set of potential control labour markets in metropolitan France. Regressions are weighted by weights that balance the matched characteristics across treated and control labour markets. Regressions do not have pair-specific time trends because the entropy balancing is not pair-wise. *Data: DADS Postes 1995–2007.*

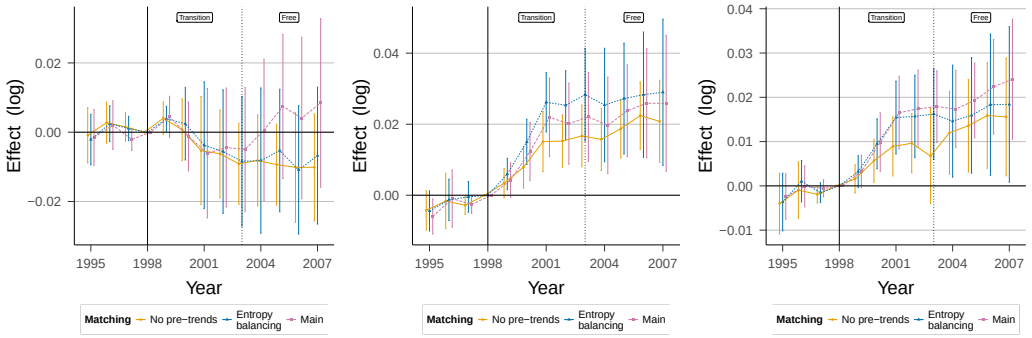
Results Table A6 shows the results. Overall, the effects are comparable across the different matching approaches. Compared to the main results, wage effects are smaller when not matching on pre-trends but similar when using entropy balancing; the inability to include pair-specific trends has little impact on the standard errors. The overall employment effects are closer to the main results when not matching on pre-trends than when using entropy balancing. Low-skill employment increases by 4 percent with both approaches, but they are less precise particularly for entropy balancing. High-skill employment effects are similar to the main results in entropy balancing, but the annual effects indicate a decline in employment towards the end of the sample period when not matching on pre-trends. The figures also show that there were no significant pre-existing trends in wages and employment in most cases.



(a) Wages (b) Employment

Figure A5
Alternative matching strategies, all workers

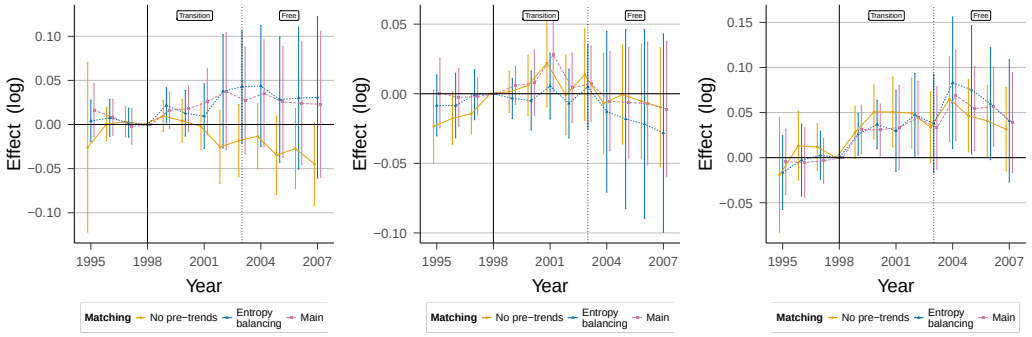
Notes: The figures show effects on the employment and wages from equation (2). The coefficients and confidence intervals refer to different matching approaches: *No pre-trends* is from matching one control labour market to each treated labour market without using pre-existing trends in wage growth as features for matching. *Entropy balancing* uses all control labour markets in the regressions, with weights calculated following Hainmueller (2012). *Main* is the main matching approach used in the paper. The error bars are 95% confidence intervals clustered at the local labour market level. *Data: DADS Postes 1995–2007.*



(a) High-skill professions (b) Mid-skill professions (c) Low-skill professions

Figure A6
Alternative matching strategies, wages by skill group

Notes: The figures show the effects on wages by skill from equation (2). The coefficients and confidence intervals refer to different matching approaches: *No pre-trends* is from matching one control labour market to each treated labour market without using pre-existing trends in wage growth as features for matching. *Entropy balancing* uses all control labour markets in the regressions, with weights calculated following Hainmueller (2012). *Main* is the main matching approach used in the paper. The error bars are 95% confidence intervals clustered at the local labour market level. *Data: DADS Postes 1995–2007.*



(a) High-skill professions (b) Mid-skill professions (c) Low-skill professions

Figure A7
Alternative matching strategies, employment by skill group

Notes: The figures show the effects on employment by skill from equation (2). The coefficients and confidence intervals refer to different matching approaches: *No pre-trends* is from matching one control labour market to each treated labour market without using pre-existing trends in wage growth as features for matching. *Entropy balancing* uses all control labour markets in the regressions, with weights calculated following Hainmueller (2012). *Main* is the main matching approach used in the paper. The error bars are 95% confidence intervals clustered at the local labour market level. *Data: DADS Postes 1995–2007.*

D.2.2 Using "excluded inland" areas as controls

Panel B of Table A7 shows the results when using the dropped inland labour markets—French areas up to 150 km from the Swiss border but not in the treatment group—as controls;[43] Panel A of the table shows the main results.

Qualitatively, the results are very similar to the main results: wage increases for mid- and low-skill workers, and employment rises for low-skill workers. Quantitatively, wage effects are more muted, possibly due to spillover effects reaching further inland—the reason we excluded these regions in the main analysis. Estimates for high-skill workers are generally more negative for both employment and wages with this alternative set of control areas.

[43] We only drop Lyon from the inland area as it is a major city and the treatment region does not contain any comparable labour market.

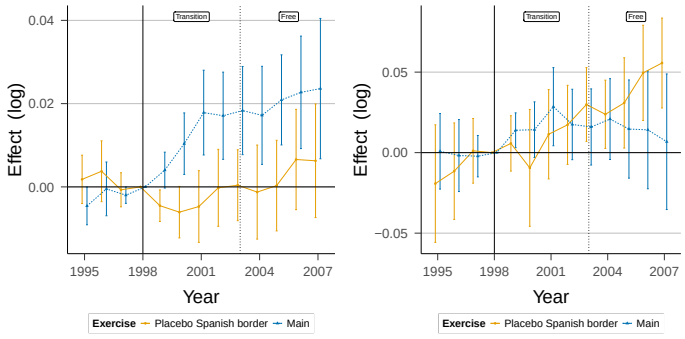
Table A7. Robustness: comparing to dropped inland markets

	Within-firm, within-worker wage growth				Employment			
	All professions	High skill	Mid skill	Low skill	All professions	High skill	Mid skill	Low skill
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Baseline								
$treat \times transition$	0.015	-0.002	0.018	0.014	0.019	0.019	0.012	0.038
	(0.004)	(0.006)	(0.004)	(0.003)	(0.010)	(0.024)	(0.013)	(0.013)
$treat \times free$	0.023	0.006	0.026	0.021	0.015	0.021	-0.006	0.058
	(0.006)	(0.011)	(0.007)	(0.005)	(0.019)	(0.039)	(0.024)	(0.022)
Observations	572	572	572	572	572	572	572	572
R^2	0.48	0.41	0.47	0.47	0.47	0.51	0.49	0.59
Panel B: Dropped inland as controls								
$treat \times transition$	0.006	-0.016	0.010	0.008	0.014	-0.019	0.011	0.038
	(0.005)	(0.008)	(0.005)	(0.005)	(0.008)	(0.027)	(0.010)	(0.017)
$treat \times free$	0.012	-0.024	0.015	0.017	-0.004	-0.050	-0.021	0.053
	(0.009)	(0.010)	(0.009)	(0.010)	(0.022)	(0.048)	(0.036)	(0.037)
Observations	754	754	754	754	754	754	754	754
R^2	0.03	0.09	0.04	0.04	0.02	0.03	0.03	0.03

Notes: Results from estimating equation (3). Employment is in logs, the wage index in levels. The wage index is calculated from workers that remain employed at their firm in two consecutive years (see text for details). The results in panel A are from the main matching approach. The results in panel B are comparing the treated labour markets to the dropped inland labour markets in figure 1a. Regressions are weighted by cell-level employment in 1998. *Data: DADS Postes 1995–2007.*

D.2.3 Placebo check

To ensure our results are not driven by another shock that impacted French border regions differently from other regions, we conduct a placebo test: instead of using the French-Swiss border as the treatment group, we use the labour markets along the Spanish-French border as the placebo treatment group. Following the main analysis, we use the same matching approach to find controls among the inland labour markets and then run the same regressions. The results are shown in Figure A8, where the yellow line refers to the placebo estimates at the Spanish border and the blue line to the baseline estimates for the Swiss border. We find no evidence of effects along the Spanish border around the treatment year 1998. Panel A8a shows that the estimated wage changes along the Spanish border are approximately zero. Panel A8b shows an approximately linear positive trend for employment along the Spanish border, but no evidence of a break around the treatment year.



(a) Wages (b) Employment

Figure A8
Placebo along Spanish border, all workers

Notes: The figures show effects on the employment and wages from equation (2). The coefficients and confidence intervals compare the main specification—denoted *Main*—to effects estimated from a placebo—denoted *Placebo Spanish border*. For the placebo exercise, the treatment group are French labour markets along the French-Spanish border, and the control group are matched inland labour markets—selected by the same method as for control group for the actual treatment group. The error bars are 95% confidence intervals clustered at the local labour market level. *Data: DADS Postes 1995–2007.*

D.2.4 Alternative controls and measurement

Table A8 presents estimates from equation (3) for the main matching strategy, varying the control variables used. First, the wage effect could be driven by other

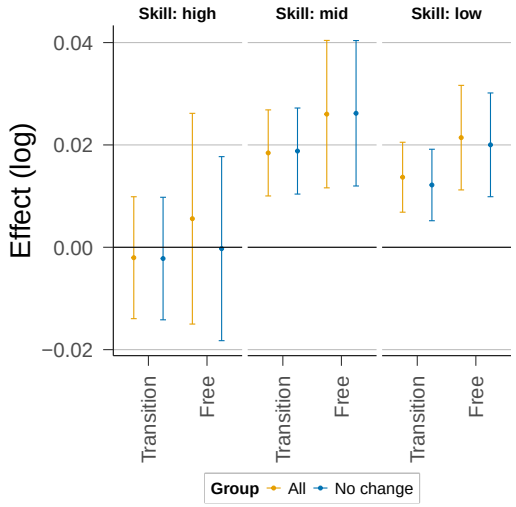
policies: Higher national minimum wages may increase wages more in labour markets with more low-wage workers; the working week reduction may increase hourly wages because it lowered a worker's number of hours worked while keeping earnings constant (Askenazy, 2013). Panel B shows that the results are robust when controlling for a time-varying impact of the labour market's exposure to minimum wage increases and to the working week reduction. Second, panel C shows that the pair-specific time trends account for important trends that are common to any given pair of treatment and control units. This is particularly the case for the employment effects.

Table A8. Robustness: other specifications

	Within-firm, within-worker wage growth				Employment			
	All professions (1)	High skill (2)	Mid skill (3)	Low skill (4)	All professions (5)	High skill (6)	Mid skill (7)	Low skill (8)
Panel A: Baseline								
$treat \times transition$	0.015	-0.002	0.018	0.014	0.019	0.019	0.012	0.038
	(0.004)	(0.006)	(0.004)	(0.003)	(0.010)	(0.024)	(0.013)	(0.013)
$treat \times free$	0.023	0.006	0.026	0.021	0.015	0.021	-0.006	0.058
	(0.006)	(0.011)	(0.007)	(0.005)	(0.019)	(0.039)	(0.024)	(0.022)
Observations	572	572	572	572	572	572	572	572
R^2	0.48	0.41	0.47	0.47	0.47	0.51	0.49	0.59
Panel B: National policies								
$treat \times transition$	0.013	-0.001	0.016	0.010	0.017	0.022	0.008	0.038
	(0.004)	(0.006)	(0.004)	(0.004)	(0.009)	(0.024)	(0.011)	(0.015)
$treat \times free$	0.018	0.008	0.022	0.014	0.011	0.028	-0.013	0.057
	(0.006)	(0.011)	(0.007)	(0.004)	(0.016)	(0.039)	(0.020)	(0.026)
Observations	572	572	572	572	572	572	572	572
R^2	0.53	0.42	0.52	0.57	0.49	0.53	0.53	0.59
Panel C: No pair-specific trends								
$treat \times transition$	0.014	-0.005	0.016	0.014	0.015	0.024	0.006	0.035
	(0.005)	(0.009)	(0.005)	(0.004)	(0.011)	(0.036)	(0.014)	(0.021)
$treat \times free$	0.020	0.000	0.022	0.021	0.008	0.030	-0.018	0.051
	(0.008)	(0.014)	(0.009)	(0.007)	(0.026)	(0.058)	(0.039)	(0.044)
Observations	572	572	572	572	572	572	572	572
R^2	0.12	0.01	0.12	0.11	0.01	0.01	0.01	0.02

Notes: Results from estimating equation (3). Employment is in logs, the wage index in levels. The wage index is calculated from workers that remain employed at their firm in two consecutive years (see text for details). Panel A are the baseline estimates as reported in table 4. Panel B includes controls for the labour market's exposure to national policies. Exposure to minimum wage increases is proxied by the fraction of workers at or below the minimum wage in 1998. Exposure to the workweek reform is proxied by the fraction of employees in firms above 20 employees. The exposure proxies are interacted with a linear time trend. The regressions are weighted by cell-level employment in 1998. *Data: DADS postes 1995–2007.*

The effects on the wage growth index are not driven by skill-upgrading as the results are robust to only including workers who remain in the same skill group, as shown in Figure A9. Lastly, the effects on employment are not driven by workers switching from full- to part-time employment: Table A9 shows that hours worked also increase. For low-skill workers, the magnitude is similar to the employment effect in the transition period and larger in the free mobility period.



(a) Wages

Figure A9
Wage effects: dropping workers that change the skill between consecutive years

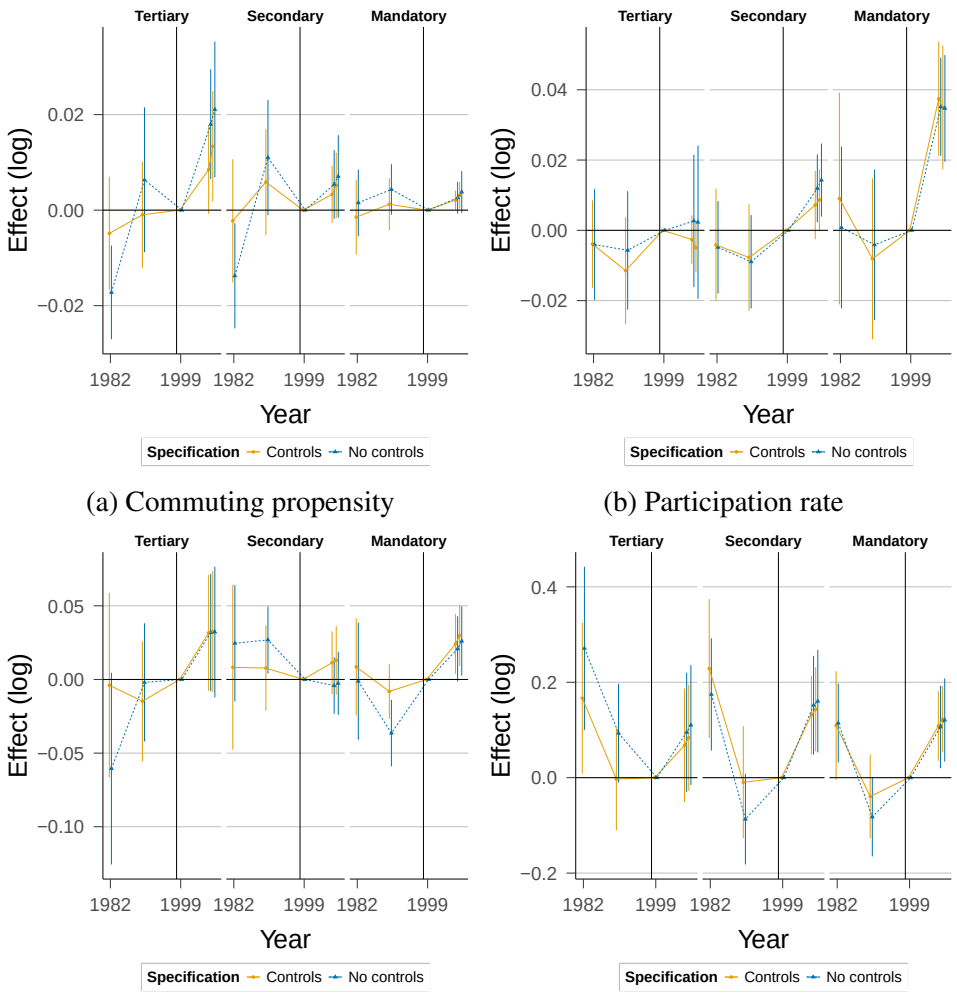
Notes: The figure shows the estimated coefficients from equation 3, separately by skill group. Yellow are estimates when all workers in the respective skill group are included, blue are the estimates when only workers who do not change their skill in two consecutive years are included. *Transition* is the coefficient for the transition period, *Free* is the coefficient for the free mobility period. The error bars are 95% confidence intervals clustered at the local labour market level. *Data: DADS Postes 1995–2007.*

Table A9. Impact on hours worked

	Hours worked			
	All professions	High skill	Mid skill	Low skill
	(1)	(2)	(3)	(4)
$treat \times transition$	0.017	0.023	0.007	0.042
	(0.011)	(0.024)	(0.013)	(0.014)
	[0.010]	[0.023]	[0.011]	[0.016]
$treat \times free$	0.013	0.017	-0.013	0.074
	(0.020)	(0.038)	(0.025)	(0.024)
	[0.020]	[0.038]	[0.024]	[0.021]
Observations	572	572	572	572
R^2	0.49	0.51	0.52	0.62

Notes: Results from estimating equation (3). The outcome is in logs. The regressions are weighted by cell-level employment in 1998. Standard errors clustered at the labour market level are in parentheses, and clustered by department in brackets. *Data: DADS postes 1995–2007.*

D.3 Annual effects for other census outcomes



(a) Commuting propensity

(b) Participation rate

(c) Population

(d) Unemployment rate

Figure A10
Yearly effect on outcomes in census

Notes: Estimates from equation (3). *Controls* are coefficients estimated with controls for entry and exit of the working-age population and pre-existing migration are included in the regressions, as described in section 3.3.1 of the main text. *No controls* are coefficients estimated without these controls. The error bars are 95% confidence intervals clustered at the local labour market level. *Data: Population census 1982–2007.*

D.4 Effects across space

We also estimate treatment effects by the labour market's exposure to the integration. On one hand, commuting should increase only in the eligible labour markets. On the other hand, there may be spillover effects to neighbouring, non-eligible labour markets. We modify equation (3):

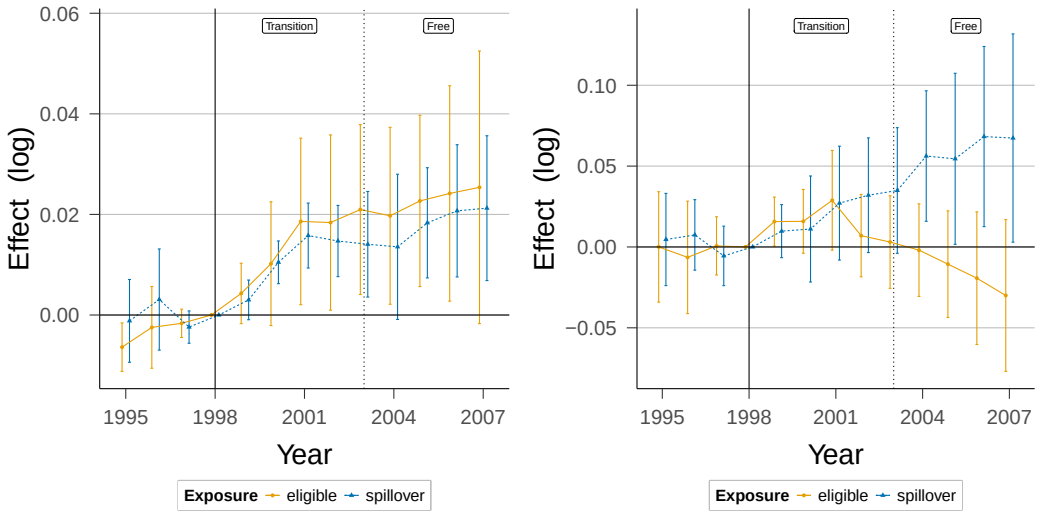
$$\begin{aligned} y^g_{mt} =& \alpha^g_m + \alpha^g_{t,elig} + \alpha^g_{t,spillover} + \beta^g_{\text{transition,elig}} elig_m \times 1[1999 \leq t < 2004] \\ &+ \beta^g_{\text{transition,spillover}} spillover_m \times 1[1999 \leq t < 2004] \\ &+ \beta^g_{\text{free,elig}} elig_m \times 1[2004 \leq t \leq 2007] \\ &+ \beta^g_{\text{free,spillover}} spillover_m \times 1[2004 \leq t \leq 2007] + \gamma^g X^g_{mt} + v^g_{mt}. \end{aligned} \tag{A.2}$$

Here, *elig* refers to labour markets whose residents became eligible to commute, *spillover* refers to the spillover labour markets. The control labour markets are assigned to the same group as the group of their matched treated labour market. We account for exposure-specific year fixed effects with $\alpha^g_{t,elig}$ and $\alpha^g_{t,spillover}$. The interest is in the β coefficients.

Here we discuss detailed results from estimating differential treatment effects by the labour market's exposure to the reform. For the wage results, we focus on the results in the full-count data because of the larger underlying number of observations.

D.4.1 Wages and employment

Figure A11 shows the annual effects by exposure for total employment and wages.



(a) Wage growth index (b) Employment

Figure A11
Wage and employment effects across space

Notes: The figures show the annual effects on eligible and spillover labour markets, using equation (A.2). The error bars are 95% confidence intervals clustered at the local labour market level. *Data: DADS Postes 1995–2007.*

Table A10 contains the main results from equation 3 in panel A, and the results by exposure from equation A.2 in panel B. Column 1 shows positive wage effects both in the eligible and in the spillover labour markets. In the free mobility period, wages in the eligible labour markets are 2.5 percent higher than in the period before the reform, while they are 1.8 percent higher in the spillover labour markets. Columns 2 to 4 show the effects for different skill groups. For mid- and low-skill workers, the effects are larger in the eligible labour markets, but still positive and significant in the spillover labour markets. For high-skill workers, wages change in neither the eligible nor the spillover labour markets during the transition phase. Their wages grow, however, by 1.7 percent in the spillover markets during the free mobility phase, while the point estimate for the eligible labour markets is zero.

Table A10. Impact on within-worker, within-firm wages and employment by exposure

	Within-firm, within-worker wage growth				Employment			
	All professions (1)	High skill (2)	Mid skill (3)	Low skill (4)	All professions (5)	High skill (6)	Mid skill (7)	Low skill (8)
Panel A: Baseline								
$treat \times transition$	0.015	-0.002	0.018	0.014	0.019	0.019	0.012	0.038
	(0.004)	(0.006)	(0.004)	(0.003)	(0.010)	(0.024)	(0.013)	(0.013)
	[0.004]	[0.005]	[0.004]	[0.003]	[0.009]	[0.023]	[0.011]	[0.013]
$treat \times free$	0.023	0.006	0.026	0.021	0.015	0.021	-0.006	0.058
	(0.006)	(0.011)	(0.007)	(0.005)	(0.019)	(0.039)	(0.024)	(0.022)
	[0.007]	[0.009]	[0.008]	[0.006]	[0.019]	[0.039]	[0.023]	[0.021]
Observations	572	572	572	572	572	572	572	572
R^2	0.48	0.41	0.47	0.47	0.47	0.51	0.49	0.59
Panel B: By exposure								
$eligible \times transition$	0.017	-0.005	0.021	0.015	0.016	0.009	0.003	0.049
	(0.006)	(0.009)	(0.007)	(0.005)	(0.013)	(0.034)	(0.015)	(0.016)
$spillover \times transition$	0.012	0.002	0.013	0.010	0.021	0.030	0.020	0.022
	(0.003)	(0.005)	(0.003)	(0.005)	(0.017)	(0.019)	(0.019)	(0.020)
$eligible \times free$	0.025	-0.001	0.030	0.024	-0.014	-0.011	-0.047	0.057
	(0.010)	(0.016)	(0.012)	(0.007)	(0.023)	(0.053)	(0.028)	(0.034)
$spillover \times free$	0.019	0.017	0.019	0.017	0.060	0.075	0.056	0.060
	(0.005)	(0.006)	(0.007)	(0.008)	(0.028)	(0.038)	(0.034)	(0.022)
Observations	572	572	572	572	572	572	572	572
R^2	0.49	0.44	0.49	0.48	0.52	0.55	0.55	0.60

Notes: Results from estimating equations (3) (panel A) and (A.2) (panel B). Employment is in logs, the wage growth index in levels. The wage growth index is calculated from workers that remain employed at their firm in two consecutive years (see text for details). The regressions are weighted by cell-level employment in 1998. Standard errors clustered at the labour market level are in parentheses; standard errors clustered at the department level are in brackets. *Data: DADS postes 1995–2007.*

Columns 5 to 8 show the estimated effects on employment in the two groups of labour markets. The effects differ by both time period and exposure group. During the transition period, the overall employment effects (column 5) are positive, not significant but quantitatively similar in both the eligible and the spillover labour markets; in the free mobility period, the effect is larger and statistically significant in the spillover labour markets, while the point estimate for eligible labour markets is -1.4 percent (se: 2.3). The effects across skill groups show, first, that the negative employment effect arises from a decline in mid-skill employment of around 4.7 percent. The positive employment effect in the spillover labour markets stems from employment gains in all skill groups, but the coefficients are only significantly different from zero for the low-skill workers. For these workers, the employment effect is stronger in the eligible market than in the spillover markets in the transition period, while they are similar in both markets in the free mobility period.

For mid- and low-skill workers, the documented wage effects across space are consistent with the labour market integration having the largest impact in the eligible labour markets, with meaningful spillover effects in neighbouring, non-eligible labour markets. For high-skill workers, however, the pattern is reversed: wages rise only in spillover markets during the free mobility phase, suggesting that underlying adjustments differ across skill groups. The documented employment effects across space reveal heterogeneity by exposure: a robust increase in employment in the spillover labour markets, and an imprecise decline in employment in the eligible labour markets. We will discuss these findings further after assessing the effects on labour supply across space.

Figure A12 shows employment effects for high-skill workers by industry skill-intensity across eligible and spillover markets. In high-skill-intensive industries, employment of high-skill workers increases gradually and significantly in spillover markets, while the effect in eligible markets remains close to zero and stable. The remaining estimates are statistically insignificant: point estimates suggest modest increases in mid-skill-intensive industries across both market types and modest declines in low-skill-intensive industries near the border.

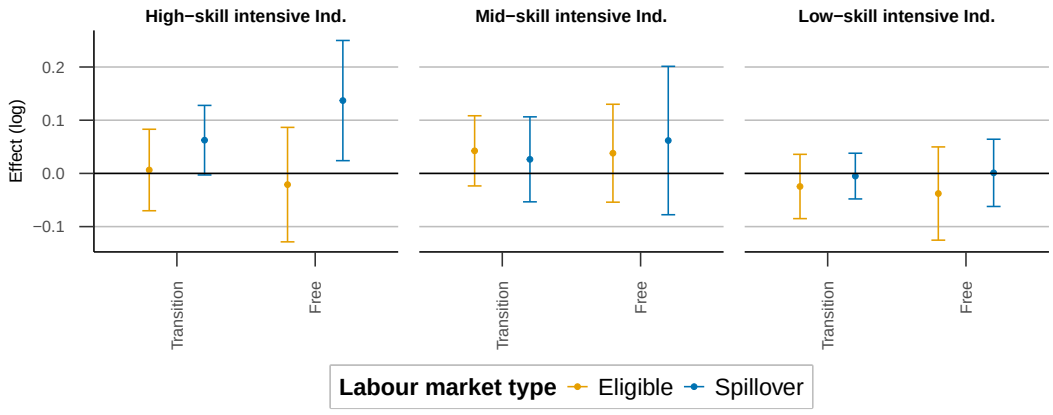
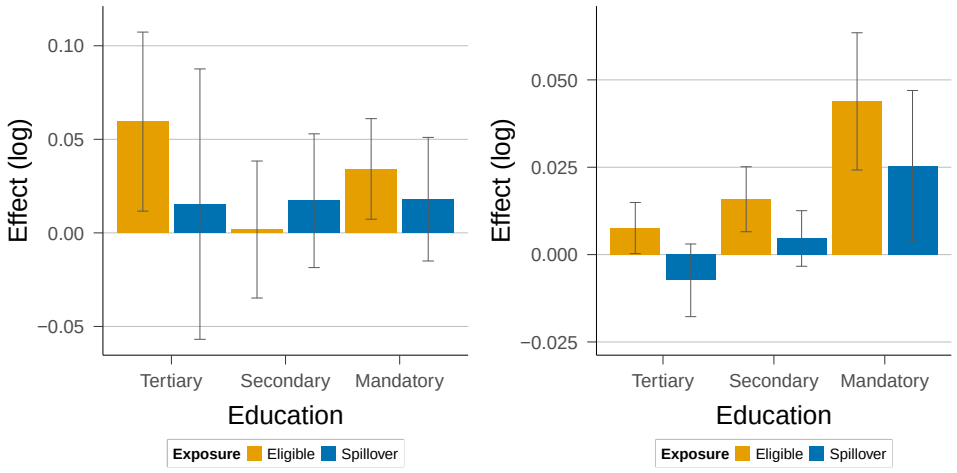


Figure A12
Employment of high-skill workers by skill-intensity of industries and space

Notes: Estimates from equation (A.2). The error bars are 95% confidence intervals clustered at the local labour market level.
Data: DADS Postes 1995–2007.

D.4.2 Labour supply

Figure A13 shows the estimated impact on population and labour force participation by education group and by the labour market's exposure to the reform. The labour supply response is concentrated in eligible labour markets: population effects are stronger there, albeit imprecisely estimated, and the participation rate increases more in eligible than in spillover markets within each education group. This spatial pattern is consistent with the reform raising the value of residing in eligible labour markets where Swiss jobs are directly accessible, and helps explain why aggregate employment in those markets does not fall sharply despite the outflow of cross-border commuters.



(a) Population (b) Participation rate

Figure A13
Impact on labour market supply across space

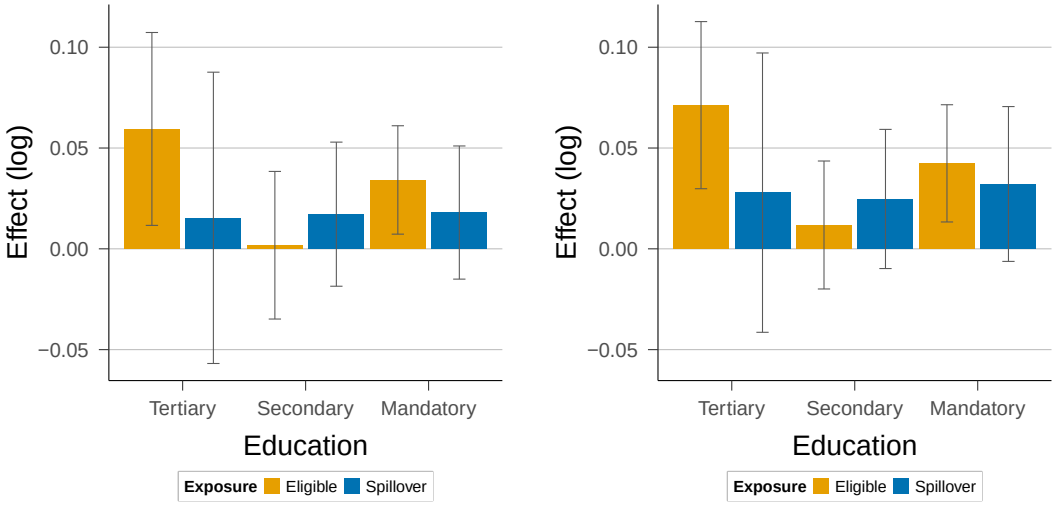
Notes: Estimates from equation (A.2). Controls for entry and exit of the working-age population and pre-existing migration are included in the regressions (see Section 3.3.1 in the main text). The error bars are confidence intervals clustered at the local labour market level. *Data: Population census 1982–2007.*

Switzerland imposed continued migration restrictions on new EU member-state citizens following the 2004 enlargement, restricting their access to Swiss jobs even if they resided in France. New EU citizens therefore cannot be the source of the cross-border commuting effects we document. The French-only results in Figure A14 provide a further check: with French citizens accounting for 88% of our analysis sample, and their population response being qualitatively similar to—and slightly stronger than—the aggregate result, the findings are not driven by non-French citizens attracted to the border region by the enlargement.

D.4.3 Labour Demand

To complement the analysis in the paper we provide here additional results on firm outcomes split by eligible and spillover labour markets.

Figure A15 presents four firm-level outcomes—sales, material costs, labour costs, and employment—by industry skill intensity, separately for eligible and spillover labour markets during the transition and free movement periods. We discuss each



(a) Main Results

(b) Only French citizens

Figure A14
Population effects by education level and treatment intensity. Panel (a) reproduces the population panel from Figure A13; panel (b) restricts the sample to French citizens.

Notes: Estimates from equation (A.2). Controls for entry and exit of the working-age population and pre-existing migration are included in the regressions (see Section 3.3.1 in the main text). The error bars are confidence intervals clustered at the local labour market level. *Data: Population census 1982–2007.*

panel in turn.

Panel A15a shows total sales effects. In high-skill intensive industries, both market types exhibit positive and statistically significant sales gains during the transition period, with eligible markets at approximately 7 percent and spillover markets at approximately 8 percent. These effects persist into the free movement period; in spillover markets, the point estimate increases to approximately 12 percent, though the wider confidence interval renders this estimate less precise. In mid-skill intensive industries, eligible markets show effects near zero in both periods, with confidence intervals spanning zero. Spillover markets display positive effects of approximately 4 percent during the transition period, rising to approximately 8 percent in the free movement period, where the effect becomes statistically significant. In low-skill intensive industries, point estimates in eligible markets increase from approximately 4 percent during transition to 7–8 percent in the free movement

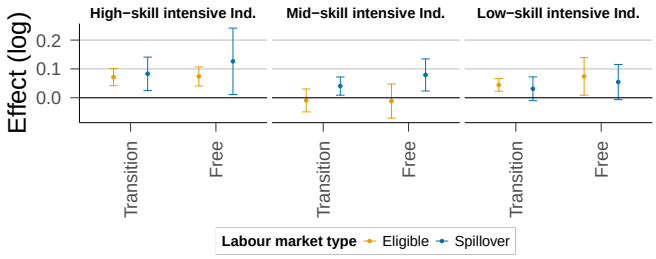
period. Spillover market estimates are similar during the transition period but smaller in the free movement period, at approximately 5 percent; however, given the wider confidence intervals, the difference between market types is not statistically significant.

Panel A15b presents material cost effects, which closely track the sales patterns, consistent with production expansion requiring proportionally more intermediate inputs. In high-skill intensive industries, eligible markets show effects of approximately 6 percent during the transition period, increasing slightly to 7 percent in the free movement period. Spillover markets exhibit larger effects, at approximately 9 percent during transition and rising to approximately 14 percent in the free movement period, mirroring the sales dynamics in these markets. In mid-skill intensive industries, both market types show effects near zero, with eligible market point estimates slightly negative but confidence intervals spanning zero. In low-skill intensive industries, eligible markets display material cost increases of approximately 5 percent during the transition period, rising to approximately 8 percent in the free movement period. Spillover market effects are more modest, at approximately 3 percent during transition and 5 percent in the free movement period. The close correspondence between sales and material cost responses across all industry types suggests that the output expansion reflects genuine increases in production activity rather than changes in pricing or product mix.

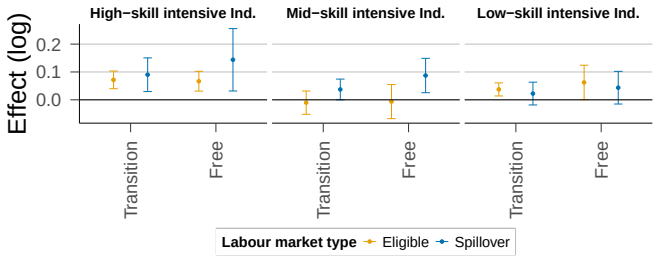
Panel A15c shows labour cost effects, which exhibit notable departures from the sales and material cost patterns. In high-skill intensive industries, eligible markets show labour cost increases of approximately 5 percent in both periods, while spillover markets display larger effects—approximately 7 percent during transition and 13 percent in the free movement period—consistent with the sales expansion in these markets. In mid-skill intensive industries, a striking divergence emerges: eligible markets show negative labour cost effects of approximately 3 percent during the transition period, declining further to approximately 5 percent in the free movement period, with the latter estimate statistically significant. Spillover markets remain near zero in both periods. This pattern of declining labour costs alongside stagnant sales suggests rationalization and possible worker reallocation away from mid-skill intensive industries in eligible markets. In low-skill intensive industries,

labour cost effects are notably large, particularly in eligible markets: approximately 5 percent during transition, rising to approximately 10 percent in the free movement period. Spillover markets show more modest increases of approximately 4 percent during transition and 6 percent in the free movement period. Importantly, the labour cost increases in low-skill intensive industries exceed the corresponding sales growth, consistent with intensified competition for workers in these sectors.

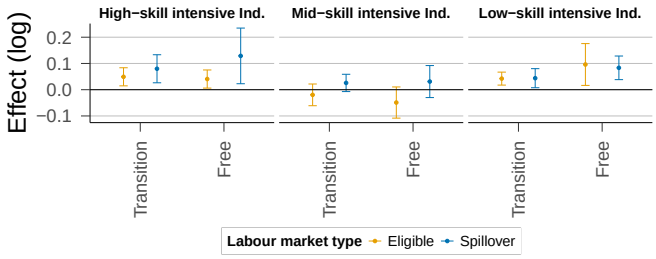
Panel A15d presents employment effects, which are generally more muted than the sales and cost responses. In high-skill intensive industries, both market types show similar employment gains of approximately 5 percent during the transition period. In the free movement period, a divergence emerges: eligible market employment remains at approximately 4 percent while spillover market employment rises to approximately 9 percent, though the difference is not statistically significant given the wide confidence intervals. In mid-skill intensive industries, the pattern is most pronounced in eligible markets, where employment declines by approximately 5 percent during the transition period and by approximately 12 percent in the free movement period, with the latter estimate statistically significant. Spillover market effects remain near zero in both periods. This employment decline in eligible markets, combined with the negative labour cost effects documented above, reinforces the interpretation of worker reallocation away from mid-skill intensive industries. In low-skill intensive industries, eligible markets show robust employment gains of approximately 10 percent in both periods, while spillover markets display more modest effects of approximately 2–3 percent. The stronger employment response in eligible markets for low-skill industries, combined with the large labour cost increases, suggests that firms in these industries expanded hiring substantially, potentially competing for the increased labour supply induced by the reform.



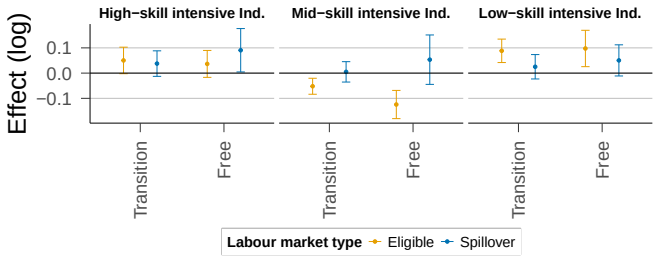
(a) Sales



(b) Material costs



(c) Labour costs

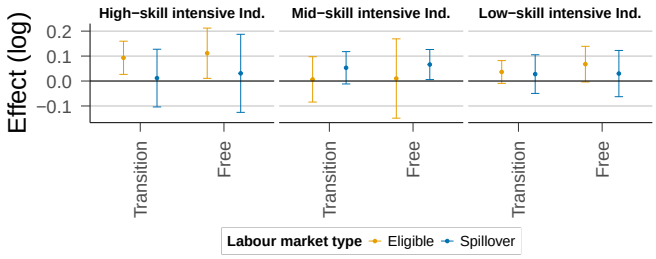


(d) Employment

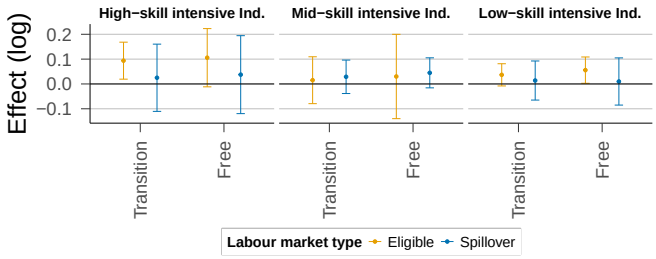
Figure A15
Firm outcomes by industry skill intensity and treatment intensity

Notes: Estimates from equation (A.2). Industries are classified into high-, mid-, and low-skill-intensity categories. The error bars are confidence intervals clustered at the local labour market level. *Data: FICUS 1995–2007.*

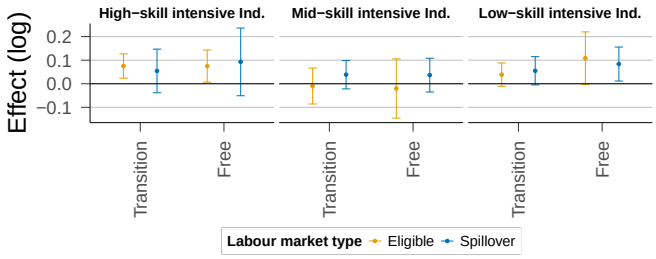
Figure A16 restricts the sample to tradable industries. Sales and material cost increases in the free movement period are concentrated in eligible markets for high- and low-skill intensive industries, while spillover effects remain close to zero. Employment shows a different spatial pattern: in low-skill intensive industries both market types expand, while in mid-skill intensive industries eligible market employment falls by approximately 17 percent. Compared to the results for all industries (Figure A15), the output expansion in high- and low-skill intensive tradable industries is more spatially concentrated near the border.



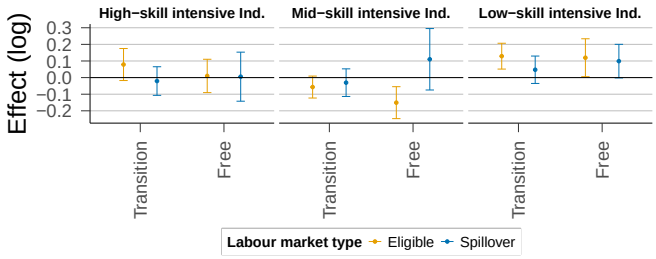
(a) Sales



(b) Material costs



(c) Labour costs



(d) Employment

Figure A16
Firm outcomes in tradable industries by skill intensity and treatment intensity

Notes: Estimates from equation (A.2), restricted to tradable industries. Industries are classified into high-, mid-, and low-skill-intensity categories. The error bars are confidence intervals clustered at the local labour market level. *Data: FICUS 1995–2007.*

D.4.4 Discussion

The results show important spillovers to non-eligible labour markets. Wages increase in both eligible and spillover markets. Labour force participation and population increase more in eligible markets, although some estimates are imprecise. The employment effects diverge over time: employment falls in eligible markets relative to spillover markets.

This pattern is consistent with gradually increasing competition from Switzerland for workers (Beerli et al., 2021). In eligible markets, residents close to the border can commute to Swiss jobs. Higher participation and population growth increase the potential labour supply, but many workers take jobs in Switzerland rather than in France, limiting domestic employment growth compared to the spillover markets.

While the heterogeneity in responses across eligible and spillover markets may also be driven by differences in (unobserved) characteristics of labour markets, the effects are plausibly a direct consequence of the increase in the finding rate for Swiss jobs.

D.5 Labour force participation: annual effects in labour force survey

The results on labour force participation use the census that is only available in some years. Here we show that for the group with the strongest participation response, women with mandatory education, the effect on participation is detectable in the smaller labour force survey in the early years of the reform. We estimate the following regressions for worker i residing in labour market m in year t:

$$y_{imt} = \alpha_m + \alpha_t + \sum_{\tau \neq 1998} \beta_\tau^g treat_m \times 1[t = \tau] + \gamma^g X_{mt}^g + v_{mt}^g. \tag{A.3}$$

m is, as in equation (2), the local labour market (*Zone emploi*). y_{imt} is an indicator variable that is 1 if the worker is in the labour force (employed or unemployed) and 0 if she is out of the labour force. $\gamma^g X_{mt}^g$ includes a matched pair-specific linear trend as in the regressions in the paper. It also includes a cubic in age. In a robustness

check, we add a trend adjustment: the pre-existing trend in the department-level participation rate from 1993 to 1998, interacted with year indicators, to account for pre-existing trends in the outcome.

The results are in Figure A17. While there is a pre-existing downward trend in participation before 1998, the trend reverses after 1998, and by 2002 the participation rate has increased by 5 percentage points relative to 1998. Accounting for the existing time trend eliminates the pre-trend and yields a similar pattern post-1998. Since the survey for 1999 was conducted in January, it is perhaps not surprising that the effect only materializes after the 1999 survey.

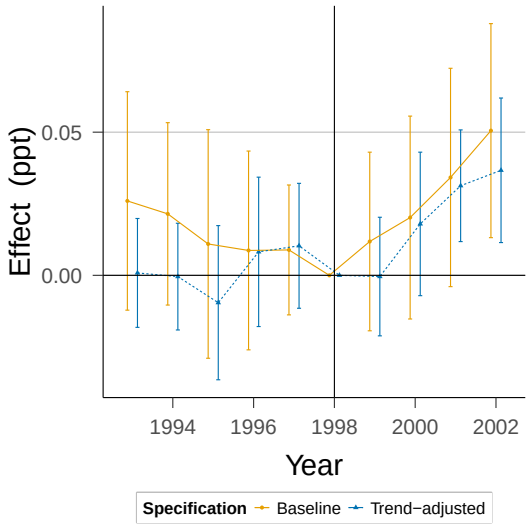
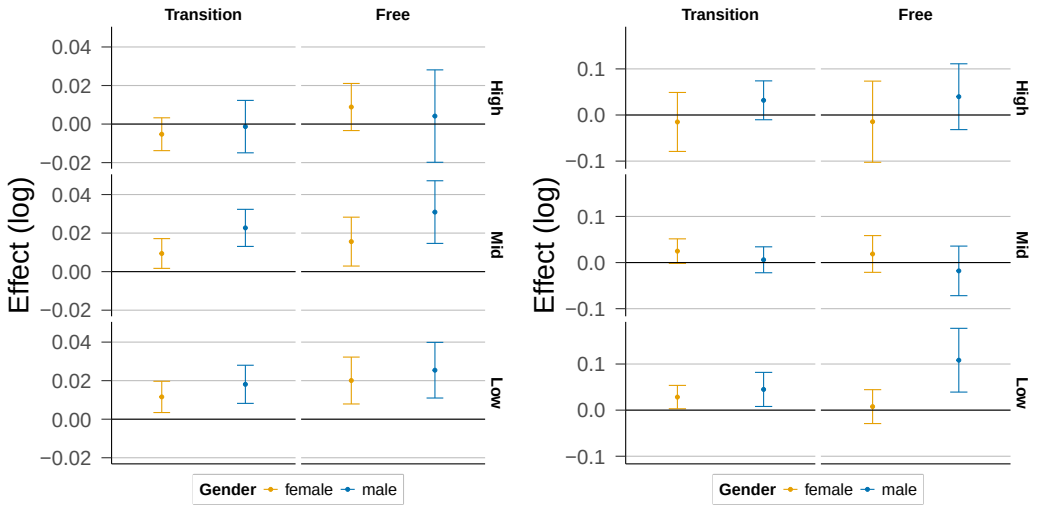


Figure A17
Labour force participation of women with mandatory education

Notes: Estimates from equation (A.3). In contrast to the *Baseline* specification, *Trend-adjusted* includes as controls the department-level change in the labour force participation rate of women with low education from 1993 to 1998 interacted with year dummies. All regressions include a cubic in age; they are weighted with the survey weights. The error bars are 95% confidence intervals clustered at the local labour market level. *Data: Labour Force Survey 1993–2002.*

D.6 Additional Tables and Figures

Figure A18 shows the main estimated effects, split by gender.

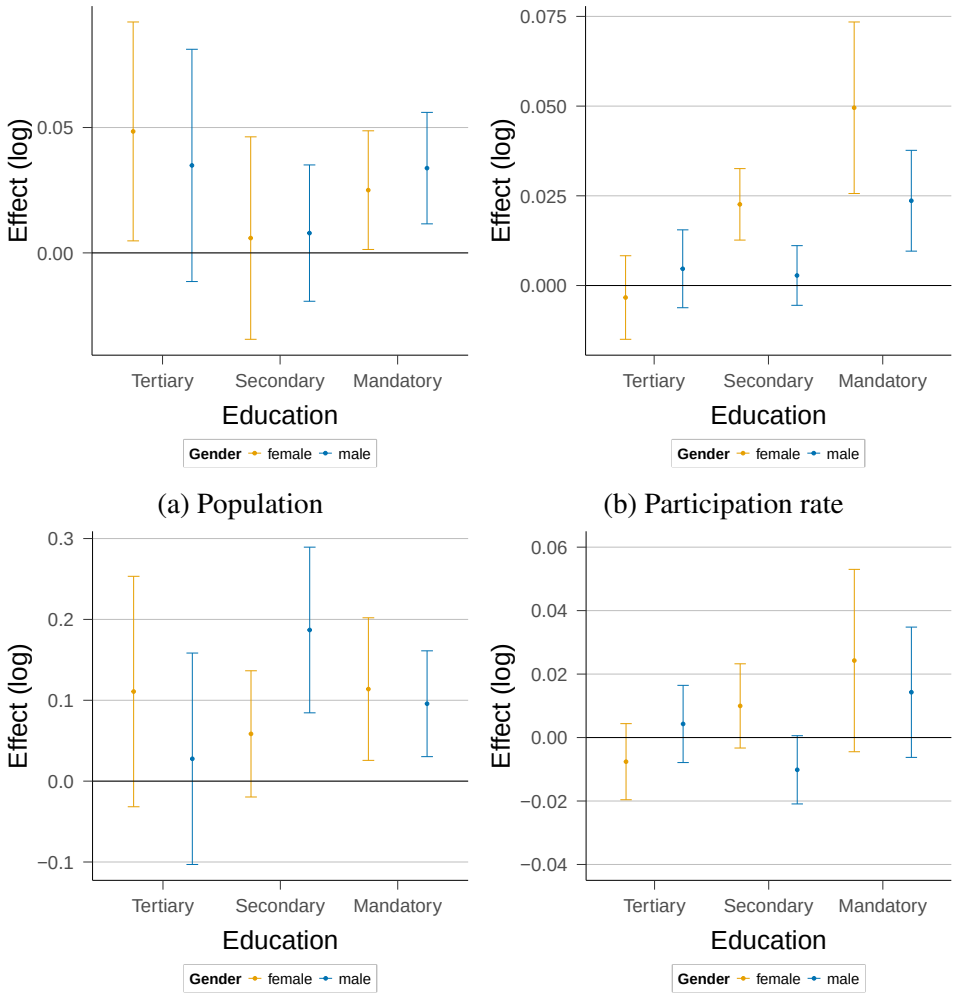


(a) Wage growth index (b) Employment

Figure A18
Wage and employment effect by detailed demographics

Notes: The figures show the estimated impact of the labour market integration by detailed demographics, using equation (3). The columns refer to the transition and to the free mobility period. The rows refer to the three skill groups. The colors refer to women (yellow) and men (blue). The error bars are 95% confidence intervals clustered at the local labour market level. *Data: DADS Postes 1995–2007.*

Figure A19 shows the estimated impact on population and labour supply by detailed demographics.



(a) Population

(b) Participation rate

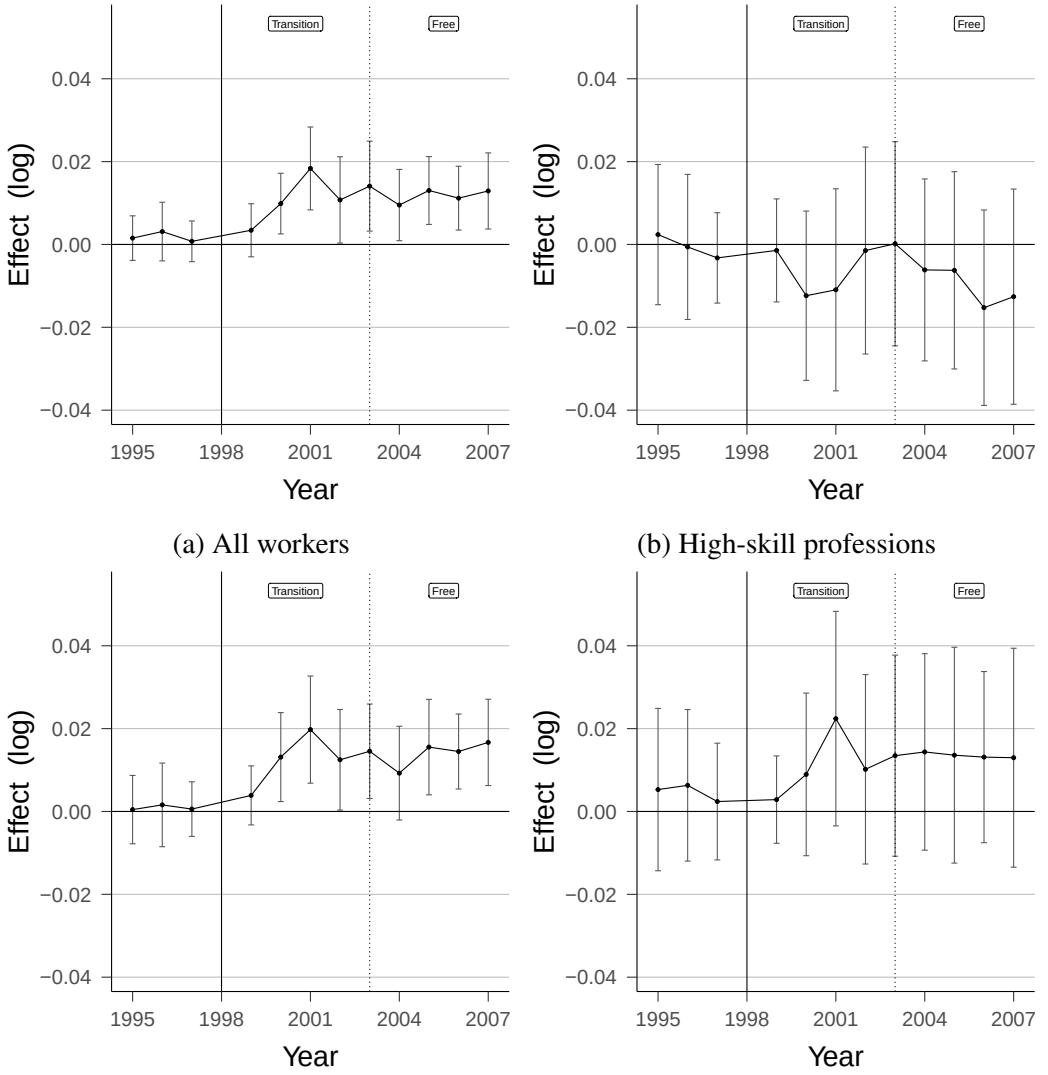
(c) Unemployment rate

(d) Employment rate

Figure A19
Impact on population and labour market status by detailed demographics

Notes: Estimates from equation (3). Controls for entry and exit of the working-age population and pre-existing migration are included in the regressions (see Section 3.3.1 in the main text). The error bars are 95% confidence intervals clustered at the local labour market level. *Data: Population census 1982–2007.*

Figure A20 shows yearly estimates of the wage effects using the worker-level panel data.



(a) All workers

(b) High-skill professions

(c) Mid-skill professions

(d) Low-skill professions

Figure A20
Worker-level wage effects

Notes: The figures show the skill-specific effects on wages from equation (4). We sample workers and assign treatment based on the labour market of the ongoing spell. The error bars are 95% confidence intervals clustered at the local labour market level. *Data: DADS Panel 1995–2007.*

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