Essays in Labor Economics

D I S S E R T A T I O N
of the University of St.Gallen,
School of Management,
Economics, Law, Social Sciences,
International Affairs and Computer Science,
to obtain the title of
Doctor of Philosophy in Economics and Finance

submitted by

Mirjam Bächli

from

Würenlingen (Aargau)

Approved on the application of

Prof. Dr. Reto Föllmi

and

Prof. Dr. Josef Zweimüller

Dissertation no. 5207
Difo-Druck GmbH, Untersiemau, 2022

Essays in Labor Economics

D I S S E R T A T I O N
of the University of St.Gallen,
School of Management,
Economics, Law, Social Sciences,
International Affairs and Computer Science,
to obtain the title of
Doctor of Philosophy in Economics and Finance

submitted by

Mirjam Bächli

from

Würenlingen (Aargau)

Approved on the application of

Prof. Dr. Reto Föllmi

and

Prof. Dr. Josef Zweimüller

Prof. Dr. Michael Lechner

Dissertation no. 5207
Difo-Druck GmbH, Untersiemau, 2022

The University of St.Gallen, School of Management, Economics, Law, Social Sciences, International Affairs and Computer Science, hereby consents to the printing of the present dissertation, without hereby expressing any opinion on the views herein expressed.

St.Gallen, November 8, 2021

The President:

Prof. Dr. Bernhard Ehrenzeller

Acknowledgements

I wish to thank my supervisor Reto Föllmi for his feedback and guidance throughout my time at his chair. I am grateful to Albrecht Glitz, who hosted me at the Universitat Pompeu Fabra in Barcelona, for inspiring discussions and the many valuable suggestions on my work. Beatrix and Frank supported me with advice and feedback, which shaped me as a researcher.

Furthermore, I would like to say thank you to my coauthor Teodora. I very much enjoyed working on our projects and sharing many special moments such as receiving the first citation or the first r&r.

A big thank you goes to the faculty and colleagues at the institute. It was a pleasure to spend so much time with you during the last years. In particular, I want to thank Adrian, Björn, David, Enea, Matthias, Noémie, Philine, Piotr, and Stefan for the continued feedback and many fun moments.

Most importantly, I wish to thank my family, friends, and especially Gian and Nicole for their unconditional support and friendship. I am very grateful to have you on my side.

St.Gallen, December 8, 2021 Mirjam Bächli

Abstract

This dissertation investigates the effect of immigration on natives' labor market outcomes, educational decisions, and attitudes towards immigration.

Chapter 1 studies the role of immigrants in higher education. How do international students affect the intranational location choices of native graduates in their early careers? Using administrative Swiss data, I exploit idiosyncratic variation in the student composition across time within a study field and university. I find that a higher exposure to international students induces natives who grew up in rural places to work more often in large urban areas. I show that this response is likely due to changes in preferences rather than labor market conditions, despite relatively high stay rates of international students. There is no evidence of an effect on native graduates' residential choice.

Chapter 2 investigates the effect of a free movement reform in Switzerland on natives' incentives to accumulate human capital at the tertiary level of education. The policy change affected local exposure to cross-border commuters differentially across regions. Our results show a rise in enrollment at universities that focus on applied studies in affected relative to non-affected regions in the post-reform period. The increase is driven by natives who have a vocational training that gives them experience and knowledge of labor market conditions. Enrollment rises in non-STEM subjects. We link study fields with foreign labor market competition in related occupations and find that native graduates in STEM occupations face stronger competition than native graduates in non-STEM occupations. This suggests that the response of natives is to build skills less transferable across countries. We estimate reform effects on native wages by education and occupation and conclude that results are consistent with rising labor market returns driving demand for education.

Chapter 3 examines the role of labor protection in shaping native preferences over migration policies. Our results show that a higher immigrant exposure reduces pro-immigration vote shares in municipalities with a relatively low-skilled native population. The negative response is mitigated under higher levels of labor protection as measured by collective bargaining coverage. We find some suggestive evidence that collective agreements mitigate negative wage responses among low-skilled natives. The analysis suggests that labor protection affects vote outcomes by improving in addition other labor market conditions or by alleviating existing fears among the native population.

Zusammenfassung

Die vorliegende Dissertation untersucht die Auswirkungen von Immigration auf Arbeitsmarktergebnisse, Bildungsentscheidungen und Zustimmung für Zuwanderung von Einheimischen.

Kapitel 1 untersucht, wie der Anteil internationaler Studierenden die Standortentscheidungen einheimischer Master-Absolventinnen und Absolventen in ihrer frühen Karriere beeinflusst. Basierend auf Registerdaten verwende ich idiosynkratische Variation in der Zusammensetzung der Studierenden über die Zeit innerhalb eines Studienfachs und Universität. Ich zeige, dass einheimische Absolventinnen und Absolventen, die auf dem Land aufgewachsen sind, durch eine höhere Exposition gegenüber internationalen Studierenden häufiger in grossen städtischen Gebieten arbeiten. Evidenz deutet darauf hin, dass die Reaktion der Einheimischen eher durch veränderte Präferenzen als durch Änderungen in den Arbeitsmarktbedingungen begründet ist.

Kapitel 2 untersucht die Auswirkungen einer Freizügigkeitsreform in der Schweiz auf tertiäre Bildungsentscheidungen der Einheimischen. Der daraus erfolgte Zustrom von Grenzgängerinnen und Grenzgängern wirkte sich auf die lokalen Arbeitsmarktbedingungen in den verschiedenen Regionen unterschiedlich aus. Unsere Ergebnisse zeigen einen Anstieg der Einschreibungen an Fachhochschulen in betroffenen im Vergleich zu nicht betroffenen Regionen in der Zeit nach der Reform. Wir zeigen, dass sich die Studierenden häufiger in Nicht-MINT-Fächern einschreiben. Da Einheimische in MINT-Berufen einem stärkeren ausländischen Wettbewerb ausgesetzt sind als Einheimische in Nicht-MINT-Berufen, suggeriert die Fächerwahl eine Tendenz hin zu Berufen mit geringerem internationalem Wettbewerb. Wir schätzen die Auswirkungen der Reform auf die Löhne von Einheimischen nach Bildung und Beruf und finden, dass die Bildungsentscheidungen wahrscheinlich von steigenden Arbeitsmarktrenditen getrieben werden.

Kapitel 3 untersucht die Auswirkung des Abdeckungsgrads durch Gesamtarbeitsverträge auf das Abstimmungsverhalten der Einheimischen bezüglich Migrationspolitik. Unsere Ergebnisse zeigen, dass ein höherer Anteil an Immigrantinnen und Immigranten die Stimmenanteile für eine liberalere Migrationspolitik in Gemeinden mit einer relativ gering qualifizierten einheimischen Bevölkerung reduziert. Der negative Effekt wird durch eine höhere Abdeckung durch Gesamtarbeitsverträge abgeschwächt. Wir stellen fest, dass die Löhne der am wenigsten Qualifizierten negativ auf Zuwanderung reagieren. Gesamtarbeitsverträge sind für diese Gruppe am wichtigsten und wir dokumentieren, dass sie den negativen Lohneffekt teils mildern.

Contents

Chapter 1

The Effect of Studying with International Peers on Location Choices

1.1 Introduction

Highly skilled individuals have ample international experience. An important part of this stems from geographic mobility during higher education. Between 2000 and 2018, the number of international students grew from 2.1 to 5.6 million (UNESCO, 2020). The flow can be expected to increase further because universities are interested in improving their rankings and raise tuition revenue, and firms want to attract international talent. International students take advantage of educational opportunities in the destination country, thereby changing the cohort composition at universities and potentially on the labor market after graduation.

In this paper, I investigate how exposure to international students affects natives' labor market decisions one year after graduation. The early phase of a career is one of high importance as initial decisions can have lasting effects

(De La Roca and Puga, 2016; Arellano-Bover, 2020). I am interested in the type of location where natives work. Given the differences in wage conditions between urban and rural areas, location decisions likely have implications on one's wage trajectory. I show that a higher exposure to international students induces natives who grew up in rural places to work more often in urban areas. This response could have two sources, which I test separately. First, natives could change their preferences for locations due to peer effects at university. Second, international students who stay in the country to work could change labor market conditions.

The empirical analysis in this paper relies on a Swiss data set that links administrative data on enrollment and graduation with survey data on workplace and residential choices in the year after graduation over the period 2009–2019. Access to the register data enables me to measure the proportion of international peers in a cohort without measurement error. It additionally allows me to distinguish international students, who migrate to enroll into higher education, from immigrant students, who have a higher education entry exam from the country where they study. Rich data allow to investigate the decisions of where to work and where to live separately, which sheds light on the mechanisms. Switzerland has 17.8% international students in higher education, which is significantly above the OECD average of 5.8% (OECD, 2020). More than 60% of the international master's graduates stay in the Swiss labor market for at least one year after completing their university degree. The context offers advantages for the effect identification, as the inflow of international students and admission to education are little regulated. This reduces issues from selection by universities. Overall, features of Switzerland are consistent with the broad empirical facts from the urban economics literature (e.g., Glaeser and Maré, 2001; Albert and Monras, 2020). For example, I find evidence of an urban wage premium and of immigrants being overrepresented in cities.

To identify the effect of international student exposure on native peers' location choices, I exploit idiosyncratic variation in the student composition across time within a study field and university. Although students are not randomly allocated to fields and institutions, the variation in exposure to in-

ternational students in adjacent cohorts is hard to predict, especially because they immigrate just at the time of enrolling into higher education. The variation is arguably exogenous conditional on individual and cohort level controls, and pair-wise interacted fixed effects at the study field, university and year level (Carrell *et al.*, 2018). I also show that the proportion of international students does not systematically relate to observable individual characteristics of natives in the same cohort. The sample covers native master graduates from universities. By excluding international students, I mitigate reflection issues as discussed in Manski (1993).

In the main analysis, I distinguish between natives who grew up in urban places and those who grew up in rural places, because location choice likely depends on the place of growing up (Bosquet and Overman, 2019). I show that natives from rural places are less likely to work and reside in urban locations one year after graduating from university than natives from urban places. With a higher proportion of international peers in a cohort, rural natives become more likely to work in urban locations. This is linked to an increase in interregional mobility across cantons and labor markets relative to the region of growing up. The estimates of the workplace analysis are robust to various sensitivity checks. I do not find evidence that the natives' decision of where to reside is affected by the proportion of international students in the cohort.

The decision where to work can be determined by preferences and labor market conditions. International students can affect these channels through social interactions during their studies or a change in labor market competition after graduation. The positive peer effect on native graduates from rural areas suggests an alignment with immigrants' preferences for urban workplaces. I test if changes in wage expectations play a role given the urban wage premium. First, survey evidence shows that international graduates report more often than natives that a high salary is an important aspect of employment. Second, I find that natives with a higher international student exposure are more likely to report so as well. I test if international students affect natives' wages in the year after graduation, but estimates provide no evidence for a change. These results indicate that a change in the preferences for a higher wage trajectory

could drive rural natives into urban workplaces.

This study lies at the intersection of urban economics, immigration and education. The focus on international students is of particular interest because they are highly skilled individuals who potentially integrate into the host country's workforce. Rosenzweig (2006) was the first to present a model that includes skill acquisition and seeking the rewards of high-skill employment to explain international student mobility. Kaushal and Lanati (2019) find that the desire for permanent settlement is a major explanation for student flows to non-English speaking OECD countries. Beine *et al.* (2014) look at differences in university characteristics and location features across and Beine *et al.* (2018) within destination countries. Compared to the latter paper that relies on data from one year, I build a panel data set with tuition fees by student type and degree, and university quality. My findings imply that enrollment of international students tends to be responsive to changes in fees, while there is no evidence that enrollment of native students depends on tuition or university rankings.

I contribute to the peer effects literature that traditionally examines the role of ability, gender, race or disruptive behavior on educational performance. Evidence comes from mandatory school (Hoxby, 2000; Hanushek *et al.*, 2003; Lavy *et al.*, 2012; Balestra *et al.*, 2021) and higher education (Sacerdote, 2001; Stinebrickner and Stinebrickner, 2006; Booij *et al.*, 2016). A recent set of papers looks at foreign peers and how they affect educational outcomes of natives. There is evidence on pass rates in high school matriculation exams (Gould *et al.*, 2009), enrollment in higher education programs (Borjas, 2004; Machin and Murphy, 2017; Shih, 2017; Bound *et al.*, 2020), and study field choices (Anelli *et al.*, 2017). Instead of investigating foreign students, I focus on the subset of international students who are the target group for educated-oriented immigration policies. I extend this literature by asking how exposure to international students affects the location choices of natives in their early career. Location choices shape wage profiles and career prospects, which is in contrast to studies that investigate wages or employment in a given point in time (Black *et al.*, 2013; Carrell *et al.*, 2018).

The literature that investigates labor market effects of immigration typically defines immigrants by country of origin or nationality, ignoring where the highest degree was obtained. However, the latter can affect the degree of substitutability between native and immigrant workers. Borjas (2009) finds that a higher share of foreign-born doctorates in a study field lowers the earnings of native-born doctorates who graduate around the same time. His evidence is limited to science and engineering while I cover all study fields, allowing broader conclusions. To understand the potential impact of international students on labor market conditions, I approximate stay rates for Switzerland and extend the scarce estimates for OECD countries (OECD, 2011). I take into account that international students can affect labor market decisions of natives not only through changes in labor market conditions, but also in preferences. The latter channel relates to a recent paper by Boelmann *et al.* (2021) presenting evidence on how immigrants can alter labor market decisions of natives through a cultural change.

The economic geography literature explores how individuals decide where to locate. There are three established concepts that describe the spatial choices of immigrants: herd effects, networks, and economic opportunities (Jaeger, 2007). A recent approach comes from Albert and Monras (2020). They argue that immigrants move to expensive but high-productive cities because they spend a part of their income in their country of origin. I document that international graduates, like immigrants, have strong preferences to work and reside in large urban locations. The literature further shows that natives with higher levels of education are more mobile than natives with lower levels (Malamud and Wozniak, 2012; Haapanen and Böckerman, 2017). In this paper, I focus on highly qualified native labor market entrants. This is in contrast to studies on mobility rates of the native population after an inflow of immigrants (Card, 2001; Saiz, 2007; Saiz and Wachter, 2011; Gonzalez and Ortega, 2013; Fernández-Huertas Moraga *et al.*, 2019). I shed light on the decisions of where to work and where to live that are often reduced to one by looking at metropolitan areas or commuting zones due to data limitations (e.g., Diamond, 2016; Albert and Monras, 2020). This split is highly informative because of different

mechanisms and implications on the distribution of economic activities and tax bases.

My analysis on native graduates also relates to the literature that looks at spatial mobility of graduates relative to where they have acquired higher education. Typically, the purpose of such studies is to evaluate whether in-state stipends (Bound *et al.*, 2004; Groen, 2004) or public funding of higher education by the home location (Oggenfuss and Wolter, 2019) pays off. My contribution is to investigate rural-urban movements of early career workers conditional on the place of growing up. The importance of the home region in location decisions is documented in the literature on home bias (e.g., Heise and Porzio, 2019). Its implications for future labor market outcomes are also emphasized in the literature on intergenerational mobility (e.g., Chetty *et al.*, 2014).

The remainder of the paper is organized as follows. In Section 1.2, I discuss the role of international mobility in higher education. In Section 1.3, I describe the data and introduce the empirical strategy. In Section 1.4, I present the results, followed by a discussion in Section 1.5. Section 1.6 concludes.

1.2 International Mobility

1.2.1 International Students

Educational mobility is a growing phenomenon and promoted in Europe by the harmonization of higher education across countries. For this purpose, the Bologna Declaration, signed in 1999, set up the European Higher Education Area (EHEA).[1] Student mobility can be short-term (i.e., credit mobility) or for a complete study program (i.e., degree mobility). This paper considers the latter form of mobility that is measured by the number of matriculated international students in a country. By definition, international students have a nationality other than that in the country of study and do not have a certificate

[1] In 2021, the EHEA has forty-nine member countries including Switzerland. Similar initiatives exist in other regions. For instance, twenty-three countries in Latin America and the Caribbean agreed to strengthen regional integration in higher education in 2019.

granting access to higher education from the destination country.

The United States receive the largest number of international students, but its share in all enrolled in 2017 is only 5.2% (see Bound *et al.*, 2021, for their role in the US). The European OECD countries have an average of 8.8% international students, while Switzerland has a significantly higher share of 17.8%. Of all OECD countries, Switzerland ranks fifth between Austria with 17.2% and the United Kingdom with 17.9% (OECD, 2020). International student flows are little regulated in most countries. As in the US, Switzerland does not have a cap on the number of permits allocated to international students. A confirmation of higher education admission and a proof of sufficient financial means are the main required documents to apply for a permit.[2]

In Switzerland, universities that offer general education receive the largest number of international students (24.5% in 2019). Universities of Applied Sciences and Universities of Teacher Education that focus on more specific skills have lower shares (11.1% in 2019). This study looks at universities because of their international orientation. The number of international students enrolled in bachelor's, master's or PhD programs at universities grew from 9,908 in 2000 to 36,035 in 2019. In relative terms, their share in all enrolled increased from 12.5% to 24.5%. This growth comes mainly from the years up to 2010, when the Bologna reform was introduced. Shares in 2019 are highest at the PhD level (54.2%), followed by the master's level (26.8%) and the bachelor's level (13.0%). I focus on the master's degree because the majority of university graduates enter the labor market with it.[3] Such a degree requires between 90 and 120 European Credit Transfer System (ECTS) credits, which corresponds to one and half to two full years of studying.

[2]Swiss higher education institutions generally do not limit admission for native and international students with few exceptions. There is a national quota for study fields related to medicine. Some other fields, especially at Universities of Applied Sciences, require an application. The University of St.Gallen restricts itself to a share of 25% international students in all enrolled.

[3]86.9% of university students with a bachelor's degree complete higher education with a master's degree within three years. This share takes into account those who obtain a bachelor degree between 1990 and 2016 and enroll into a master's study until 2019. It likely underestimates the true share because enrollment into a master's degree abroad cannot be measured.

Of all international students enrolled in a university master's program in 2019, 64% are nationals of an EU or EFTA member country. The top three sending countries – France, Germany, Italy – account for 45% of all international students. The countries with the fourth and fifth largest shares are China (7.8%) and India (3.3%). International students are overrepresented in STEM fields (science, technology, engineering, mathematics). Their share in all enrolled is 41.6% compared to 16.1% in non-STEM fields in 2019. Moreover, universities have varying shares of international students, which is partly driven by their range of study programs but also by student preferences.[4] This distinct sorting shows that the level of exposure varies among native students.

Native and international students also differ in individual characteristics. 51% of the native master students enrolled in 2019 are female compared to 45.8% of the internationals. The average age of natives is 26.2 and of internationals 25.6 years. Part of these differences are linked to the study field choice. For example, STEM students are overall more likely to be male and younger than their peers in non-STEM fields. These statistics highlight the importance of comparing students within a field of study and university to understand differences in educational and labor market outcomes across student types.

1.2.2 Transition to the Labor Market

Holding a university degree from the country of destination can facilitate immigrants' entry into the labor market due to specific skills acquired during their studies or access to networks. Additionally, employers are familiar with the degree, which can reduce recruitment costs. Graduates who are EU or EFTA nationals can access the Swiss labor market based on the Agreement on the Free Movement of Persons. However, non-EU/EFTA graduates are subject to work permit requirements with some exemptions because of their

[4] 84.3% of all master students at the Graduate Institute Geneva are internationals. The university with the second largest share is the Universita della Svizzera italiana (73.5%). The University of Lucerne (11.6%) and the University of Bern (9.8%) have the lowest shares.

Swiss university degree.[5]

Stay rates of international graduates are an important measure to understand international student flows. The most general approximation is based on permit status changes, since all individuals who once obtained a student permit are included. Using administrative data on immigration stocks (ZEMIS), the number of individuals reported with a student permit between 2002 and 2012 is in the denominator. The subset of them with a non-student permit in at least one year between 2002 and 2018 is in the numerator.

$$\text{Stay rate} = \frac{\text{nr stayers with former student permit}_{2002-2018}}{\text{nr immigrants with student permit}_{2002-2012}}$$

The average stay rate is 27.3%. It is higher for EU and EFTA students (38.2%), within which the neighboring countries have the highest probability to stay (41.6%). Consistent with the generally more demanding work permit requirements, non-EU/EFTA students are less likely to transition to the labor market (18.5%). These shares should be considered lower bounds for the group of university master students.[6] For comparison, the average stay rate in fourteen OECD countries is around 25% with values between 17% and 33% in 2009 (OECD, 2011). These shares are also based on permit status changes but cover only individuals who are not part of a free movement regime in a given country.

Stay rates can be estimated specifically for university master's graduates using survey data. Since stayers are more likely to fill in the survey, this approach potentially results in an overestimation. The following stay rates

[5] Yearly quotas are defined at the federal level. On the other hand, non-EU/EFTA graduates can stay six months for job search after their graduation. The local priority requirement, which forces employers to prove that the vacancy cannot be filled with a native or EU/EFTA worker, is waived if the employment is of high scientific or economic interest. See Bundesgesetz über die Ausländerinnen und Ausländer und über die Integration, Art. 21, Par. 3.

[6] Comparing student permit with student enrollment data shows that numbers for EU and EFTA students in the immigration dataset (ZEMIS) are similar to the inflow of bachelor, master and PhD students at universities (SHIS-studex). The number of non-EU/EFTA students is considerably higher in the ZEMIS dataset, suggesting that most of them are not graduating with a degree from a Swiss higher education institution. Therefore, the stay rates are likely to understate the true value, especially for non-EU/EFTA students.

should, thus, be considered upper bounds. Data for the period 2009–2019 show that 61.5% of international graduates report to live and 67.8% to work in the destination country. Graduates from non-EU/EFTA countries have a higher probability to stay for work (70.4%) than those from EU/EFTA countries (65.7%). Moreover, STEM graduates are more likely to stay for work (70.2%) than non-STEM graduates (65.9%).

Former international students staying in the destination country become resident immigrants. An established empirical fact is that immigrants are more likely to work and reside in larger cities than natives (e.g., Lewis and Peri, 2015). I show suggestive evidence that this holds based on Swiss data. I construct a concentration measure of immigrants in region r and year t following Albert and Monras (2020) and estimate the following equation:

$$\ln\left(\frac{nr\ immigrants_{rt}}{nr\ immigrants_{t}} / \frac{nr\ natives_{rt}}{nr\ natives_{t}}\right) = \alpha_0 + \alpha_1 \ln population_{rt} + \delta_r + \delta_t + \varepsilon_{rt} \tag{1.1}$$

Estimates in column (1) of Table B.1 show that an increase in the municipal population by 1% is associated with a higher concentration of immigrants of around 0.3%. Results in columns (2) and (3) further confirm this relation at the level of the commuting zone of the workplace. Such a pattern can emerge due to relative labor supply or relative labor demand forces (Moretti, 2013).

1.3 Data and Methods

1.3.1 Data

The main dataset is a linked version of the Swiss Higher Education Information System (SHIS-studex) and the Survey of Higher Education Graduates (EHA). Both are individual level datasets and obtained from the Swiss Federal Statistical Office (FSO). The SHIS-studex is administrative data covering all enrolled students at a Swiss higher education institution since 1990. Information on enrollment and graduation by degree, field of study and institution is collected annually for the fall semester. Available personal characteristics are

age, gender, nationality, and place of growing up. The latter variable refers to the time of obtaining the university entrance exam. It is defined at the municipality level for those with an entry exam from Switzerland and at the country level for all others. I distinguish international from native students based on the nationality and place of growing up. This dataset is used to calculate the peer composition in the year of graduation and, alternatively, in the year of first enrollment.

All graduates in even years are invited to participate in the EHA one and five years after graduation. Due to data quality, I focus on the first wave survey, which is sent out to all graduates in the year after completing a degree. The response rate of master graduates from universities was 57% in 2019. The available data covers the graduation cohorts 2002–2018. The FSO provides weights that take into account non-response. Participants self-report preferences in finding a job, labor market outcomes, working and residential locations. Information on the locations is available at the municipality level. The FSO adds variables such as the standardized yearly wage, which is normalized for full-time employment. I use this variable in the wage analysis. By linking the EHA to the SHIS-studex, I know the complete academic history of each survey participant. Additional information on the main datasets can be found in the Data Appendix.

I supplement the education data with three self-collected series. The dataset on tuition fees includes the semester fee by university and degree, and separately for native and international students for the period 2000–2020. For the university quality I rely on the QS World University Ranking, provided by Quacquarelli Symonds for the years 2004–2020.[7] The QS ranking is one of the best known global rankings and it exists since 2004. Almost 1,000 universities are considered. I build an index that reflects the perceived quality of an institution following Beine *et al.* (2018). Universities with a ranking above 400 or no ranking receive a value of 1. The universities with a better ranking receive a value according to the formula $Quality = 400 + 2 - Ranking$. Lastly, I collected data on travel time and distance by public transport and

[7] See the website of Quacquarelli Symonds for further information.

car between every municipality and the ten municipalities with a university. The API used relies on google maps for the calculations.

To measure stay rates of international students based on permit status changes, I use data from the Swiss Central Migration System (ZEMIS) which are obtained from the State Secretariat for Migration. The dataset includes the stock of foreign nationals as of December 31st each year and the daily inflow from 2002 onwards. From the Earnings Structure Survey (ESS) I derive information on the working population 26–65 that is employed in the private sector. This survey has been conducted by the FSO every two years since 1994 and firms are obliged to participate. In 2018 firms with around 2 million employees were surveyed. Individual information is reported at the worker level with the commuting zone (106 units) as the most detailed geographic unit. The main variables used are the work location and the standardized gross monthly wage for full-time employment. In addition, several publicly available datasets from the FSO on the resident population, the number of firms and employees are included in the analysis. In the analysis on the general population, immigrants and natives are distinguished by nationality. For deflating wages, I rely on a nationwide CPI with reference year 2015. Moreover, I use data from Wüest Partner on rental rates over the period 2010 to 2019 and on vacancy rates of rental objects over the period 2009–2018. These data relate to the first quarter of the year and are available for the five largest cities Basel, Bern, Geneva, Lausanne, and Zurich, which are the economic centers of the country.

The FSO classifies municipalities by density, size and accessibility into urban, intermediate and rural (Bundesamt für Statistik, 2017). Because of the similarities between intermediate and rural municipalities and because of the small share of individuals working there, I group the two together as rural units.[8] Out of 2,212 municipalities, 482 are urban, whereas 33 are categorized as cores of an agglomeration. This subset of urban cores includes, among others, the ten cities with a university. The geographic distribution of urban

[8]There are 2,212 municipalities in January 2019. 22% of all municipalities are urban, 26% intermediate and 52% are rural. However, 63% of the population live and 75% of the labor force work in urban places. For rural places these shares are 16% of the population and 10% of the labor force.

and rural municipalities is illustrated in Figure 1.1 and shows that urban locations and urban cores are present in all regions with some concentration in the northern part. Urban municipalities tend to have larger populations than rural municipalities, but there is overlap as the population is just one of three criteria to define the categories (see Figure 1.2). The median population of rural municipalities is $1,156$ and of urban ones $5,838$ in 2018. Urban cores are the largest locations with a median population of $34,599$.

1.3.2 Sample Selection and Summary Statistics

The sample builds on the EHA. The observation period 2009–2019 covers the time after all universities have implemented the Bologna reform. In the main analysis, I focus on a sample that includes natives. Natives are defined as master graduates who have a Swiss university entry exam. Around 4% of them have a non-Swiss nationality and are likely second or third generation immigrants. I consider master graduates who also have a bachelor's degree, which ensures that all individuals have completed their higher education within the Bologna framework, mitigating systematic differences across individuals. Around 96% of the native master students work and live in Switzerland one year after graduation. This large share highlights the importance of looking at intranational mobility.

Summary statistics on the outcome and control variables are presented in Panel A of Table 1.1. The variables are measured in the year after receiving the master's degree. 92% of all native graduates work in urban locations and 65% in urban cores. The average natural log of the population size of the workplace is 10.92 ($55,271$ in levels). Natives reside in relatively smaller places than where they work. The average natural log of the population size is 10.36 ($31,571$ in levels), while 82% live in an urban place and 52% in urban cores. They are on average almost 28 years old, 87% of them are single, and slightly more than half are female. 35% grew up in a rural municipality.[9]

[9]Note that the share of native graduates who grew up in rural places is very close to the share of the resident population in urban areas (37% in 2019). This suggests that the probability of obtaining a master's degree at a university is similar regardless of the place of growing up. The share of foreign residents in the population is 25.3% in 2019, indicating

The summary statistics in Panel B of Table 1.1 and the histogram in Figure 1.3 give an overview of the cohort composition that is constructed with SHIS-studex data. An average graduation cohort consists of about twenty-one individuals. This is a relatively small number and suggests that meaningful social interactions are likely between students. 22% of the students are international students. As the histogram shows, the size of the share of international peers shifts to the right over time. Subjects that relate to STEM, and business and administration receive the highest share of international students. In the empirical analysis I use the most narrow definition of fields of study to approximate best the level of interaction between native and international students. There were 48 distinct fields in the 2009 survey and 69 in 2019. Around 64% of the international students are from EU and EFTA countries, in particular from the neighboring countries, and around half are female.

1.3.3 Empirical Strategy

What is the effect of studying with international students on the intranational location choices of native peers in early career? I estimate the following regression equation at the individual level i:

$$\begin{aligned} y_{ifst} = \beta_0 + \beta_1 \textit{share international peers}_{fsc} + \beta_2 D_{ifst} \\ + \mathbf{X}'_{ifst}\gamma + \delta_{fs} + \delta_{ft} + \delta_{st} + \varepsilon_{ifst} \end{aligned} \tag{1.2}$$

where f, s and t represent the field of study, university and year. The main outcome variables y are indicators that equal 1 if a native graduate works or resides in an urban or urban core municipality, respectively. I complement the binary measures with the natural log of the resident population.

The measure of exposure to international peers is defined at the graduation cohort level f, s in time $c = t - 1$. I calculate the proportion of international peers by excluding the individual herself in the denominator: $\textit{share international peers}_{fsc} = \frac{\textit{nr international graduates}_{fsc}}{\textit{nr all graduates}-1_{fsc}}$. In an alternative

that a considerable fraction of the Swiss students are likely naturalized citizens.

specification, I measure international peer exposure in the year of enrollment e because the graduation cohort can be selected: $\frac{nr\ international\ students_{fse}}{nr\ all\ students-1_{fse}}$. With a median study length of two years, peer exposure is measured three years or less prior to the survey in year t for 50% of native students. D_{ifst} is an indicator for the type of location of growing up. It equals 1 for rural and 0 for urban municipalities.

To only capture the random variation across time within a study field and university, I add fixed effects and control variables. The pair-wise fixed effects δ_{fs}, δ_{ft} and δ_{st} absorb variation that can affect student selection, for example, due to tuition fees or the range of fields offered by a university. The vector $\mathbf{X}$ includes age and its squared term, gender, civil status, canton of growing up, nationality. Besides age, the variables are controlled for with dummies. The dummy for the canton of growing up takes into account differences in the prior education, which is cantonally regulated. It is also a proxy for the distance to the nearest university and labor market opportunities. Moreover, $\mathbf{X}$ includes the cohort means of the individual controls and the natural log of the cohort size. Each individual observation is weighed with the survey weights. The standard errors are clustered at the cohort level.

Location decisions likely depend on the place of growing up (Bosquet and Overman, 2019) and this can affect an individual's responsiveness to peer exposure. In Equation 1.3, I take this into account and allow the peer effect to vary with the place of growing up.

$$\begin{aligned} y_{ifst} = {} & \beta_0 + \beta_1 share\ international\ peers_{fsc} + \beta_2 D_{ifst} \\ & + \beta_3 share\ international\ peers_{fsc} \times D_{ifst} \\ & + \mathbf{X}'_{ifst}\gamma + \delta_{fs} + \delta_{ft} + \delta_{st} + \varepsilon_{ifst} \end{aligned} \tag{1.3}$$

The coefficient of interest is β_3. It shows the differential impact of a one unit change in the peer exposure for individuals from rural places compared to individuals from urban places on the probability to move to an urban place.

1.3.4 Identification

The empirical specification exploits random variation in the year-by-year cohort compositions similar to Carrell *et al.* (2018). The two key assumptions that must be fulfilled for causal estimates relate to selection and reflection.

Selection Students are not randomly allocated to cohorts. There can be self-selection and selection by universities. The latter is mitigated because of little to no education supply constraints in the Swiss context. In addition, universities cannot generate significant revenue from the relatively low fees, although international students pay on average more than native students.[10] Since twelve out of fourteen universities are public, making fee setting a rather slow political process, it tends not to be a means of selection.

University policies, on the other hand, can affect self-selection. In Table B.2 I investigate the implications of tuition fees and the ranking on student enrollment by student type and degree. In column (3) of Panel A, an increase in tuition fees has a positive but insignificant effect on international master student enrollment. The university quality, which is derived from its ranking, does not play a significant role. The coefficient on tuition fees turns marginally significant when further controlling for the population size and the average wage rate of higher educated workers in the university location in column (4). Results in Panel B show that tuition fees and the ranking do not affect native student enrollment. As noted above, these correlations could be biased if, for example, universities change their fees in order to control the inflow of students. In my baseline specification, I include university-by-year fixed effects, which absorb variation specific to the universities and their locations that could differently affect enrollment by student type. Similarly, differences in the quality of faculties across universities or in the course language across fields could induce selection. Changes at the field level are absorbed by field-by-university or field-by-year fixed effects.

The rough share of international students in a cohort can be a determinant

[10] Note that fees are set at the university level. Half of the universities price discriminate by student type. The average tuition fee per semester was CHF 1,055 for natives and CHF 1,514 for international students in 2020. Fees are largely publicly funded by the home canton of native students and by the university canton in the case of international students.

of native student enrollment. Given the empirical strategy, the variation that I exploit comes from random year-by-year changes in the cohort composition. This is difficult to predict because accurate cohort-level information on student types is not publicly available, making informed choices about cohort composition difficult at enrollment. Since I measure peer peer exposure in the year of graduation where students are aware of their cohort composition, I test if exposure to international peers in the cohort of first enrollment affects the probability to graduate within four years. Results in column (1) of Table B.3 shows that peer exposure has no significant effect on the probability to graduate. While the peer exposure has a marginally significant positive effect on the graduation rate in the study field of first enrollment, I do not find evidence that the graduation at the cohort level is affected as presented in column (4). Within a cohort, natives who want to avoid or intensify international competition can do so by selecting into different courses. Since this paper is conducted at the study field level, allocations at a narrower unit do not bias my results.

Existing work investigates native responses to international students by looking at enrollment and study field choices. These studies present evidence for crowding in effects of natives at the graduate level by referring to cross-subsidization, which is not a likely mechanism in this paper given the overall relatively low tuition fees.[11] In Table B.4 I formally test for selection by native characteristics. I regress each individual control on the peer exposure measure, the cohort controls and the fixed effects. All coefficients are insignificant, suggesting that the share of international peers does not predict own characteristics. In Table B.5 I test if individual characteristics predict their peer exposure, but again no evidence is found. To conclude, the empirical setting allows to exploit the natural variation among adjacent cohorts that is random and this approach is supported by the tests performed.

[11] Machin and Murphy (2017) find that a higher share of international students does not affect native undergraduates and increases the number of postgraduates. Shih (2017) finds higher enrollment of native graduates and Bound *et al.* (2020) lower enrollment of native undergraduates, respectively. In terms of study fields, Anelli *et al.* (2017) reports that a higher share of international students in a math introductory course increases the number of native STEM graduates. The cited studies are conducted in the US or UK context where enrollment quotas can apply and institutions often generate sizeable revenue with tuition fees.

Reflection Peer effects can work in both ways, which Manski (1993) named the reflection problem. If the sample includes the relevant peer group, the estimated peer effect is partly a mechanical phenomenon because the behavior of international peers would be mapped onto the dependent variable (Angrist, 2014). Since I limit the sample to natives, I have a clear division between the international peers and the response of natives. In addition, the student type is pre-determined as it is defined by a combination of the nationality and the country that issued the university entry exam.

1.4 Analysis

In this section, I estimate the causal effect of exposure to international students on native peers' location choices in early career. I investigate the decisions of where to work and where to reside separately as they involve different costs and benefits (e.g., Moretti, 2013; Combes *et al.*, 2018). The direction of the effect is ambiguous a priori, as the potential mechanisms at work during the study period or after graduation can point in different directions.

1.4.1 Results

Place of work I begin by estimating Equation 1.2, where I am interested in the effect of exposure to international peers and growing up in a rural place on where to work after completing university. Table 1.2 presents results for different outcomes in the panels and for different sets of control variables in the columns. Results in Panel A show that an increase in international peer exposure is associated with a higher probability of working in urban locations. When augmenting the most basic specification in column (1) with fixed effects and control variables, the effect becomes smaller and statistically insignificant. Estimates further show that the place of growing up is an important predictor of where to work in the year after graduation. In the preferred specification with pair-wise interacted fixed effects and control variables in column (4), individuals who grew up in a rural place have a 2.8 percentage points lower probability to work in an urban area than natives who grew up in an urban

place. The findings in Panel A are consistent with urban cores in Panel B and location size in Panel C as outcome variables. Overall, estimates in column (3) with pair-wise interacted fixed effects and in column (4) with additional control variables are comparable. Introducing controls slightly increases the adjusted R squared and shifts the coefficient on place of growing up towards zero, while the coefficient on peer exposure remains insignificant. If selection on observables is informative on selection of unobservables, the relatively stable coefficients suggest that omitted variable bias is limited (Altonji *et al.*, 2005; Oster, 2019).

Following Equation 1.3, I interact the two independent variables. The last column in Panel A of Table 1.3 shows that natives from rural places become more likely to work in urban areas as their exposure to international peers increases. A 10 percentage point increase in the peer exposure raises the probability by 0.4 percentage points (p-value 0.108). Panel B shows that this effect is driven by decisions towards working in urban core municipalities where the coefficient is more than twice as large and statistically significant at the 5% level.The weaker response in Panel A is expected given that a high share of natives work in urban locations, leaving little margin to adjust: almost 92% of the native graduates work in an urban municipality, while 65% work in an urban core. Panels A and B show no evidence that individuals who grew up in urban areas are affected by the peer composition.

Is the positive effect on the work location choice driven by natives taking a job in the next bigger location or do they consider locations in regions further away than the one they grew up in? To answer this question, I look at how peer exposure affects the likelihood to work in a different region than that of growing up. I consider the canton and the labor market as the relevant types of region.[12] The canton as an administrative unit is interesting because it carries most of the educational costs of its citizens. The labor market corresponds

[12]There are 16 labor markets and 26 cantons. Each labor market has at least one urban core. The mean share of employees in urban municipalities in a labor market is 70% in 2018. The lowest share is 44.6% and the highest 93.5%. The distribution is more unequal in cantons. The mean share of employees in urban municipalities in a canton is 68%, the lowest share 36.7% and the highest share 96.6%, when leaving out the two cantons that are completely urban or rural.

to the area for job search, provided that the place of growing up is a relevant reference point. Evidence in the first two columns of Table B.6 shows that natives from rural places are more likely to move interregionally as the share of international peers increases.

The first robustness test is shown in Panel C of Table 1.3 where I use the population size as a continuous outcome variable. Findings confirm that a higher exposure to international peers induces rural natives to work in larger places, as suggested by the difference in magnitudes of the coefficients in Panels A and B. In the specification presented in Table B.7, I replace the indicator variable of where someone grew up with quintiles based on population size in 2005. Each quintile includes an equal number of native graduates.[13] The two third of the native graduates who grew up in the smallest municipalities are most responsive to peer exposure in their decisions to work in urban cores as shown in column (2). The peer exposure interacted with the third quintile, where more than half of the individuals are from urban areas, has the largest coefficient. This suggests that international peers also induce natives from urban but smaller places to work more often in urban cores.

In another robustness check in Table B.8, I measure the share of international peers in the year of first enrollment instead of graduation. This addresses issues linked to endogenous adjustments of students during the study period, for example, in terms of drop outs, changes of universities or study fields. Results shown in columns (1)–(3) of Panel A are robust to the baseline, while the coefficient magnitude and significance slightly drop. In Panel B I exclude long-term students taking four or more years to complete their master's degree because they are exposed to international students at a different intensity over time. Dropping these outliers leads to virtually unchanged results compared to the baseline findings. Finally, in an unreported analysis I take into account that one of the Swiss universities has a cap on the share of international students in all enrolled. This limits the variation in the proportion of international

[13] In the first quintile, 83.6% of the individuals grew up in a rural place. In the second one the share is 61.4%, in the third 31.3% and in the top two quintiles it is roughly 0%. When focusing on individuals who grew up in urban cores, 96.6% of the individuals in the fifth quintile are from urban cores, in the fourth the share is 20.9% and in the lower quintiles it goes to zero.

students at the university level and can affect selection. However, excluding this university from the sample does not change results.

Place of residence Table 1.4 presents the results of the non-interacted specification for the place of residence. The preferred specification in column (4) of Panel A shows that the coefficient capturing the peer effect is negative and marginally insignificant (p-value 0.101). Moreover, I find that natives from rural places are less likely to reside in urban areas after completing higher education than natives from urban places. Results from the interacted specification are shown in Table 1.5. In column (4) of Panel A, the negative coefficient of the peer effect becomes statistically significant at the 10% level (p-value 0.084). This negative effect is not driven by movements out of urban cores as shown in Panel B. It is also not observable when looking at movements across locations by population size in Panel C. In all three panels, the coefficient of the interaction term is positive and statistically insignificant.

The results in Table 1.5 imply that higher international peer exposure induces natives to live in rural areas, but that these movements take place within similarly sized municipalities. I test if the peer effect is linked to interregional movements in columns (3)–(4) of Table B.6. I do not find evidence for a change in the propensity to live in a labor market or canton different to that of growing up, suggesting that movements are local. Next, I replace the indicator variable of the place of growing up with population quintiles in Table B.7. Results in column (4) show that the peer effect is negative and significant for individuals in the top quintile. This result is surprising because more than 95% of the natives in the top quintile grew up in urban core locations. 95.0% of individuals from urban cores live in urban places after graduation, which implies a low margin for movements to rural areas. The results in columns (4)–(6) of Table B.8 are based on the peer measurement in the year of enrollment instead of graduation. The peer effect on the probability to live in urban locations is not statistically significant and the same holds when dropping the long-term students in Panel B. This check suggests that the peer effect in the baseline specification is specific to the measurement of the cohort composition and, thus, not robust.

1.4.2 Heterogeneity

The main analysis has shown that native graduates who grew up in rural places are responsive to international peers in their decision of where to work. In Table 1.6 I look at heterogeneity in the estimates by considering two outcomes – the probability to work in urban core locations in columns (1) and (3) and the population size in columns (2) and (4).

In Panel A I split the sample into non-STEM and STEM graduates. STEM fields have on average a higher share of international students than non-STEM fields (see Table 1.1). Moreover, labor market characteristics such as the spatial distribution of occupations likely differ by type of skill. Results show that the peer effect is driven by non-STEM graduates. Panel B shows that the effect comes from both male and female natives. In Panel C I find that graduates at the median age of twenty-seven or younger drive the results.[14] Finally, in Panel D I split the sample into graduates from a canton with and without university, proxying distance to the closest university. The distance to the closest university is on average 19 minutes by car for individuals from a university canton and 44 minutes for individuals from a non-university canton. The gap persists with 51 versus 70 minutes when looking at the travel minutes to the effectively chosen university. Results suggest that this criteria has no clear impact on the responsiveness of natives. Natives who grew up in a university canton likely drive the movements towards urban cores, but natives who grew up in cantons without a university drive the movements towards larger work locations.

1.5 Discussion

International students can affect native preferences for wages and working conditions through interactions during their studies. In addition, those who stay in the host country after graduation can alter native labor market conditions. I discuss these mechanisms in the following sections.

[14] The allocation of the individuals at the median age of twenty-seven to one of the subsets is not decisive.

Preferences Native and international students differ in where they work. Results in columns (1) and (2) of Table 1.7 show that international graduates are significantly more likely to work in urban cores and larger cities than native graduates. These differences are more pronounced in a subset with natives from rural places compared to natives from urban places. Albert and Monras (2020) document that financial preferences can be an underlying reason for the concentration of immigrants in large and typically expensive cities, where nominal wages are higher. Consistent with this is Figure A.1a, which illustrates that 59.5% of the international graduates report that earning a high salary is important or very important to them. The share among native graduates is 44.3%.

I examine if international peers affect the importance that natives assign to wages, which could drive them to urban workplaces given the urban wage premium. Findings in columns (1) and (2) of Table 1.9 show that natives are more likely to report that a high salary is important to them as their exposure to international peers increases. Since the interaction term is not statistically significant, the financial preferences of natives who grew up in rural and urban areas are similarly affected. As the main analysis has shown, only native graduates from rural areas are on average responsive to international peer exposure in their workplace decisions. This can be explained by the fact that a high proportion of native graduates who grew up in urban areas also work there (93.2%), which implies that overall migration to urban areas is limited. At a finer level, results from the quantile specification in Table B.7 suggest that individuals from urban but smaller places are also likely to work more often in larger cities as the international peer exposure increases. To conclude, findings are in line with a channel where a change in preferences for higher wages induces native graduates to work in urban and larger locations.

The existence of an urban wage premium is an established finding in the literature (see, e.g., Behrens *et al.*, 2014, for different explanations). I provide evidence for Switzerland by estimating an average static earnings premium following Combes *et al.* (2008) and De La Roca and Puga (2016). In the first step, I include controls that vary across individuals. The regression in the

second step includes only variation across regions.

$$\begin{aligned} w_{irt} &= \beta_0 + \delta_r + \mathbf{X}'_{irt}\gamma + \varepsilon_{irt} \\ \hat{\delta}_r &= \alpha_0 + \alpha_1 \ln population_r + \eta_r \end{aligned} \tag{1.4}$$

w_{irt} is the natural log of the yearly earnings of worker i in municipality r at time t. δ_r is a municipality fixed effect, the vector with control variables $\mathbf{X}$ contains individual and job characteristics, and year fixed effects. The variable *population* is the natural log of the average municipal population over the observation period. Standard errors are robust and clustered at the cohort level in the upper regression equation.

Results in column (2) of Table 1.10 show that a 10% increase in the municipal population is associated with 2.8% higher wages in the year after graduation. For comparison, I also estimate the premium for the native labor force. Column (2) of Table B.9 shows that a 10% increase in the region's population size is associated with 5.0% higher wages.[15] The coefficient for the subset of high-skilled native employees in column (4) is 4.3%. In sum, the difference in urban wage premiums suggests that working in urban locations one year after graduation is likely associated with higher wage trajectories and not necessarily with immediate benefits.

Labor market conditions Stay rates of international graduates of above 60% suggest that international peers can affect native labor market conditions. Since native and international graduates from the same cohort are in the same skill-experience cell, a high degree of substitutability is expected (Borjas, 2003). However, the finding that rural natives become more likely to work in places where international graduates are concentrated does not suggest a negative wage impact. A mechanism whereby international stayers increase agglomeration benefits, and thus wages, would be more consistent to explain the main finding (see Glaeser and Gottlieb, 2009, for an overview). Yet, estimates in column (1) of Table 1.8 show no evidence that international

[15]The estimated premium in column (2) is comparable to elasticities of 0.037 in West Germany (Dauth *et al.*, 2021) or 0.046 in Spain (De La Roca and Puga, 2016).

peers affect native wages. This result also implies that native graduates who respond to the peer exposure do not benefit immediately from an urban wage premium, as the coefficient on the interaction term is close to zero.

Another potential mechanism relates to demand effects. Firms seeking to recruit international talent are likely to post vacancies in urban places given the spatial preferences of highly skilled immigrants. Since firms cannot perfectly discriminate between native and international applicants, an increase in vacancies is expected to attract natives too. As data on vacancies are not available, I instead test this hypothesis with data on the number of firms and employees. The analysis is limited to the ten municipalities with a university. They make around one third of the urban core municipalities and the majority of the graduates work there: 66.3% of the international stayers and 54.5% of the native graduates.[16] If there are demand effects, they are likely strongest in this subset of municipalities.

Table B.10 presents correlations between the share of international graduates and the number of firms and employees, respectively, for all sectors in Panel A and the tertiary sector in Panel B.[17] I find that a higher share of international graduates is positively related to the number of firms and the number of employees. While the firm demand analysis is conducted at the municipality level, the peer effect study exploits variation at the cohort level. A conclusive link between the two analyses is hence difficult, but results suggest that demand effects may play a role in explaining the peer effects.

Other channels Exposure to international students can affect native location decisions through further channels. First, survey data suggest that an international work environment is more important to international students than to natives as illustrated in Figure A.1b. This is consistent with the results in columns (3) and (4) of Table 1.7 showing that international students

[16]Note that the correlation between the number of international graduates in a location and the number of international stayers in the same location is 0.86 with a p-value of 0.000. Separate correlations for the ten university cities show that they are significant in all but three cities (St.Gallen, Lugano, Fribourg).

[17]In the specifications in columns (3) and (6), I introduce lagged values of the share of international graduates to address reverse causality if the graduation year is endogenous to the number of vacancies in the university location (Messer and Wolter, 2010).

are more likely to work for large and international firms. Do native graduates have a higher propensity to work for such firms, which tend to be located in urban areas, as their exposure to international students increases? Results in columns (2) and (3) of Table 1.8 show no evidence for this hypothesis. I also do not find indications that natives change their preferences by reporting more often that an international work environment is important to them as presented in columns (3) and (4) of Table 1.9.

Second, the literature documents that high-skilled individuals sort into urban places. For example, Bütikofer and Peri (forthcoming) show that individuals with a higher cognitive ability are more likely to migrate from rural to urban locations in Norway. Thus, location choice could further differ by grades, which could be affected by international peers. International students are a selected group and are likely to come from the upper end of the ability distribution of a given country due to the costs involved with studying abroad, in particular the high living costs in Switzerland. A simple regression of grades on the student type and pair-wise interacted fixed effects does, however, not reveal any systematic relation between the two variables. In line, column (4) of Table 1.8 shows that the exposure to international peers has no impact on the final grades of the natives.

Third, the peer effects analysis has shown that natives from rural places respond to the international student exposure in terms of where they work, but not in terms of where they live. Why is there a lack of responsiveness in the latter choice? Immigrants can increase demand for housing in places where they are concentrated, raise rental rates and potentially crowd out natives (Saiz, 2007; Gonzalez and Ortega, 2013). On the other hand, the group of international master students is small relative to the population and has gradually increased over time.[18] I explore correlations between the share of international graduates and rents in the five largest cities for which data on housing is available. The first two columns in Table B.11 do not suggest a systematic link between the two variables. The share of international graduates does also not affect vacancy rates of rental properties as presented in

[18]For example, their share in the municipal population is between 0.33% in Zurich and 1.43% in Lausanne in 2019. In 2010, the shares were 0.26% in Zurich and 0.72% in Lausanne.

the last two columns. Given that 79.5% of all international students graduate in one of these five cities and 60.5% of all international stayers work there, it is unlikely that rental markets in other urban areas with lower exposure to international students are affected. The literature discusses further channels to explain native relocation after an inflow of immigrants (Saiz and Wachter, 2011; Fernández-Huertas Moraga *et al.*, 2019). However, country of origin, socioeconomic status or ethnicity should play only a limited role in the case of high-skilled immigrants. In conclusion, the natives' non-response in residential location choice is likely related to their willingness to commute. This is consistent with data showing that workers with higher levels of education commute the longest compared to workers with lower levels of education (Bundesamt für Statistik, 2021).

1.6 Conclusion

This paper provides novel evidence on how the university cohort composition affects decisions of natives early in their career. The literature shows that such initial decisions can have long-term implications on individual labor market outcomes. I focus on the proportion of international students in a cohort because they are a growing group of (temporary) immigrants for whom few regulations apply in most countries. I show that native graduates from rural areas are less likely to work in urban places than native graduates from urban areas. This difference, however, decreases as the exposure to international students increases because rural natives become more likely to work in urban places. Despite the great similarity between native and international students in their acquired skills, I do not find displacement effects of native graduates on the labor market.

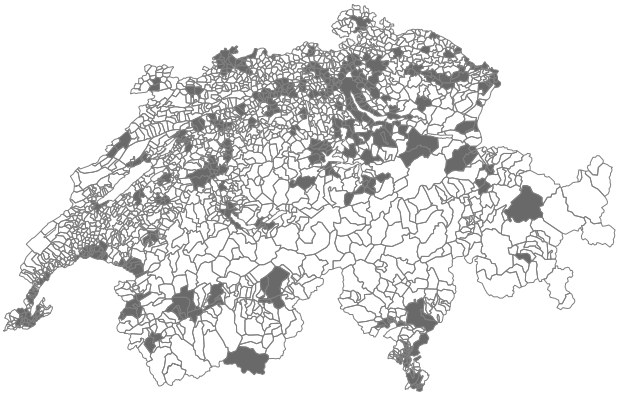
These findings are relevant for policy makers because international student flow is little regulated, as is often the transition to the labor market of the country where these students graduate. This makes international students a politically and economically relevant group of immigrants. Results imply that the concentration of economic activity in urban areas increases with more

international cohorts, which could enhance agglomeration benefits. At the same time, firms in smaller locations may struggle to recruit highly skilled workers. Since international students do not affect the natives' decision of where to reside, there are no implications on the distribution of the tax bases.

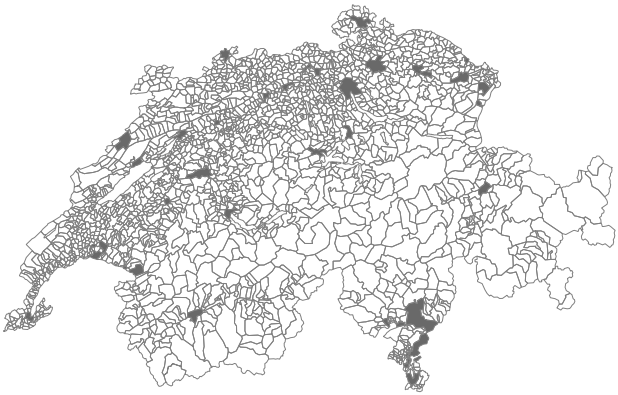
Figures

Figure 1.1: Spatial distribution of urban and rural municipalities

(a) Urban locations



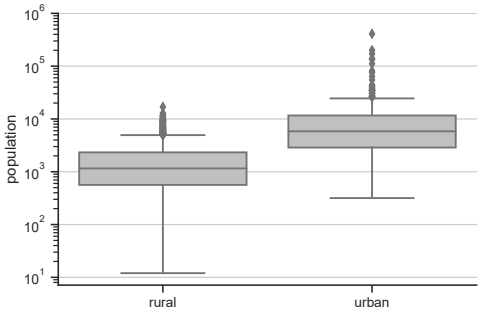
(b) Urban core locations



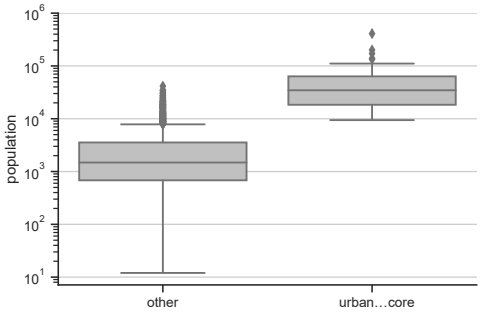
Note: The maps show the 2,212 municipalities of Switzerland. In figure (a), the gray units are classified as urban (482) and the white as rural. In figure (b), the gray units are classified as urban cores (33) and the white as the other urban und rural municipalities. Source: FSO.

Figure 1.2: Distribution of population across urban and rural municipalities

(a) Urban locations

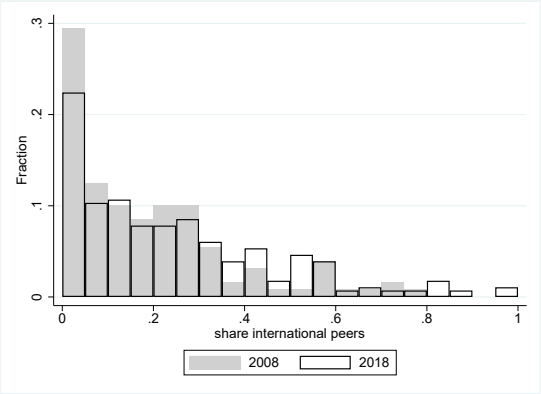


(b) Urban core locations



Note: The boxplots show the distribution of the population across municipalities in 2018. Figure (a) plots the distribution by urban and rural category and figure (b) by urban core versus all other municipalities. The y-axis is in log scale. Source: FSO.

Figure 1.3: Share of international peers in a cohort



Note: The histogram shows the share of international peers in a graduation cohort in 2008 and 2018. A cohort is defined at the study field-by-university level. Bin width is 0.05. Source: SHIS-studex.

Tables

Table 1.1: Summary statistics

	Mean	Sd	Min	Max
Panel A: Outcome variables and controls				
working urban	0.92	0.28	0.00	1.00
working urban core	0.65	0.48	0.00	1.00
log population in work location	10.92	1.57	5.38	12.92
living urban	0.82	0.38	0.00	1.00
living urban core	0.52	0.50	0.00	1.00
log population in residence	10.31	1.80	3.71	12.92
growing up rural	0.35	0.48	0.00	1.00
age	27.67	3.08	23.00	75.00
single	0.87	0.34	0.00	1.00
female	0.51	0.50	0.00	1.00
non-Swiss nationality	0.04	0.20	0.00	1.00
Panel B: Cohort size and composition				
log cohort size	3.05	1.25	0.00	6.55
sh international peers	0.22	0.21	0.00	1.00
... in education	0.10	0.14	0.00	1.00
... in arts and humanities	0.16	0.21	0.00	1.00
... in social sciences, journalism	0.23	0.21	0.00	1.00
... in business, administration, law	0.26	0.22	0.00	0.86
... in natural sciences, maths, stats	0.26	0.18	0.00	1.00
... in ICT	0.38	0.25	0.00	0.95
... in engineering, manufacturing, construction	0.38	0.22	0.00	1.00
... in agriculture, forestry, veterinary	0.03	0.04	0.00	0.15
... in health and welfare	0.13	0.15	0.00	0.75
... from neighboring countries	0.10	0.14	0.00	1.00
... from EU/EFTA countries	0.14	0.16	0.00	1.00
... female	0.11	0.14	0.00	1.00

Note: Panel A presents statistics of the main sample covering the period 2009–2019. It includes native graduates who obtained a master's degree from a Swiss university between 2008 and 2018, and work and live in Switzerland in the year after graduation. The number of observations is 22,243. Panel B presents statistics on the graduation cohorts covering the period 2008–2018. A cohort is defined at the study field-by-university level. The aggregate study fields shown follow the ISCED-F 2013 classification. ICT is short for Information and Communication Technology. The number of observations is 1,447. Sources: EHA, FSO, SHIS-studex.

Table 1.2: Work location choice

	regression coefficient (1)	+ single FE (2)	+ interacted FE (3)	+ controls (4)
Panel A: Working in urban municipality				
sh international peers	0.096***	-0.026	0.020	0.022
	(0.028)	(0.020)	(0.031)	(0.031)
growing up rural	-0.044***	-0.036***	-0.036***	-0.028***
	(0.005)	(0.004)	(0.004)	(0.005)
Mean outcome	0.916	0.916	0.916	0.916
Sd outcome	0.278	0.278	0.278	0.278
N	22243	22243	22222	22222
Adj. R2	0.009	0.050	0.053	0.055
Panel B: Working in urban core municipality				
sh international peers	0.099	-0.045	-0.016	0.002
	(0.065)	(0.041)	(0.052)	(0.050)
growing up rural	-0.040***	-0.034***	-0.033***	-0.028***
	(0.009)	(0.008)	(0.008)	(0.008)
Mean outcome	0.654	0.654	0.654	0.654
Sd outcome	0.476	0.476	0.476	0.476
N	22243	22243	22222	22222
Adj. R2	0.003	0.061	0.067	0.075
Panel C: Log population of work place				
sh international peers	0.900***	0.091	0.053	0.098
	(0.275)	(0.141)	(0.170)	(0.166)
growing up rural	-0.210***	-0.167***	-0.166***	-0.111***
	(0.030)	(0.024)	(0.025)	(0.025)
Mean outcome	10.919	10.919	10.919	10.919
Sd outcome	1.573	1.573	1.573	1.573
N	22243	22243	22222	22222
Adj. R2	0.013	0.113	0.121	0.135

Note: The table shows results from estimating Equation 1.2. The sample consists of native individuals with a university master's degree who work and live in Switzerland one year after graduation. The dependent variable is displayed at the top of each panel. Column (1) includes only the two independent variables. In Column (2) I add fixed effects for the study field, university and year. In Column (3) I add pair-wise interacted fixed effects. Column (4) additionally includes individual and cohort controls. Standard errors in parentheses are clustered at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, SHIS-studex.

Table 1.3: Work location choice (interacted specification)

	regression coefficient (1)	+ single FE (2)	+ interacted FE (3)	+ controls (4)
Panel A: Working in urban municipality				
sh international peers	0.073***	-0.037*	0.009	0.009
	(0.024)	(0.022)	(0.032)	(0.033)
growing up rural	-0.056***	-0.042***	-0.042***	-0.036***
	(0.009)	(0.007)	(0.007)	(0.007)
rural x sh int peers	0.066**	0.032	0.035	0.041
	(0.033)	(0.025)	(0.026)	(0.026)
Mean outcome	0.916	0.916	0.916	0.916
Sd outcome	0.278	0.278	0.278	0.278
N	22243	22243	22222	22222
Adj. R2	0.009	0.050	0.053	0.055
Panel B: Working in urban core municipality				
sh international peers	0.068	-0.076*	-0.045	-0.030
	(0.062)	(0.042)	(0.052)	(0.049)
growing up rural	-0.056***	-0.050***	-0.050***	-0.045***
	(0.015)	(0.012)	(0.013)	(0.012)
rural x sh int peers	0.093*	0.090*	0.092**	0.100**
	(0.054)	(0.047)	(0.046)	(0.046)
Mean outcome	0.654	0.654	0.654	0.654
Sd outcome	0.476	0.476	0.476	0.476
N	22243	22243	22222	22222
Adj. R2	0.003	0.061	0.067	0.075
Panel C: Log population of work municipality				
sh international peers	0.782***	0.023	-0.014	0.002
	(0.276)	(0.149)	(0.173)	(0.169)
growing up rural	-0.270***	-0.202***	-0.204***	-0.163***
	(0.048)	(0.035)	(0.036)	(0.035)
rural x sh int peers	0.344*	0.199	0.213	0.303**
	(0.177)	(0.139)	(0.139)	(0.136)
Mean outcome	10.919	10.919	10.919	10.919
Sd outcome	1.573	1.573	1.573	1.573
N	22243	22243	22222	22222
Adj. R2	0.013	0.113	0.121	0.135

Note: The table shows results from estimating Equation 1.3. The sample consists of native individuals with a university master's degree who work and live in Switzerland one year after graduation. The dependent variable is displayed at the top of each panel. Column (1) includes only the two independent variables. Column (2) includes fixed effects for the study field, university and year. In Column (3) I add pair-wise interacted fixed effects. Column (4) additionally includes individual and cohort controls. Standard errors in parentheses are clustered at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, SHIS-studex.

Table 1.4: Residential location choice

	regression coefficient (1)	+ single FE (2)	+ interacted FE (3)	+ controls (4)
Panel A: Living in urban municipality				
sh international peers	0.043	-0.036	-0.074	-0.075
	(0.027)	(0.029)	(0.046)	(0.045)
growing up rural	-0.348***	-0.343***	-0.342***	-0.336***
	(0.010)	(0.010)	(0.011)	(0.011)
Mean outcome	0.823	0.823	0.823	0.823
Sd outcome	0.382	0.382	0.382	0.382
N	22243	22243	22222	22222
Adj. R2	0.191	0.204	0.205	0.214
Panel B: Living in urban core municipality				
sh international peers	0.034	-0.025	-0.024	-0.028
	(0.044)	(0.034)	(0.055)	(0.054)
growing up rural	-0.144***	-0.142***	-0.140***	-0.129***
	(0.007)	(0.007)	(0.007)	(0.008)
Mean outcome	0.516	0.516	0.516	0.516
Sd outcome	0.500	0.500	0.500	0.500
N	22243	22243	22222	22222
Adj. R2	0.019	0.047	0.046	0.076
Panel C: Log population of residential municipality				
sh international peers	0.387	-0.018	-0.074	-0.096
	(0.243)	(0.136)	(0.187)	(0.186)
growing up rural	-0.779***	-0.746***	-0.741***	-0.648***
	(0.030)	(0.030)	(0.031)	(0.033)
Mean outcome	10.313	10.313	10.313	10.313
Sd outcome	1.798	1.798	1.798	1.798
N	22243	22243	22222	22222
Adj. R2	0.045	0.106	0.107	0.163

Note: The table shows results from estimating Equation 1.2. The sample consists of native individuals with a university master's degree who work and live in Switzerland one year after graduation. The dependent variable is displayed at the top of each panel. Column (1) includes only the two independent variables. Column (2) includes fixed effects for the study field, university and year. In Column (3) I add pair-wise interacted fixed effects. Column (4) additionally includes individual and cohort controls. Standard errors in parentheses are clustered at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, SHIS-studex.

Table 1.5: Residential location choice (interacted specification)

	regression coefficient (1)	+ single FE (2)	+ interacted FE (3)	+ controls (4)
Panel A: Living in urban municipality				
sh international peers	0.028*	-0.043	-0.080*	-0.083*
	(0.016)	(0.029)	(0.048)	(0.048)
growing up rural	-0.356***	-0.347***	-0.346***	-0.341***
	(0.014)	(0.014)	(0.015)	(0.015)
rural x sh int peers	0.045	0.020	0.020	0.027
	(0.055)	(0.053)	(0.055)	(0.056)
Mean outcome	0.823	0.823	0.823	0.823
Sd outcome	0.382	0.382	0.382	0.382
N	22243	22243	22222	22222
Adj. R2	0.191	0.204	0.205	0.214
Panel B: Living in urban core municipality				
sh international peers	0.013	-0.037	-0.037	-0.041
	(0.044)	(0.035)	(0.057)	(0.057)
growing up rural	-0.154***	-0.148***	-0.147***	-0.136***
	(0.010)	(0.010)	(0.011)	(0.011)
rural x sh int peers	0.061	0.035	0.040	0.042
	(0.046)	(0.045)	(0.048)	(0.050)
Mean outcome	0.516	0.516	0.516	0.516
Sd outcome	0.500	0.500	0.500	0.500
N	22243	22243	22222	22222
Adj. R2	0.019	0.047	0.046	0.076
Panel C: Log population of residential municipality				
sh international peers	0.322	-0.009	-0.067	-0.121
	(0.231)	(0.137)	(0.194)	(0.193)
growing up rural	-0.813***	-0.741***	-0.737***	-0.662***
	(0.040)	(0.041)	(0.042)	(0.045)
rural x sh int peers	0.192	-0.027	-0.023	0.080
	(0.194)	(0.181)	(0.191)	(0.192)
Mean outcome	10.313	10.313	10.313	10.313
Sd outcome	1.798	1.798	1.798	1.798
N	22243	22243	22222	22222
Adj. R2	0.045	0.106	0.107	0.163

Note: The table shows results from estimating Equation 1.3. The sample consists of native individuals with a university master's degree who work and live in Switzerland one year after graduation. The dependent variable is displayed at the top of each panel. Column (1) includes only the two independent variables. Column (2) includes fixed effects for the study field, university and year. In Column (3) I add pair-wise interacted fixed effects. Column (4) additionally includes individual and cohort controls. Standard errors in parentheses are clustered at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, SHIS-studex.

Table 1.6: Work location choice – heterogeneity in peer effects

	Subset A		Subset B	
	working in urban core	log population workplace	working in urban core	log population workplace
	(1)	(2)	(3)	(4)
Panel A: Non-STEM (A) vs. STEM fields (B)				
sh international peers	-0.089	-0.229	0.040	0.210
	(0.060)	(0.201)	(0.088)	(0.309)
growing up rural	-0.044***	-0.149***	-0.057***	-0.257***
	(0.014)	(0.041)	(0.020)	(0.068)
rural x sh int peers	0.153***	0.465***	0.077	0.316
	(0.057)	(0.168)	(0.076)	(0.246)
Mean outcome	0.661	10.884	0.637	11.003
Sd outcome	0.473	1.527	0.481	1.676
N	15494	15494	6728	6728
Adj. R2	0.071	0.140	0.085	0.123
Panel B: Male (A) vs. female (B)				
sh international peers	-0.118	-0.117	0.023	-0.037
	(0.081)	(0.276)	(0.065)	(0.205)
growing up rural	-0.047***	-0.169***	-0.046***	-0.175***
	(0.017)	(0.052)	(0.016)	(0.050)
rural x sh int peers	0.113*	0.260	0.121*	0.532**
	(0.058)	(0.181)	(0.068)	(0.231)
Mean outcome	0.669	11.014	0.641	10.825
Sd outcome	0.471	1.585	0.480	1.554
N	10506	10506	11659	11659
Adj. R2	0.076	0.127	0.071	0.133
Panel C: Below (A) vs. above median age (B)				
sh international peers	-0.064	-0.015	-0.052	-0.071
	(0.071)	(0.209)	(0.085)	(0.295)
growing up rural	-0.052***	-0.179***	-0.033*	-0.121**
	(0.015)	(0.043)	(0.018)	(0.059)
rural x sh int peers	0.114**	0.300*	0.088	0.279
	(0.058)	(0.178)	(0.083)	(0.268)
Mean outcome	0.646	10.882	0.668	10.972
Sd outcome	0.478	1.562	0.471	1.586
N	13256	13256	8917	8917
Adj. R2	0.079	0.142	0.063	0.117
Panel D: From canton with (A) vs. without university (B)				
sh international peers	-0.096	0.030	-0.028	-0.019
	(0.117)	(0.379)	(0.058)	(0.203)
growing up rural	-0.049***	-0.079	-0.042***	-0.197***
	(0.017)	(0.051)	(0.014)	(0.044)
rural x sh int peers	0.130	0.073	0.065	0.304*
	(0.088)	(0.235)	(0.056)	(0.177)
Mean outcome	0.643	10.869	0.660	10.940
Sd outcome	0.479	1.615	0.474	1.553
N	6731	6731	15421	15421
Adj. R2	0.054	0.094	0.077	0.146

Note: The table shows results from estimating Equation 1.3. The sample consists of native individuals with a university master's degree who work and live in Switzerland one year after graduation. The dependent variable is displayed at the top of each column. All regressions include pair-wise interacted fixed effects, individual and cohort controls. Standard errors in parentheses are clustered at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, SHIS-studex.

Table 1.7: Differences in labor market outcomes between native and international graduates

	working in urban core (1)	log population workplace (2)	firm > 250 employees (3)	firm with int. branches (4)
Panel A: Full sample				
international student	0.049***	0.265***	0.089***	0.048***
	(0.013)	(0.048)	(0.011)	(0.013)
Mean outcome	0.661	10.969	0.400	0.292
Sd outcome	0.474	1.581	0.490	0.454
N	26200	26200	26200	26200
Panel B: Rural natives and internationals				
international student	0.064***	0.347***	0.096***	0.048***
	(0.015)	(0.054)	(0.013)	(0.014)
Mean outcome	0.655	10.956	0.416	0.320
Sd outcome	0.475	1.617	0.493	0.467
N	11626	11626	11626	11626
Panel C: Urban natives and internationals				
international student	0.040***	0.216***	0.083***	0.046***
	(0.012)	(0.046)	(0.011)	(0.013)
Mean outcome	0.676	11.056	0.417	0.306
Sd outcome	0.468	1.562	0.493	0.461
N	18188	18188	18188	18188

Note: The tables shows how labor market choices differ between native and international graduates. The sample consists of native and international individuals with a university master's degree who work and live in Switzerland one year after graduation. The dependent variable is displayed at the top of each column. The independent variable is an indicator which equals one if it is a former international student and zero if it is a former native student. The regressions include pair-wise interacted fixed effects. Standard errors in parentheses are clustered at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Source: EHA.

Table 1.8: Peer effects on labor market outcomes and grades

	log yearly earnings (1)	firm > 250 employees (2)	firm with int. branches (3)	grades (4)
sh international peers	-0.004	-0.093	0.061	0.041
	(0.041)	(0.059)	(0.047)	(0.112)
growing up rural	0.005	-0.014*	-0.006	0.046**
	(0.007)	(0.008)	(0.008)	(0.021)
rural x sh int peers	0.001	0.024	0.006	-0.020
	(0.027)	(0.043)	(0.040)	(0.080)
Mean outcome	11.184	0.377	0.264	-0.015
Sd outcome	0.369	0.485	0.441	0.999
N	21604	21604	21604	20336
Adj. R2	0.276	0.134	0.271	0.184

Note: The table shows results from estimating Equation 1.3. The sample consists of native individuals with a university master's degree who work and live in Switzerland one year after graduation. The dependent variable is displayed at the top of each column. The dependent variables in columns (2) and (3) are indicators. The dependent variable in column (4) is standardized. All regressions include pair-wise interacted fixed effects, individual and cohort controls. Standard errors in parentheses are clustered at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, SHIS-studex.

Table 1.9: Peer effects on preferences in job finding process

	high salary		int. work environment	
	(1)	(2)	(3)	(4)
sh international peers	0.096*	0.091*	0.021	0.018
	(0.053)	(0.055)	(0.056)	(0.056)
growing up rural	-0.019**	-0.022*	-0.019***	-0.021**
	(0.008)	(0.012)	(0.006)	(0.009)
rural x sh int peers		0.014		0.011
		(0.045)		(0.036)
Mean outcome	0.443	0.443	0.303	0.303
Sd outcome	0.497	0.497	0.460	0.460
N	21424	21424	21424	21424
Adj. R2	0.074	0.074	0.115	0.115

Note: The table shows results from estimating Equation 1.3. The sample consists of native individuals with a university master's degree who work and live in Switzerland one year after graduation. The dependent variable equals one if an individual reports that earning a high salary in columns (1) and (2) or working in an international environment in columns (3) and (4) is important or very important. This is equivalent to a 4 or 5 on the scale (the scale goes from 1 to 5, see Figure A.1). All regressions include pair-wise interacted fixed effects, individual and cohort controls. Standard errors in parentheses are clustered at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, SHIS-studex.

Table 1.10: Urban wage premium

	log yearly earnings (1)	municipality fixed effect coefficients column (1) (2)	log yearly earnings (3)	municipality fixed effect coefficients column (3) (4)
log population		0.028***		0.023***
		(0.006)		(0.005)
age	0.010**		0.014***	
	(0.004)		(0.004)	
age squared	-0.000		-0.000	
	(0.000)		(0.000)	
single	-0.021***		-0.018***	
	(0.007)		(0.006)	
female	-0.021***		-0.019***	
	(0.005)		(0.004)	
foreign national	-0.009		-0.008	
	(0.010)		(0.009)	
interns, research assistants	-0.380***		-0.283***	
	(0.028)		(0.013)	
self-employed	-0.325***		-0.212***	
	(0.034)		(0.026)	
Municipality FE	yes		yes	
Year FE	yes		yes	
University FE	yes		yes	
Study field FE	yes		yes	
Mean outcome	11.182		11.240	
Sd outcome	0.368		0.273	
Reduced sample	-		drop 5th pct	
N	21956	618	20847	607

Note: The table shows results from estimating Equations 1.4. The sample consists of native individuals with a university master's degree who work and live in Switzerland one year after graduation. The dependent variable in columns (1) and (3) is the natural log of the yearly earnings (standardized for full-time employment). The baseline category of the type of employment that is left out is employed. The independent variable in columns (2) and (4) is the natural log of the average population over the observation period 2009–2019. In the specification in columns (3) and (4), observations with unreasonably low earnings are dropped. The threshold is set at the 5th percentile of the wage distribution, i.e. 10.4088. Standard errors in parentheses are robust, which are clustered at the cohort level in columns (1) and (3). * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, FSO.

References

Albert, C. and Monras, J. (2020). *Immigration and Spatial Equilibrium: The Role of Expenditures in the Country of Origin*. Working paper.

Altonji, J. G., Elder, T. E. and Taber, C. R. (2005). Selection on observed and unobserved variables: Assessing the effectiveness of catholic schools. *Journal of Political Economy*, **113** (1), 151–184.

Anelli, M., Shih, K. Y. and Williams, K. (2017). *Foreign Peer Effects and STEM Major Choice*. IZA Discussion Paper 10743, Institute of Labor Economics (IZA).

Angrist, J. D. (2014). The perils of peer effects. *Labour Economics*, **30**, 98 – 108.

Arellano-Bover, J. (2020). *Career Consequences of Firm Heterogeneity for Young Workers: First Job and Firm Size*. IZA Discussion Papers 12969, Institute of Labor Economics (IZA).

Balestra, S., Sallin, A. and Wolter, S. (2021). High-Ability Influencers? The Heterogeneous Effects of Gifted Classmates. *Journal of Human Resources*, pp. 0920–11170R1.

Behrens, K., Duranton, G. and Robert-Nicoud, F. (2014). Productive Cities: Sorting, Selection, and Agglomeration. *Journal of Political Economy*, **122** (3), 507–553.

Beine, M., Delogu, M. and Ragot, L. (2018). The role of fees in foreign education: evidence from Italy. *Journal of Economic Geography*, **20** (2), 571–600.

—, Nöel, R. and Ragot, L. (2014). Determinants of the international mobility of students. *Economics of Education Review*, **41**, 40–54.

Black, S. E., Devereux, P. J. and Salvanes, K. G. (2013). Under Pressure? The Effect of Peers on Outcomes of Young Adults. *Journal of Labor Economics*, **31** (1), 119–153.

Boelmann, B., Raute, A. and Schönberg, U. (2021). *Wind of Change? Cultural Determinants of Maternal Labor Supply*. CESifo Working Paper No. 9094.

Booij, A. S., Leuven, E. and Oosterbeek, H. (2016). Ability Peer Effects in University: Evidence from a Randomized Experiment. *The Review of Economic Studies*, **84** (2), 547–578.

Borjas, G. J. (2003). The Labor Demand Curve Is Downward Sloping: Reexamining the Impact of Immigration on the Labor Market. *The Quarterly Journal of Economics*, **118** (4), 1335–1374.

— (2004). *Do Foreign Students Crowd Out Native Students from Graduate Programs?* NBER Working Papers 10349, National Bureau of Economic Research, Inc.

— (2009). *Immigration in High-Skill Labor Markets: The Impact of Foreign Students on the Earnings of Doctorates*, University of Chicago Press, pp. 131–161.

Bosquet, C. and Overman, H. G. (2019). Why does birthplace matter so much? *Journal of Urban Economics*, **110**, 26 – 34.

Bound, J., Braga, B., Khanna, G. and Turner, S. (2020). A Passage to America: University Funding and International Students. *American Economic Journal: Economic Policy*, **12** (1), 97–126.

—, —, — and — (2021). *The Globalization of Postsecondary Education: The Role of International Students in the US Higher Education System*. Working Paper 28342, National Bureau of Economic Research.

—, Groen, J., Kézdi, G. and Turner, S. (2004). Trade in university training: cross-state variation in the production and stock of college-educated labor. *Journal of Econometrics*, **121** (1), 143 – 173, Higher education (Annals issue).

Bundesamt für Statistik (2017). *BFS Aktuell: 21 Nachhaltige Entwicklung, regionale und internationale Disparitäten - Gemeindetypologie und Stadt/Land-Typologie 2012*. Bundesamt für Statistik (BFS).

Bundesamt für Statistik (2021). *BFS Aktuell: 11 Mobilität und Verkehr - Pendlermobilität in der Schweiz 2019*. Bundesamt für Statistik (BFS).

Bütikofer, A. and Peri, G. (forthcoming). How Cognitive Ability and Personality Traits Affect Geographic Mobility. *Journal of Labor Economics*.

Card, D. (2001). Immigrant Inflows, Native Outflows, and the Local Labor Market Impacts of Higher Immigration. *Journal of Labor Economics*, **19** (1), 22–64.

Carrell, S. E., Hoekstra, M. and Kuka, E. (2018). The long-run effects of disruptive peers. *American Economic Review*, **108** (11), 3377–3415.

Chetty, R., Hendren, N., Kline, P. and Saez, E. (2014). Where is the land of Opportunity? The Geography of Intergenerational Mobility in the United States. *The Quarterly Journal of Economics*, **129** (4), 1553–1623.

Combes, P.-P., Duranton, G. and Gobillon, L. (2008). Spatial wage disparities: Sorting matters! *Journal of Urban Economics*, **63** (2), 723–742.

—, — and — (2018). The Costs of Agglomeration: House and Land Prices in French Cities. *The Review of Economic Studies*, **86** (4), 1556–1589.

Dauth, W., Findeisen, S., Moretti, E. and Suedekum, J. (2021). *Matching in Cities*. Working paper.

De La Roca, J. and Puga, D. (2016). Learning by Working in Big Cities. *The Review of Economic Studies*, **84** (1), 106–142.

Diamond, R. (2016). The Determinants and Welfare Implications of US Workers' Diverging Location Choices by Skill: 1980-2000. *American Economic Review*, **106** (3), 479–524.

Fernández-Huertas Moraga, J., i Carbonell, A. F. and Saiz, A. (2019). Immigrant locations and native residential preferences: Emerging ghettos or new communities? *Journal of Urban Economics*, **112**, 133–151.

Glaeser, E. L. and Gottlieb, J. D. (2009). The Wealth of Cities: Agglomeration Economies and Spatial Equilibrium in the United States. *Journal of Economic Literature*, **47** (4), 983–1028.

— and Maré, D. C. (2001). Cities and Skills. *Journal of Labor Economics*, **19** (2), 316–342.

Gonzalez, L. and Ortega, F. (2013). IMMIGRATION AND HOUSING BOOMS: EVIDENCE FROM SPAIN. *Journal of Regional Science*, **53** (1), 37–59.

Gould, E. D., Lavy, V. and Daniele Paserman, M. (2009). Does Immigration Affect the Long-Term Educational Outcomes of Natives? Quasi-Experimental Evidence. *The Economic Journal*, **119** (540), 1243–1269.

Groen, J. A. (2004). The effect of college location on migration of college-educated labor. *Journal of Econometrics*, **121** (1), 125–142, Higher education (Annals issue).

Haapanen, M. and Böckerman, P. (2017). More educated, more mobile? Evidence from post-secondary education reform. *Spatial Economic Analysis*, **12** (1), 8–26.

Hanushek, E. A., Kain, J. F., Markman, J. M. and Rivkin, S. G. (2003). Does peer ability affect student achievement? *Journal of Applied Econometrics*, **18** (5), 527–544.

Heise, S. and Porzio, T. (2019). *Spatial Wage Gaps and Frictional Labor Markets*. Staff Reports 898, Federal Reserve Bank of New York.

Hoxby, C. (2000). *Peer Effects in the Classroom: Learning from Gender and Race Variation*. NBER Working Papers 7867, National Bureau of Economic Research, Inc.

Jaeger, D. (2007). Green Cards and the Location Choices of Immigrants in the United States, 1971-2000. *Research in Labor Economics*, **27**, 131–183.

Kaushal, N. and Lanati, M. (2019). *International Student Mobility: Growth and Dispersion*. NBER Working Papers 25921, National Bureau of Economic Research, Inc.

Lavy, V., Silva, O. and Weinhardt, F. (2012). The Good, the Bad, and the Average: Evidence on Ability Peer Effects in Schools. *Journal of Labor Economics*, **30** (2), 367–414.

Lewis, E. and Peri, G. (2015). Chapter 10 - Immigration and the Economy of Cities and Regions. In G. Duranton, J. V. Henderson and W. C. Strange (eds.), *Handbook of Regional and Urban Economics*, *Handbook of Regional and Urban Economics*, vol. 5, Elsevier, pp. 625–685.

Machin, S. and Murphy, R. (2017). Paying out and crowding out? The globalization of higher education. *Journal of Economic Geography*, **17** (5), 1075–1110.

Malamud, O. and Wozniak, A. (2012). The Impact of College on Migration: Evidence from the Vietnam Generation. *Journal of Human Resources*, **47** (4), 913–950.

Manski, C. F. (1993). Identification of endogenous social effects: The reflection problem. *The Review of Economic Studies*, **60** (3), 531–542.

Messer, D. and Wolter, S. C. (2010). Time-to-degree and the business cycle. *Education Economics*, **18** (1), 111–123.

Moretti, E. (2013). Real wage inequality. *American Economic Journal: Applied Economics*, **5** (1), 65–103.

OECD (2011). Education at a Glance 2011: OECD Indicators. *OECD Publishing*.

OECD (2020). International student mobility (indicator). Accessed 22.09.2020.

Oggenfuss, C. and Wolter, S. (2019). Are they coming back? The mobility of university graduates in Switzerland. *Review of Regional Research: Jahrbuch für Regionalwissenschaft*, **39** (2), 189–208.

Oster, E. (2019). Unobservable selection and coefficient stability: Theory and evidence. *Journal of Business & Economic Statistics*, **37** (2), 187–204.

Rosenzweig, M. (2006). Global Wage Differences and International Student Flows. *Brookings Trade Forum*, **2006**, 57–86.

Sacerdote, B. (2001). Peer Effects with Random Assignment: Results for Dartmouth Roommates. *The Quarterly Journal of Economics*, **116** (2), 681–704.

Saiz, A. (2007). Immigration and housing rents in American cities. *Journal of Urban Economics*, **61** (2), 345–371.

— and Wachter, S. (2011). Immigration and the neighborhood. *American Economic Journal: Economic Policy*, **3** (2), 169–88.

Shih, K. (2017). Do international students crowd-out or cross-subsidize Americans in higher education? *Journal of Public Economics*, **156**, 170–184.

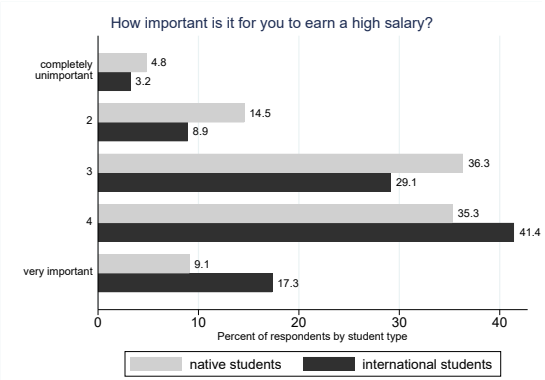
Stinebrickner, R. and Stinebrickner, T. (2006). What can be learned about peer effects using college roommates? Evidence from new survey data and students from disadvantaged backgrounds. *Journal of Public Economics*, **90** (8-9), 1435–1454.

UNESCO (2020). National monitoring: Inbound internationally mobile students by continent of origin. (Institute for Statistics (UIS) database, http://data.uis.unesco.org, accessed on 6 January 2021).

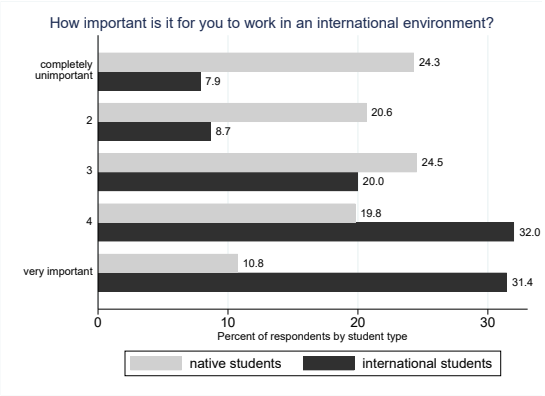
Appendix A: Figures

Figure A.1: Importance of wages and work environment in job search

(a) Wage



(b) International work environment



Note: The figures show how native and international master's graduates value a high salaray and an international work environment on a scale from 1 – completely unimportant – to 5 – very important. Source: EHA.

Appendix B: Tables

Table B.1: Immigrant concentration and city size

	Resident immigrants	Employed immigrants	Employed high-skilled immigrants
	(1)	(2)	(3)
log population	0.301***	0.915***	0.808**
	(0.063)	(0.331)	(0.322)
Year FE	yes	yes	yes
Region FE	yes	yes	yes
Mean outcome	-0.820	-0.059	-1.115
Sd outcome	0.866	0.541	0.537
N	34209	1272	1266

Note: The table shows results from estimating Equation 1.1. The sample consists of natives and immigrants who live or work in Switzerland. The dependent variable is the concentration of immigrants. The regression in column (1) uses yearly municipality level data between 2006 and 2018 and is based on the place of residence. The regressions in columns (2)–(3) use biennial data at the commuting zone level between 1996 and 2016 and is based on the work location. The subset of high-skilled workers in the last column includes those with a higher education degree. Standard errors in parentheses are clustered at the region level. * p<0.1; ** p<0.05; *** p<0.01. Sources: ESS, FSO.

Table B.2: Enrollment of international and native students by degree

	log nr bachelor students		log nr master students	
	(1)	(2)	(3)	(4)
Panel A: Subset of international students				
log tuition fee	-0.269***	-0.190**	0.109	0.164*
	(0.091)	(0.091)	(0.094)	(0.088)
log ranking	0.003	0.006	0.031	0.025
	(0.023)	(0.020)	(0.029)	(0.028)
log population		-0.437		5.923***
		(1.736)		(2.256)
log high skill wage		-2.050***		1.650
		(0.594)		(1.014)
Year FE	yes	yes	yes	yes
University FE	yes	yes	yes	yes
Mean outcome	6.252	6.252	6.022	6.022
Sd outcome	0.823	0.823	1.041	1.041
N	143	143	148	148
Panel B: Subset of native students				
log tuition fee	0.128	0.171	0.061	0.078
	(0.121)	(0.133)	(0.169)	(0.161)
log ranking	0.006	0.004	0.050	0.045
	(0.010)	(0.011)	(0.033)	(0.030)
log population		1.458		4.012
		(1.378)		(2.885)
log high skill wage		0.547		2.227**
		(0.518)		(1.102)
Year FE	yes	yes	yes	yes
University FE	yes	yes	yes	yes
Mean outcome	8.110	8.110	6.999	6.999
Sd outcome	0.837	0.837	1.017	1.017
N	143	143	148	148

Note: The table shows determinants of university enrollment by student type and degree. The dependent variable is displayed at the top of each column. The control variables are the natural log of the population in the university location and the natural log of the average gross hourly wage rate of high-skilled workers in the commuting zone of the university. The biennial wage data is linearly interpolated. The observation period is 2005–2016. Standard errors in parentheses are robust. * p<0.1; ** p<0.05; *** p<0.01. Sources: ESS, FSO, SHIS-studex.

Table B.3: Peer effects on probability to graduate with a master's degree

	probability to graduate	... to graduate in field of first enrollment	... to graduate at university of first enrollment	... to graduate in field and university of first enrollment
	(1)	(2)	(3)	(4)
sh international peers	0.040	0.080*	0.022	0.070
	(0.028)	(0.046)	(0.033)	(0.049)
Mean outcome	0.927	0.890	0.911	0.884
Sd outcome	0.260	0.312	0.285	0.321
N	89503	89503	89503	89503

Note: The table shows results from regressing the probability to graduate on the exposure to international peers in the first year of enrollment in a master's study. The sample consists of native students who enrolled between 2005 and 2015. The dependent variable is displayed at the top of each column. The graduation data covers the years 2005–2019. All regressions include pair-wise interacted fixed effects at the university, field of study and year level, and controls for age, age squared, gender, foreign nationality, canton of growing up, cohort size. Standard errors in parentheses are clustered at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Source: SHIS-studex.

Table B.4: Test for selection by native peers

	growing up rural	age	female	foreign national-ity	single
	(1)	(2)	(3)	(4)	(5)
sh international peers	-0.027	0.662	-0.007	-0.002	0.002
	(0.028)	(0.472)	(0.022)	(0.007)	(0.024)
Mean outcome	0.354	27.674	0.505	0.042	0.869
Sd outcome	0.478	3.076	0.500	0.200	0.338
N	22222	22222	22222	22222	22222

Note: The table shows how the treatment predicts observable individual characteristics. The sample consists of native graduates from Swiss universities who live and work in Switzerland one year after graduation. The dependent variable is displayed at the top of each column. The regressions include pair-wise interacted fixed effects and cohort level controls. Standard errors in parentheses are clusterd at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, SHIS-studex.

Table B.5: Test for selection by international peers

	Outcome: share international peers					
	(1)	(2)	(3)	(4)	(5)	(6)
growing up rural	-0.0006					-0.0005
	(0.0003)					(0.0003)
age		0.0003				0.0003
		(0.0008)				(0.0008)
age squared		-0.0000				-0.0000
		(0.0000)				(0.0000)
female			-0.0001			0.0001
			(0.0003)			(0.0003)
foreign nationality				-0.0001		-0.0001
				(0.0005)		(0.0005)
single					0.0001	0.0005
					(0.0006)	(0.0006)
Mean outcome	0.180	0.180	0.180	0.180	0.180	0.180
Sd outcome	0.158	0.158	0.158	0.158	0.158	0.158
N	22222	22222	22222	22222	22222	22222

Note: The table shows how observable individual characteristics predict the treatment. The sample consists of native graduates from Swiss universities who live and work in Switzerland one year after graduation. The dependent variable is displayed at the top of the columns. The regressions include pair-wise interacted fixed effects, fixed effects for the canton of growing up and cohort level controls. Standard errors in parentheses are clusterd at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, SHIS-studex.

Table B.6: Peer effects on interregional mobility

	Workplace		Residence	
	different labor market (1)	different canton (2)	different labor market (3)	different canton (4)
sh international peers	0.009	0.043	-0.006	0.052
	(0.057)	(0.056)	(0.053)	(0.055)
growing up rural	0.017	-0.011	0.029***	0.022**
	(0.011)	(0.010)	(0.009)	(0.009)
rural x sh int peers	0.086**	0.142***	0.023	0.020
	(0.041)	(0.041)	(0.038)	(0.038)
Mean outcome	0.505	0.547	0.282	0.306
Sd outcome	0.500	0.498	0.450	0.461
N	22222	22222	22222	22222
Adj. R2	0.149	0.227	0.090	0.137

Note: The table shows results from estimating Equation 1.3. The sample consists of native graduates from Swiss universities who live and work in Switzerland one year after graduation. The dependent variable is displayed at the top of each column. It is an indicator that equals 1 if the place of work or the place of residence one year after graduation is different to that of growing up. The location is defined at the labor market or cantonal level. All regressions include pair-wise interacted fixed effects, individual and cohort controls. Standard errors in parentheses are clustered at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, SHIS-studex.

Table B.7: Workplace and residence (robustness check on the measure of place of growing up: population quintiles instead of urban-rural classification)

	Workplace			Residence		
	working urban	working in urban core	log population workplace	living urban	living in urban core	log population residence
	(1)	(2)	(3)	(4)	(5)	(6)
sh international peers	0.004	-0.100	-0.288	-0.141***	-0.066	-0.163
	(0.038)	(0.064)	(0.215)	(0.051)	(0.069)	(0.236)
4th population quintile	-0.013	-0.043**	-0.135**	-0.032***	-0.321***	-0.757***
	(0.009)	(0.017)	(0.053)	(0.008)	(0.021)	(0.058)
3rd population quintile	-0.012	-0.058***	-0.196***	-0.136***	-0.394***	-1.029***
	(0.010)	(0.019)	(0.057)	(0.010)	(0.016)	(0.051)
2nd population quintile	-0.030***	-0.072***	-0.255***	-0.211***	-0.375***	-1.231***
	(0.011)	(0.019)	(0.057)	(0.013)	(0.017)	(0.060)
1st population quintile	-0.036***	-0.059***	-0.255***	-0.308***	-0.408***	-1.631***
	(0.010)	(0.016)	(0.051)	(0.016)	(0.017)	(0.077)
4th quintile x sh int peers	0.012	0.080	0.330	0.043	0.022	-0.023
	(0.033)	(0.062)	(0.219)	(0.034)	(0.074)	(0.215)
3rd quintile x sh int peers	0.033	0.191***	0.657***	0.136***	0.087	0.185
	(0.035)	(0.070)	(0.220)	(0.045)	(0.067)	(0.209)
2nd quintile x sh int peers	0.037	0.158**	0.581***	0.087*	-0.027	0.034
	(0.040)	(0.072)	(0.223)	(0.051)	(0.071)	(0.223)
1st quintile x sh int peers	0.025	0.117*	0.498***	0.110**	0.042	0.036
	(0.036)	(0.064)	(0.189)	(0.055)	(0.067)	(0.268)
Mean outcome	0.916	0.654	10.919	0.823	0.516	10.313
Sd outcome	0.278	0.476	1.573	0.382	0.500	1.798
N	22222	22222	22222	22222	22222	22222
Adj. R2	0.054	0.075	0.135	0.124	0.136	0.211

Note: The table shows results from estimating Equation 1.3 with population quintiles instead of the rural-urban classification of the place of growing up. The sample consists of native graduates from Swiss universities who live and work in Switzerland one year after graduation. The dependent variable is displayed at the top of each column. The regressions include pair-wise interacted fixed effects, individual and cohort controls. Standard errors in parentheses are clustered at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, SHIS-studex.

Table B.8: Workplace and residence (robustness check on the peer measure: enrollment instead of graduation cohort)

	Workplace			Residence		
	working urban	working in urban core	log population workplace	living urban	living in urban core	log population residence
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Full sample						
sh international peers	-0.033	-0.056	-0.154	0.011	-0.044	-0.307
	(0.040)	(0.063)	(0.217)	(0.050)	(0.067)	(0.211)
growing up rural	-0.037***	-0.047***	-0.163***	-0.340***	-0.135***	-0.658***
	(0.008)	(0.013)	(0.037)	(0.016)	(0.012)	(0.049)
rural x sh int peers	0.040	0.090*	0.237*	0.007	0.017	0.020
	(0.026)	(0.048)	(0.139)	(0.057)	(0.049)	(0.192)
Mean outcome	0.916	0.655	10.919	0.823	0.516	10.313
Sd outcome	0.278	0.476	1.572	0.382	0.500	1.798
N	22094	22094	22094	22094	22094	22094
Adj. R2	0.056	0.076	0.136	0.215	0.077	0.165
Panel B: Subset of natives graduating within 3 years						
sh international peers	-0.027	-0.032	0.009	-0.005	-0.078	-0.305
	(0.041)	(0.066)	(0.211)	(0.050)	(0.072)	(0.244)
growing up rural	-0.038***	-0.054***	-0.188***	-0.345***	-0.139***	-0.677***
	(0.008)	(0.013)	(0.038)	(0.017)	(0.012)	(0.049)
rural x sh int peers	0.049*	0.102**	0.299**	0.003	0.024	0.058
	(0.027)	(0.051)	(0.149)	(0.058)	(0.050)	(0.196)
Mean outcome	0.915	0.652	10.911	0.821	0.510	10.291
Sd outcome	0.279	0.476	1.570	0.384	0.500	1.796
N	20451	20451	20451	20451	20451	20451
Adj. R2	0.055	0.076	0.134	0.219	0.074	0.162

Note: The table shows results from estimating Equation 1.3 with the peer exposure based on the cohort in the first year of enrollment instead of graduation. The sample consists of native graduates from Swiss universities who live and work in Switzerland one year after graduation. The dependent variable is displayed at the top of each column. All regressions include pair-wise interacted fixed effects, individual and cohort controls. Estimates in Panel A are based on the full sample. Estimates in Panel B are based on the sample with individuals who need three years or less between enrollment and graduation. Standard errors in parentheses are clustered at the cohort level. * p<0.1; ** p<0.05; *** p<0.01. Sources: EHA, SHIS-studex.

Table B.9: Urban wage premium of native employees

	All workers		Workers with higher education	
	log monthly earnings (1)	region fixed effect coefficients column (1) (2)	log monthly earnings (3)	region fixed effect coefficients column (3) (4)
log population		0.050***		0.043***
		(0.005)		(0.014)
age	0.029***		0.046***	
	(0.000)		(0.001)	
age squared	-0.000***		-0.000***	
	(0.000)		(0.000)	
female	-0.124***		-0.097***	
	(0.001)		(0.002)	
single	-0.029***		-0.039***	
	(0.001)		(0.002)	
firm tenure	0.005***		0.007***	
	(0.000)		(0.000)	
firm tenure squared	-0.000***		-0.000***	
	(0.000)		(0.000)	
lower management	0.151***		0.117***	
	(0.001)		(0.003)	
middle management	0.335***		0.332***	
	(0.002)		(0.003)	
top management	0.397***		0.499***	
	(0.002)		(0.004)	
upper-secondary education	0.180***			
	(0.002)			
higher education	0.388***			
	(0.002)			
Region FE	yes		yes	
Year FE	yes		yes	
Firm FE	yes		yes	
Mean outcome	8.847		9.191	
Sd outcome	0.444		0.480	
N	1976130	106	345309	106

Note: The sample in columns (1) and (2) covers native employees of age 26–65 in the private sector. Columns (3) and (4) include the subset of employees with a higher education degree (university, university of applied sciences, university of teacher education). The dependent variable in columns (1) and (3) is the natural log of the monthly standardized gross wage for full-time employment. The natural log of the population is the average over the observation period 2012–2016 (biennial data). The geographic unit is the commuting zone. Standard errors in parentheses are robust. * p<0.1; ** p<0.05; *** p<0.01. Sources: ESS, FSO.

Table B.10: Firm outcomes in university cities

	Log nr firms			Log nr employees		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All sectors						
sh international graduates	0.475**	0.531***		0.258***	0.225**	
	(0.188)	(0.195)		(0.094)	(0.091)	
log population		-0.209	-0.158		0.125	0.306**
		(0.199)	(0.174)		(0.118)	(0.130)
lagged sh int graduates			0.460***			0.218**
			(0.159)			(0.087)
Year FE	yes	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes	yes
Mean outcome	9.259	9.259	9.259	11.533	11.533	11.533
Sd outcome	0.746	0.746	0.746	0.811	0.811	0.811
N	80	80	70	80	80	70
Panel B: Tertiary sector						
sh international graduates	0.427**	0.505***		0.175*	0.179**	
	(0.172)	(0.174)		(0.089)	(0.088)	
log population		-0.291*	-0.230		-0.015	0.186
		(0.170)	(0.162)		(0.165)	(0.154)
lagged sh int graduates			0.445***			0.162*
			(0.148)			(0.089)
Year FE	yes	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes	yes
Mean outcome	9.168	9.168	9.168	11.421	11.421	11.421
Sd outcome	0.756	0.756	0.756	0.827	0.827	0.827
N	80	80	70	80	80	70

Note: The sample contains the ten municipalities with a university. The dependent variable is displayed at the top of the columns. The observation period is 2011–2018. Standard errors in parentheses are robust. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SHIS-studex.

Table B.11: Rental market in the five largest cities

	Log median rent per m^2 and year		Vacancy rate (in %)	
	(1)	(2)	(3)	(4)
sh international graduates	-0.181	-0.305	0.366	-0.509
	(0.210)	(0.294)	(1.839)	(2.076)
log population		0.357		2.153
		(0.457)		(4.229)
Year FE	yes	yes	yes	yes
Region FE	yes	yes	yes	yes
Mean outcome	5.638	5.638	0.440	0.440
Sd outcome	0.182	0.182	0.262	0.262
N	50	50	50	50

Note: The sample contains the five largest cities. The dependent variable is displayed at the top of the columns. The vacancy rate goes from 0 to 100. The observation period is 2010–2019 in the first two columns and 2009–2018 in the second two columns. Standard errors in parentheses are robust. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SHIS-studex, Wüest Partner.

Appendix C: Data

This appendix provides additional information on the two main education datasets that are provided by the Swiss Federal Statistical Office (FSO). Individual level data are used throughout the analysis. The smallest available geographical unit is the municipality by zip code, defined as of January 2019. The municipalities are grouped to broader units following the most recent definitions from the FSO. The split into urban and rural locations is based on characteristics measured in 2012. Urban cores are defined as cores of a big agglomeration (Kernstadt einer grossen Agglomeration, code 111) or of a medium sized agglomeration (Kernstadt einer mittelgrossen Agglomeration, code 121). The mapping of municipalities into sixteen labor markets is based on 2018 data. The allocation of municipalities to cantons is unchanged over time.

Swiss Higher Education Information System (SHIS-studex)

The SHIS-studex is an administrative dataset with information on enrollment and graduation. Universities report individual characteristics and enrollment information by field of study for all matriculated students each fall semester. Information on degrees obtained is reported by graduation date. Information on the study fields is available at three levels of aggregation. I use the most detailed definition of a field with 69 categories in 2019 (i.e., level 3). For example, the field of economics and business administration – the definition at level 1 and 2 – is split into economics, business administration, business informatics, and other related studies at level 3. These Swiss-specific fields can be linked to the ISCED-F 2013 codes (International Standard Classification of Education: Fields of Education and Training) from the UNESCO with a matching scheme provided by the FSO. In the analysis I use the Swiss-specific definitions, while presenting summary statistics by the ISCED-F 2013 broad fields with nine categories to enhance readability (fields falling in the tenth category “Services” are not offered at Swiss universities).

Note that in the analysis on university enrollment by student type (see

Table B.2), the distance learning university is excluded because it cannot be assigned to a unique location.

Survey of Higher Education Graduates (EHA)

The EHA is a survey conducted one and five years after graduation. Individuals graduating in even years receive the first survey in the year after graduation. Participation in the second survey is relatively low because only those who sent back the first survey receive the second one. For example, 58% of the graduation cohort in 2014 returned the first wave survey. Data on the second wave is available for 40% of the initial cohort. The low participation is in particular apparent among the international students of the graduation cohorts 2008–2018. None of them takes part in any of the second wave surveys.

The EHA assigns graduates to twelve out of fourteen universities covering 98.9% of all master students enrolled in 2019. The two missing institutions are the Graduate Institute Geneva and the distance learning university. To estimate the survey weights, the FSO considers the distribution of enrolled students along several lines: university, broad study field (level 1), degree, gender, international versus native student. Thus, the weighted sample of university master graduates by survey wave is representative for the relevant population. Note that the EHA has been conducted in its current form since 2003. Data on earlier years are available but cannot be linked to the SHIS-studex and weights are not provided.

Chapter 2

Free Movement of Workers and Native Demand for Tertiary Education

Joint with Teodora Tsankova

2.1 Introduction

Higher education has gained momentum in the developed world with one in three people in the OECD holding a tertiary degree today. Schooling decisions have a significant impact on individual outcomes as there are substantial returns to acquiring higher education. Graduates with a tertiary degree earned on average 55% more than those with an upper-secondary degree in 2019 (OECD, 2020). Returns to education reflect the relative availability of skills in an economy and immigration can significantly alter the composition of the local labor force. Growing international mobility can be linked to immigration

regulation. Migration within the EU is based on the free movement of persons principle and member countries of the EFTA have negotiated similar conditions with the EU. As the skill level of immigrants often defers from the one of natives, the induced change in the composition of the labor force is likely to have an impact on returns to education and could alter native incentives to demand schooling.

In this paper, we focus on an inflow of skilled foreign workers who could either encourage or discourage natives to enroll into tertiary education depending on how labor market outcomes are affected. This has been subject to a heated debate in the literature. The traditional view is that skill groups most affected by a migrant inflow face worse labor market conditions (Borjas, 1995; Borjas and Doran, 2012; Dustmann *et al.*, 2012), suggesting that native incentives to accumulate human capital may be weakened. At the same time, there is evidence that skilled immigrants boost total factor productivity and innovation (Moser *et al.*, 2014; Peri *et al.*, 2015; Hunt, 2017), resulting in the opposite prediction. We contribute to this debate by exploring the role of labor market conditions in educational decisions. Answering this question is crucial to understand the long-run effects of rising foreign competition in the labor market.

Switzerland offers a unique setting to explore our research question. The Agreement on the Free Movement of Persons (AFMP) abolished restrictions to access the Swiss labor market for foreign workers from the EU and EFTA, including cross-border commuters. As a result, the number of frontier workers permanently increased. Since cross-border commuters reside abroad, they leave demand for goods and services in the country of work largely unaffected. Moreover, the Swiss education system enables us to isolate education demand from supply forces since fulfilling the admission requirements generally guarantees enrollment. Similar to other Western European countries, Switzerland's dual education system gives access to tertiary education to graduates from general training at Universities and from general and vocational training at Universities of Applied Sciences. Different educational backgrounds are linked to a different level of labor market experience and are likely to lead to dif-

ferent enrollment decisions in response to changes in labor market conditions. Finally, we have access to administrative data on all individuals enrolled in academic tertiary education, which allows us to precisely quantify demand by institutional type and study field.

Our empirical strategy combines the timing of the AFMP implementation with cross-sectional variation in distance to the Swiss border in a difference-in-differences framework. Motivated by the fact that commuting costs rise with distance, we define Swiss areas close to the international border as affected labor market regions and those further away as non-affected regions (Dustmann *et al.*, 2017; Beerli *et al.*, 2021). Indeed, approximately 90% of cross-border commuters are employed within thirty minutes of travel time from the border. We assign native students to their region of residence at the time they took their tertiary education entrance exam under the assumption that individuals rely on local information at the time of enrollment, regardless of where they end up working. There is no evidence suggesting that trends in native educational and labor market outcomes would have been different in treatment and control regions absent the reform.

Results show that the share of commuters in treated regions grew by 3.3 percentage points relative to the control regions in the post-reform period. This effect is large in magnitude compared to an average exposure in the treated regions in the pre-reform period of 14.4%. It is driven by skilled commuters with an upper-secondary or tertiary education. We find that enrollment in undergraduate degrees at Universities of Applied Sciences rises in the post-reform period in treated regions by 1.1 percentage points relative to a pre-reform average of 7.9%. University enrollment in treated relative to control regions does not change. Furthermore, we map occupations to fields of study using survey data and classify fields according to the extent to which they are affected by the presence of commuters. Subjects are considered to be affected if they are linked to occupations that frontier workers hold relatively more often than resident workers. We find that enrollment in less affected fields of study at Universities of Applied Sciences rises in the post-reform period in treated regions. These are non-STEM subjects that typically require

more country-specific skills compared to STEM fields. Our findings are robust to different treatment definitions, outcome measures, and additional control variables.

The reform directly affected the composition of the workforce by raising the share of skilled foreign workers. We document a rise in the wages of natives with tertiary education and the likelihood that they hold a managerial position (Beerli *et al.*, 2021). Moreover, we show that wages decrease for those with an upper-secondary degree. Enrollment at Universities of Applied Sciences is driven by individuals with a vocational background. They are prepared to enter the labor market, which gives them knowledge of labor market conditions, and have access to higher education. In contrast, general education prepares for entrance into tertiary education only. We show that the reform effects on native wages are heterogenous by educational attainment and occupation. Wages for native tertiary educated workers in affected regions increased for STEM and non-STEM workers, and the share of employed in management rose in particular for the latter group. Wages at the upper-secondary level increased for STEM workers and decreased for non-STEM workers. These results suggest complementarities between foreign workers, who are overrepresented in STEM professions, and high-skilled natives employed in non-STEM jobs. Consistent with rising returns to skill, the natives' response is to advance their non-STEM skills.

We contribute to the literature that links native educational outcomes to immigration, which has so far relied on evidence from the United States. Early work finds a negative effect on high school graduation rates of American-born minorities and argues that it is likely driven by competition for school resources (Betts, 1998). More recently, Hunt (2017) differentiates between adult immigrants and immigrants of school age. Results show that a higher share of low-skilled adult immigrants has a positive impact on high-school completion through its effect on labor market conditions, and no effect of school aged immigrants. In the same context, McHenry (2015) documents a rise in native educational outcomes at the secondary and post-secondary level. Overall, Llull (2018) argues that the direction of response varies across

the native population depending on individual level labor market returns to education. Most of the existing work either assumes an exogenous migrant allocation or uses a shift-share instrumental variable strategy, which relies on strong assumptions (e.g., Goldsmith-Pinkham *et al.*, 2020). In contrast, we focus on a policy experiment as an exogenous source of variation. The inflow of foreign workers we explore consists of cross-border commuters who do not compete with natives for school resources.

Our mapping between occupations and fields of study contributes to the literature on differences in occupational choices between immigrants and natives. Studies document that foreign-born workers are more often employed in scientific and technical occupations than natives (Peri and Sparber, 2009; Hunt and Gauthier-Loiselle, 2010; Peri and Sparber, 2011; Hanson and Slaughter, 2017). We confirm these findings in a context where the foreign workers are culturally and linguistically similar to the natives. Few studies link immigrant occupational choices to native enrollment in specific study fields. Ransom and Winters (2020) look at STEM fields and find an outflow of native-born Americans, specifically blacks, from subjects related to occupations with more foreign workers. Cortés and Pan (2015) document a similar crowding-out effect from nursing studies. We add to this literature by considering all study fields, increasing the generalizability of this paper. Grouping fields by the intensity of expected labor market competition with foreign workers enables us to link the enrollment analysis to labor market conditions at the field level.

The education literature finds that expected earnings and employment perspectives matter in the study field choice (Beffy *et al.*, 2012; Wiswall and Zafar, 2015; Schweri and Hartog, 2017) with some studies showing limited knowledge of labor market returns (Xia, 2016). A number of related studies exploit business cycles to evaluate the impact of opportunity costs on demand for education. There is evidence that enrollment is countercyclical at lower educational levels (Ayllon and Nollenberger, 2016), in college (Dellas and Sakellaris, 2003; Long, 2014) and in graduate school for women (Johnson, 2013). In comparison, we use an immigration reform that creates exogenous variation in local labor market conditions, leaving country-wide economic conditions unchanged.

We distinguish between individuals with general and vocational background to identify the groups of individuals most responsive to the changes in local labor market conditions. This level of detail is novel in the literature.

To understand drivers of enrollment decisions, we investigate labor market effects of a migration reform. There is mixed evidence on the impact of an inflow of foreigners on native labor market outcomes (see e.g., Borjas, 2003; Ottaviano and Peri, 2012; Dustmann *et al.*, 2016). While most of the existing literature looks at resident migrants, we focus on cross-border commuters. In an early study, Dustmann *et al.* (2017) investigate a temporary increase in low-skilled Czech frontier workers into Germany after the fall of the Berlin wall. They find a decline in wages and an even stronger drop in employment outcomes for natives. Looking at the same reform as we do, Beerli *et al.* (2021) find a positive effect on the wages of high-skilled natives due to the expansion of incumbent firms in affected regions. Cristelli and Lissoni (2020) document that natives who collaborate with cross-border inventors benefit from higher productivity. We extend this literature by examining effects on native human capital accumulation which likely have long-run impacts on the native skill composition. Ignoring such adjustments could result in misleading estimates of the labor market effects of immigration.

The remainder of the article is organized as follows. In Section 2.2 we discuss the regulatory framework applied to cross-border commuters and the educational system in Switzerland. In Section 2.3 we describe the data and outline the empirical strategy. In Section 2.4 we present our results on enrollment by institutional type and by field of study, while the mechanisms are discussed in Section 2.5. In Section 2.6 we conclude.

2.2 Context

2.2.1 Cross-Border Commuting

Individuals with a citizenship from a European Union (EU) or European Free Trade Association (EFTA) member state working in Switzerland are subject to the rules outlined in the Agreement on the Free Movement of Persons (AFMP).

It was signed in June 1999, approved by the electorate in May 2000 and introduced on the 1st of June 2002.[19] While the agreement affects all workers from EU and EFTA countries, we focus on cross-border commuters. Commuters are non-Swiss by nationality and require a working permit to be employed in Switzerland. Since they need a working contract from a Swiss employer to receive or extend such a permit, frontier workers are by definition employed individuals.

Prior to the AFMP, cross-border commuters and firms that wanted to hire them had to fulfil several requirements. Commuters had to live in formal border zones in the neighboring countries and were only allowed to work in similarly defined zones in border regions of Switzerland. Permits were tied to a specific employer and valid for up to one year after which they had to be renewed. Commuters had to return to their place of origin on a daily basis. Furthermore, employers had to prove that the vacancy could not be filled by a native worker (local priority requirement).

The policy change was implemented in three steps. From June 2002 onwards, cross-border commuters from EU-15 and EFTA countries were free to reside outside the border zones of the home country. In addition, they were required to return to their place of residence only once a week rather than every day. The work permit was no longer bound to a specific job and its validity was extended to the length of the working contract, for a maximum of five years. In June 2004 the local priority requirement was abolished and, as a result, cross-border commuters could be hired under the same conditions as resident workers in the Swiss border zones. Full liberalization across the entire country came into force in June 2007 when commuters were allowed to work anywhere in Switzerland. Interim regulations applied for other EU member states and were relaxed over time.

The new rules on the free movement of cross-border commuters led to a large increase in the number of foreign workers. Most of them work in the Swiss

[19]The AFMP is a bilateral agreement. Regulations for Swiss nationals were completely removed in June 2002. The removal of immigration barriers is expected to have benefited all natives. The AFMP is unlikely to have promoted commuting of Swiss nationals from border regions due to the relatively high living costs and wages in Switzerland.

border regions, where the share of commuters in total employed rose from 9.9% in 2001 to 14.2% in 2017. In the latter year, 95% of all cross-border commuters were nationals of the neighbor countries Austria, France, Germany or Italy. Consistent with travel costs depending on distance, commuters generally work in regions close to their place of residence where the same language is spoken.[20]

Commuters differ from natives in their educational level. Earnings structure survey data show that in 2016 23% of cross-border commuters have up to a lower-secondary degree, 48% an upper-secondary degree, 10% a professional tertiary and 19% an academic tertiary degree. In comparison, the share of native workers with a lower-secondary education is considerably lower (15%) and with an upper-secondary education higher (57%). The shares of natives with professional and academic tertiary degrees (12% and 16%, respectively) are comparable to those among commuters. In further sections, we look at over time changes in exposure to commuters by education and occupation.

2.2.2 Dual Education System

We focus on enrollment in academic tertiary education in Switzerland. Two broad types of institutions exist: Universities and Federal Institutes of Technology, with roughly 60% of all students in 2017, and Universities of Applied Sciences. Universities and the Federal Institutes of Technology (UNI) are the oldest institutions with a right to grant tertiary level degrees. In 1997 the Universities of Applied Sciences (UAS) were established.[21] While Universities are committed to a combination of teaching and research, Universities of Applied Sciences impart professional skills with a practice and application oriented focus. Both offer STEM and non-STEM education. Around 69% of all University students are enrolled in a non-STEM field in 2017. This share is close to 74% at Universities of Applied Sciences.

[20] Between 97 and 98% of the Austrian and German commuters work in a municipality in which German is spoken by the majority of residents. The share of Italian and French commuters that go to Italian- and French-speaking municipalities is 88% and 80% respectively.

[21] In some regions the UAS include Teacher Education while other regions have set up independent Universities of Teacher Education (UTE). We combine these institutions with the Universities of Applied Sciences.

The Swiss education system has features common to other European countries. Figure 2.1 shows that at the upper-secondary level one can follow a vocational or a general education track. According to the Swiss Federal Statistical Office, 68.3% of students pursued a vocational degree in 2016, while the rest enrolled in general training. At the end of upper-secondary education, a student needs to pass a matura examination to enter tertiary education. There are three types of matura that can be combined with the vocational or general education. While a general matura grants access to all tertiary education institutions, a vocational and a specialised matura target Universities of Applied Sciences. In 2016, 21.2% of the Swiss residents under the age of 25 hold a general, 15.4% a vocational, and 3% a specialised matura.

Figure 2.2 shows the locations of the tertiary education institutions across Switzerland in 2017. Most of the institutions are in the northern and western part of the country and clustered in the urban centers. There are ten cantonal Universities and two Federal Institutes of Technology spread over ten cities. In contrast, most of the Universities of Applied Sciences have several locations, which are often specific to a study field. As the expansion of UAS took place during our study period, we take this into account in our empirical specification. The high density of institutions we observe in the end of the period enables daily commuting to classes for a large share of the population lowering the costs of studying.[22]

The Swiss education system offers a unique setting as the lack of supply constraints enables us to infer demand for tertiary education from enrollment. Besides a matura, no major entry restrictions exist for Swiss nationals at the undergraduate level. A general matura typically grants access to any degree in the chosen university. As an exception, health degrees can have a cap on the number of students enrolled in a year. To enroll in a specific field, Universities of Applied Sciences can require a certain major of the vocational matura or relevant work experience. Interviews are often conducted to test the ability

[22] Yearly study costs are estimated to be around CHF 24,000 including tuition fees that are generally below CHF 2,000 for Swiss nationals. See, e.g., the estimation by the study advisory service from the University of Zurich. On September 15th 2020 one Swiss Franc is equivalent to approximately 1.1 US Dollars.

of candidates in social or health related fields at UAS. While there is overall little screening at entry, the pool of eligible students is already selected due to the admission requirements for upper-secondary education tracks resulting in a matura. In the analysis, we focus on enrollment but also look at differences in graduation rates.

2.3 Data and Methods

2.3.1 Data

We take the commuting zone as the unit of observation.[23] They are considered small-scale labor markets where the allocation of municipalities rests on 2000 census data and is provided by the Swiss Federal Statistical Office (FSO). For simplicity, we refer to them as "regions". We combine several data sources to conduct our analysis. Detailed information is available in the Data Appendix.

In the enrollment analysis we use administrative data referred to as SHIS-studex, an abbreviation for the Swiss Higher Education Information System. This is an individual-level database covering all matriculated students at the academic tertiary level of education in Switzerland. It includes students at Universities since 1990 and Universities of Applied Sciences since their foundation in 1997. The variables used are age, nationality, place of residence prior to beginning a study, the type of matura granting access to tertiary education, type of tertiary institution and field of study. The structure of the SHIS-studex dataset allows tracking individuals from the point of enrollment up to graduation and provides information on received degrees.

We are interested in demand for undergraduate degrees and focus on first-year students enrolled in a bachelor study over the period 1997–2017. We select students who completed their matura in Switzerland in order to assign them to the region of residence at the time of receiving the certificate. We calculate our main outcome as $\textit{Share of students enrolled}_{rt} = \frac{\textit{Nr first-year students}_{rt}}{\textit{Birth cohort size}_{rt}}$. The cohort is the Swiss population in each region at the median age of first-year

[23] The commuting zone is called MS-region in Switzerland. MS comes from the French "mobilité spatiale".

students. In the full sample the median age is twenty-one, in the sample of students enrolled in Universities it is twenty and in Universities of Applied Sciences twenty-two. The FSO provides information about the size of the native population at the municipality level and the age structure of the population at the cantonal level. We add to this dataset the geographic location of the tertiary institutions. A University is located in a single city, while Universities of Applied Sciences are spread over several municipalities. We collected this information from the websites of the institutions.

Additionally, we use information from the Survey of Higher Education Graduates (EHA). The survey is conducted every two years. It has a panel structure where individuals respond to questions related to their working experience and acquired skills one and five years after graduation. Our focus lies on first-wave results because we are interested in outcomes a short time after graduation. We consider the subset of Swiss graduates with a bachelor's or master's degree who have in addition a Swiss matura. We use information about place of living (current and at the time of taking the entrance exam), place of work and the mapping between fields of study and occupations.

In the labor market analysis, we rely on two surveys over the period 1996–2016. The Swiss Earnings Structure Survey (SESS) is a large-scale firm survey conducted every two years. It is a repeated cross-section of private sector firms in the secondary and tertiary sectors of the economy. We use information on the firm location at the commuting zone level, which is the most detailed geographical unit available. We limit the sample to employees 18–65 years of age. To calculate our outcome variables, we use data on native gross hourly wages, level of managerial tasks and working permit information that allows us to distinguish native from cross-border employees. To calculate the share of cross-border commuters, we divide the number of commuters by the total number of employees. In the analysis by educational level, the share of cross-border commuters is the number of commuters divided by the total number of employees by education. We differentiate three types of education based on the highest level attained – tertiary, upper-secondary and up to lower-secondary training. Similarly, we differentiate between workers employed in STEM and

non-STEM occupations. In the analysis by occupation we limit the observation period to 1996–2010 because different occupation classifications were used before and after 2010. Furthermore, we use data on the demographic characteristics of workers such as gender and age. In the analyses where we use administrative data, we rely on the Cross-Border Commuters Statistics provided by the FSO and on publicly available employment data at the municipality level available for the years 1995, 2001, 2005, 2008, 2011-2018.

While the SESS covers only employed individuals, the Swiss Labor Force Survey (SLFS) includes individuals aged 15 years and older. We use annual data on the municipality of residence, demographic characteristics, educational attainment and employment outcomes for the household head. We limit the sample to individuals in the age group 18–65. The native unemployment rate is the number of unemployed relative to total labor force by educational category. The native employment rate is the number of employed relative to total number of individuals by educational category.

Additionally, we collected travel time data for each municipality from `www.map.search.ch`, which we accessed in December 2018. We take the travel time by car from each municipality m to the closest border crossing or border checkpoint according to the Federal Customs Office. At the regional level r we calculate the measure $\textit{Travel time}_r = \sum_{m \in r} \textit{Travel time}_{m,2018} \times \frac{Nr\ employed_{m,1995}}{Nr\ employed_{r,1995}}$. Regions with a border crossing or border checkpoint are assigned a value of zero minutes.

2.3.2 Empirical Strategy

Motivated by the nature of the policy change, the empirical analysis is based on a standard difference-in-differences strategy. We investigate the reform effects by comparing regions close to the border with those further away before and after the regulatory change. Figure 2.3 shows how travel time from the border relates to the share of commuters in a region. Exposure to commuters declines sharply with travel time. We add to the figure a function that approximates

treatment intensity by distance to the border: $\exp(-0.05 \times travel\ time)$.[24] In the main part of the analysis we use a fixed threshold of thirty minutes to define treatment, which is consistent with Beerli *et al.* (2021). This approach assigns 35 out of the 106 regions to the treatment group and the remaining 71 regions to the control group (see map in Figure 2.2). As is visible in Figure 2.3, there is no discontinuity in exposure to cross-border commuting at the thirty minutes threshold. To take this into account, we consider different treatment assignments in alternative specifications.

We run the following specification in the main part of the analysis:

$$\begin{aligned} y_{rt} = \alpha + \beta_1 Transition_t \times 1(Travel\ time_r \leq 30\,min) + \\ \beta_2 Post_t \times 1(Travel\ time_r \leq 30\,min) + \mathbf{X}'_{rt}\gamma + \delta_r + \varepsilon_{rt} \end{aligned} \tag{2.1}$$

where r is region, and t year. In the analysis of enrollment, first-year students are allocated to their region of residence at the time of taking the matura. Our main outcome is the share of first-year students in birth cohort. In the labor market analysis, individuals are either assigned to the region of the workplace (wage outcome) or to the region of living (employment outcomes). We look at the gross hourly wage rate, likelihood of holding a managerial position, employment and unemployment rates. We estimate the reform effect by distinguishing between three periods: pre-reform (1997–2001), transition (2002–2006) and post-reform (2007–2017). The observation period for the labor market outcomes is 1996–2016 due to data availability. The coefficients of interest, β_1 and β_2, show the difference in the dependent variables between treated and control regions during and after the reform compared to pre-reform years.

In our baseline specification we include region fixed effects to capture time-invariant regional variation in the outcomes of interest. We further include NUTS II region × year fixed effects which control for changes over time oc-

[24] Figure 2.3 also reveals that commuters work further away from the border in 2017 than they did in 1997. The continuous function tracks well the relationship between commuter flows and travel time in both years and, therefore, takes into account the upward trend in the commuting distance.

curring at the larger geographical level.[25] In the enrollment analysis, we also control for the natural log of native population that may drive changes in enrollment rates. Additional variables that could vary during the period and across regions are introduced in robustness checks. We use time invariant weights to account for the different population and employment sizes across regions, which are specified in the notes to the figures and tables. In a robustness check we confirm that the weights do not drive our results. Standard errors are clustered at the regional level.

While β_1 and β_2 are the only estimates we report in tables, graphically we present the results from an event study.

$$y_{rt} = \alpha + \sum_{t=1997}^{2017} \beta_t Year_t \times 1(Travel\ time_r \leq 30\,min) + \mathbf{X}'_{rt}\gamma + \delta_r + \varepsilon_{rt} \quad (2.2)$$

The event study shows how the yearly treatment effects materialize over time. The coefficients β_t capture the impact of the reform relative to the last year in the pre-reform period. This is 2001 in the enrollment analysis where we have yearly data. In the wage analysis with biennial data the reference year is 2000.

The key assumption under which our results are valid is that enrollment rates and labor market conditions would have followed the same trend in treatment and control regions absent the reform. We compare yearly coefficients in the pre-reform period to investigate whether this assumption is likely to hold. Graphical evidence shows that prior to the reform educational demand in treatment and control units follows parallel trends. Pre-trends for overall and University enrollment are shown for 1991–2001, while for the Universities of Applied Sciences they cover the period since their foundation in 1997. Similarly, results are robust to additional control variables which could have evolved differently over time in the two groups of regions. These results are reported in more detail in Section 2.4.

[25] Switzerland has seven NUTS II regions, each containing between one and seven cantons. Cantons are the largest administrative sub-national units, followed by districts and municipalities. The education system is organized at the cantonal level, while a tertiary institution's catchment area often extends over several cantons.

The parallel trends assumption could be violated if natives in the border regions commute abroad for study or work reasons after the introduction of the AFMP or the Bologna reform in the 2000s. We argue that both examples are not a potential threat to our identification. First, although there are few tertiary institutions in proximity to the Swiss border it is unlikely that one of the reforms increased commuting to study, because the tertiary education systems in these countries were already similar and the Swiss institutions are of relatively high quality.[26] Second, low unemployment and a high wage level make Switzerland a relatively favorable country to work. This makes the likelihood of Swiss commuting abroad low, in particular because of the high living costs in Switzerland.

The Stable Unit Treatment Value Assumption (SUTVA) is the second important identifying assumption. We are interested in local labor market conditions and their impact on demand for education.[27] We take an area approach similar to Beerli *et al.* (2021), but use the commuting zone as a unit of observation. This reduces concerns about geographical spillovers across regions as zones are constructed to capture where a large part of the population resides and works. Based on 2018 register data we calculate that on average 64% of the resident population in a commuting zone also works there (Bundesamt für Statistik, 2020a). This share is the same for the group of treated and control regions.

We argue that the labor market conditions in the place of residence at the time of receiving the matura are the relevant determinants of first-time enrollment and study field choice. Information about local conditions should be most readily available to the individual especially at a young age. The experience of immediate family members, which is arguably accrued locally, is likely to be an important information source (see Xia, 2016). Additionally, our sample consists of individuals with a Swiss nationality and a Swiss tertiary entry exam. This subgroup is likely to perceive local conditions as

[26] Universities close to the Swiss border are: University of Konstanz and Zeppelin University, Germany; University of Applied Sciences in Dornbirn and Feldkirch, Austria; University of Liechtenstein, Liechtenstein.

[27] Evidence for the importance of local compared to national labor market conditions in educational decisions is presented in Long *et al.* (2015) for the US context.

more important than the subgroup of foreign nationals who tend to exploit more distant economic opportunities (Basso and Peri, 2020). We compare the place where former students work and live one year after completing tertiary education to the one where they resided when they took their matura in the EHA survey. In 2017 59% of the graduates live in the same region where they resided during their upper-secondary education. 29% even work in that same commuting zone and this share is essentially the same in the treatment and control regions. This is considerable given that many high-skill jobs are not available across the country. Any violations of the SUTVA assumption would bias our estimates towards zero, so results should be considered conservative.

2.3.3 Treatment Intensity

To justify the treatment assignment rule, we estimate Equation 2.1 and compare the share of cross-border commuters in employment across treatment and control regions in the different periods. Column (1) of Table 2.1 shows that regions within thirty minutes of travel time from the national border experienced a large inflow of commuters relative to regions further away. While average exposure in the treatment region grew from 14.4% in the pre-reform period to 18.6% in the post-reform period, we estimate a reform effect of 3.3 percentage points after controlling for region fixed effects and an interaction between NUTS 2 regions and year dummies. Magnitudes increase after the second implementation step of the AFMP in 2008 as shown in Figure 2.4a. The continuous rise in the exposure to commuters during the period highlights the permanent nature of the reform. Figure D.1a replicates these results with administrative data. Estimates are larger in magnitude as we fix the denominator in the baseline year due to employment data availability. Results show that cross-border commuting was already slightly on the rise in the last years of the pre-reform period. This could be explained by an informal relaxation of migration regulations prior to 2002, which we take into account when discussing the timing of the enrollment results.

In Table 2.1, columns (2)–(4), and in Figures 2.4b–2.4d we look at exposure to cross-border commuting by educational level. We find that the rise in the

share of cross-border commuters among the upper-secondary educated is 4.6 percentage points while among the tertiary educated 3.2 in the post-reform period. The positive effect on the former group is already significant during the transition period. We do not find a significant increase in commuting of lower-secondary educated workers as presented in the Table, while the positive estimates in Figure 2.4b are driven by the choice of the base year.

In the Appendix we present robustness checks. In Table E.1 we test the sensitivity of the results to lower and higher cut-off values in treatment definition. We find that the estimated magnitude of the supply shock declines as we choose a higher threshold value. As a generalization, we confirm the rise in cross-border commuting using the continuous treatment measure. The estimated rise in cross-border commuting becomes higher in magnitude compared to the baseline results. Given that the exponential function takes the value of one at zero minutes of travel time and 0.22 at thirty minutes, the difference in magnitudes is in line with the functional specification. Another concern we address is whether resident migrants are, like commuters, more often employed in border regions. Figure D.1b shows that the share of resident migrants does not evolve differently across treatment and control regions during the study period. We, therefore, focus on cross-border commuters as the relevant group of foreign workers given our empirical strategy.

2.4 Main Results

2.4.1 Enrollment by Institutional Type

Summary statistics show that during our study period, average enrollment in tertiary education is higher in regions more affected by the introduction of the free movement reform than in regions less affected (see Table 2.2). This difference is driven by enrollment at Universities while shares are similar for Universities of Applied Sciences. Figure D.2 shows for UAS that the gap in enrollment between the two regions grew over time, while it followed the same trend in the pre-period. We next test whether these patterns are statistically significant and persist conditional on region fixed effects, population level and

an interaction between NUTS 2 regions and year dummies.

Results in column (1) of Table 2.3 show a positive but insignificant rise in overall enrollment in the post-reform period among individuals residing in affected regions prior to beginning their studies compared to non-affected regions. However, the responses differ by institutional type. Columns (2) and (3) indicate that individuals from regions close to the border enroll significantly more often at Universities of Applied Sciences. The magnitude of the effect is 1.1 percentage points. Average enrollment rates in the treated regions increased from 7.9% in the pre-reform period to 18.3% in the post-reform period. The reform effect can account for almost 10% of the enrollment growth observed during the period and is 14% of the pre-treatment enrollment level. In contrast, we find no change in entry into Universities between the treatment and the control regions.

Figure 2.5 shows that demand for tertiary education, overall and by institutional type, evolved similarly between the treatment and control group in the pre-reform years. This suggests that the common trend assumption is unlikely to be violated. Indeed, the timing of the increase in enrollment at Universities of Applied Sciences is in line with the intensity of the labor supply shock presented in Figure 2.4a. While we observe a small increase in commuting prior to 2002, we find that enrollment goes up only in the post-reform period when all barriers were abolished and the inflow of frontier workers was substantial. We take this as evidence against anticipation effects.

In the Appendix, we provide a number of robustness checks showing that our results hold in alternative specifications. Panels A and B of Table E.2 show that the threshold of thirty travel minutes is not decisive for the main findings. Moreover, the estimates remain similar when using the continuous measure for travel time (Panel C). Table E.3 investigates whether our main finding is sensitive to additional control variables and the weighting scheme. Changes in the supply of education and demand for labor could be confounding factors to the common trend assumption. Since our observation period coincides with the expansion of the UAS, we test whether enrollment rates are

driven by the availability of new study locations and study fields.[28] Column (2) shows that results are robust to controlling for the presence of tertiary institutions as well as the number of study fields offered within a radius of 20km from the largest municipality in a region in 1990. To mitigate labor demand concerns, we proxy labor demand with a Bartik type measure of employment, relying on the industrial composition of each region in 1995 and aggregate annual employment growth at the industry level (see Bartik, 1991, for an initial application to labor demand).[29] As shown in column (3), controlling for labor demand does not change results compared to our baseline specification. Additionally, in column (4) we confirm that weights do not drive the results. In Figure D.3 we redefine our outcome variable as the natural log of the number of natives enrolled. Results are consistent with our baseline measure and mitigate concerns that the effect is driven by variation in the size of the birth cohorts over time.

2.4.2 Enrollment by Field of Study

The enrollment analysis has shown that natives respond to the inflow of frontier workers by demanding more tertiary education at Universities of Applied Sciences. In this section, we investigate how the free movement reform affects demand for specific study fields.

We start by linking subjects to occupations and create the variable *Sh*

[28] Hoxby (2009) finds for the USA that university choice is less driven by distance in recent times partly due to declining transportation costs. In the context of Switzerland, Denzler and Wolter (2010) argue that the distance to university matters for both the decision to enroll and the study field choice in particular for individuals from middle and low socio-economic groups.

[29] Atkin (2016), for example, documents that expansion in export manufacturing in Mexico affected school enrollment negatively by raising the opportunity cost of education. We construct the Bartik variable as follows: $Bartik_{rt} = \sum_i Sh\,employed_{ir1995} \times \frac{Nr\,Employed_{it}}{Nr\,Employed_{i1995}}$, where i denotes industry, r region and t year. The industry is defined by two-digit NOGA-08 codes.

employed$_j$ which proxies the share of employees trained in a field j.

$$\text{Sh employed}_j = \sum_{o=1}^{O} \text{Sh employed}_o \times \text{Sh employed}_{oj}, \quad j \in [1, 22] \tag{2.3}$$

Sh employed$_{oj}$ is the share of employed individuals in an occupation o with a degree in field j, which we multiply with the share of employed in the same occupation *Sh employed*$_o$. Intuitively, we allocate individuals employed in an occupation to fields of study and take into account the size of the occupation.

We infer the link between study fields and occupations from their joint distribution provided by the EHA survey (2003–2017). This approach is consistent with the fact that natives do not observe the education of commuters but have some knowledge of their occupations. We use the study fields at the two-digit ISCED level as presented in column 1 of Table 2.4 and consider the ten occupations in ISCO-08 level 1 (managerial) and level 2 (professional occupations) as requiring high skill. We derive the distribution of cross-border commuters and residents across occupations from 1999 and 2000 administrative data, respectively. These years are the earliest available and, hence, alleviate concerns about endogenous adjustments in the commuters' occupational choices to changes in the skill levels of natives.[30]

We build a relative measure based on the values from Equation 2.3 for cross-border commuters and resident workers.

$$\text{Relative skill supply}_j = \frac{\text{Sh cross-border commuters}_j}{\text{Sh residents employed}_j}, \quad j \in [1, 22] \tag{2.4}$$

The measure *Relative skill supply*$_j$ indicates how the highly educated commuters are allocated across study fields j relative to the workers living in the

[30]FSO administrative data provide the distribution of cross-border commuters in 1999, while census data from 2000 offer information on all resident employees in Switzerland. We focus on occupations held by resident workers living in the border region to control for potential differences in the industrial structure of places where cross-border commuters and resident employees work.

country. A higher value of the measure implies that commuters are relatively more likely to have received training in this specific field than resident workers. In column 3 of Table 2.4 we present for each study field the skill supply of commuters relative to that of resident workers. The least affected fields, those with the lowest ratio, are listed first and the most affected fields come last. Frontier workers are more often trained in study fields which build technical and numerical skills and underrepresented in ones which build knowledge less likely to be transferable across borders and require social or high level of language skills. Comparing columns (1) and (2) in Table 2.4 reveals that expected labor market competition with foreign workers is higher in STEM than in non-STEM occupations. If we divide the study fields based on the variable *Relative skill supply* into affected (value above one) and non-affected (below one) we see that the former group coincides with STEM and the latter with non-STEM fields. The only exception is Arts which is a non-STEM subject while classified as affected.

In Table 2.5 we study the variation in the skills of the commuters over time and complement the static picture of the skill distribution presented above. Specifically, we investigate the change in exposure to cross-border commuters by both educational level and occupation. We consider upper-secondary and tertiary levels of education, while we split occupations into STEM and non-STEM. At both levels we observe a stronger inflow in STEM than in non-STEM occupations in the transition and post-reform periods. Overall, we take this as evidence in line with the static one presented in Table 2.4. Next, we proceed to the analysis of enrollment by field of study.

Figure D.4 plots raw enrollment rates into STEM and non-STEM fields at UAS and shows that demand for non-STEM fields grew faster in treated relative to control regions. Panel C of Table 2.6 confirms this by showing a statistically significant rise in enrollment of 1 percentage point in the post-reform period. The reform effect can account for roughly 10% of the enrollment growth observed during the period and is almost 24% of the pre-treatment level. Figure 2.6 shows that the timing of the effects is in line with the implementation of the free movement reform. The evidence from the analysis of

enrollment in non-affected fields provides consistent evidence. In contrast to Ransom and Winters (2020) who estimate crowding-out effects from STEM fields in regions with more foreign workers, we find no such evidence. Panel A of Table 2.6 shows a statistically insignificant rise in overall enrollment and Panel B no change in University enrollment.

In Table E.4 we show that the overall increase in the demand for non-STEM and non-affected fields is robust to variations in the treatment definition. Enrollment in STEM fields turns significant at the threshold of twenty-five minutes and in the continuous treatment specification. Results reported in column (3) also show a rise in enrollment in affected fields, which is however of smaller magnitude than the estimate for non-affected fields. In summary, while the STEM enrollment results depend slightly on the treatment definition, the rise in non-STEM enrollment is robust and of larger magnitude. Table E.5 reports results from specifications including additional control variables in columns (2)–(3) and without weighting scheme in column (4). Estimates remain very close to the ones from the main specification.

A final concern is whether enrollment in study fields is geographically concentrated (results available upon request). Switzerland is split into four language regions, where we investigate the effect of dropping the two largest oft hose regions.[31] The coefficients of enrollment in non-affected fields in the post-treatment period is of similar magnitude when dropping the German or the French speaking regions but estimates become statistically insignificant at the conventional levels. The reported results are, thus, not driven by a single language region. Given that the inflow of commuters is present in all language regions, this exercise reinforces the link that we draw between local labor market conditions and enrollment.

[31] Several commuting zones (i.e. "regions") form a language region. In 75 out of 106 regions the majority speaks German, in 23 French and in 8 either Italian or Romansh. Within the treated regions, the French speaking regions (eleven) and the Italian speaking regions (three) are overrepresented while the German speaking regions are underrepresented (twenty). There are only two regions with the main language Romansh, whereas one is treated.

2.5 Mechanisms

Results show that natives respond to the free movement reform by acquiring more schooling. When faced with stronger competition, education offers an opportunity to stay competitive by upgrading one's skills. In this section we explore mechanisms and discuss whether natives of certain types select into education.

2.5.1 Prior Labor Market Experience

Previous studies on the AFMP find that labor market outcomes of some natives have improved due to the reform (Cristelli and Lissoni, 2020; Beerli *et al.*, 2021). To test if changes in such outcomes are consistent with the observed educational choices, we investigate wage effects by education level. Panel A of Table 2.8 reports a decrease in wages for upper-secondary educated workers and an increase in wages for tertiary educated workers in affected regions, with statistically significant effects in the post-reform period. Wage results by educational attainment also hold in the sample of workers below the worker median age of forty years (results upon request).[32] In Panel B we look at the probability of natives to hold at least middle management positions and find that the share of tertiary educated increases in the post-reform period in affected regions. We do not find any difference at the upper-secondary level. Note that in unreported event study figures, the magnitude and significance of the estimates depend on the choice of the base year. Overall, the pattern of the results is consistent with the ones reported in Beerli *et al.* (2021), while we look at upper-secondary educated natives separately. The authors explain the improved labor market outcomes for tertiary degrees with an increase in the labor demand of skill-intensive incumbent and new firms. This is in contrast to a standard model, which considers solely a labor supply shock and predicts

[32] We additionally look at whether the native employment conditions at the educational level evolve differently during the period in treated and control regions. Results for unemployment rates in Panel A of Table E.6 and for employment rates in Panel B of Table E.6 do not suggest so.

declining wages.[33]

Summary statistics in Table 2.2 show a high existing premium to tertiary education. Wage effects can be hard to observe especially relative to a high existing premium. While others have found that future earnings matter for major choice (Schweri and Hartog, 2017, in the Swiss context), the choice elasticity is often relatively low (Patnaik *et al.*, 2020). However, natives with prior labor market experience are likely to have knowledge of local wages and more so of positions held by educational level. To test this, we run the enrollment analysis separately for individuals with different educational backgrounds.

Numbers from the FSO for 2012 upper-secondary graduates show that 64% of those with a vocational matura enroll in tertiary education within 42 months after graduation. This is significantly lower compared to 94% of those with a general and 84% with a specialised matura (Bundesamt für Statistik, 2018). This is not surprising given that the vocational and specialised education prepare to enter both the labor market and tertiary education, while the objective of a general training is to prepare for enrollment at University. The two groups tend to enroll in different types of institutions. The majority of students at a University have a general education while at a University of Applied Sciences students typically have a vocational training. Since individuals with a vocational, specialised and general matura can enroll at UAS, we can test which group drives our results. We take into account that a vocational matura can be completed during the vocational training (Type I), or in two to four semesters after the vocational education (Type II). Table 2.7 illustrates that the higher demand for tertiary education is driven by people who do their vocational matura at the same time as their vocational education or have a specialised matura.

This evidence suggests that the reform affected educational decisions of individuals with an upper-secondary degree that combines schooling and oc-

[33] Our framework deviates from Beerli *et al.* (2021) in at least two respects that may explain the different magnitude of the wage effect on tertiary educated natives. First, we use 2000 as the reference year in our event study analysis, while they take 1998. Second, in our measure of tertiary educated we only include individuals with an academic degree, while they also consider individuals with professional tertiary degrees. Our analysis leads to the same qualitative results as theirs.

cupational training. We additionally run separate difference-in-differences regression by age at enrollment into UAS. In Figure 2.7 we show that individuals between 19 and 21 years of age, or close after graduating from upper-secondary education, are most responsive. Vocationally trained individuals already have at least three years of work experience at the time at which they choose whether to pursue a tertiary degree. Access to a professional network makes them more aware of changes in local labor market conditions. This link to the professional world persists during the studies: students at a UAS report more often to work while studying (79%) than those at a UNI (69%) (Bundesamt für Statistik, 2020b). Around 22% of all UAS students are enrolled in a part-time study. In unreported results, we test if the increase in enrollment in the post-reform period comes from full-time or part-time studies. We find that the reform effect is driven by full-time students.

2.5.2 Skill Complementarities

To better understand responses at the study field level, we examine native wages by education and occupation. Columns (1) and (2) in Panel A of Table 2.9 show that at the upper-secondary level the returns in STEM professions rise and in non-STEM professions fall in the post-reform period. Estimates for workers with a tertiary education in columns (3) and (4) are positive and not significant but comparable in magnitude to the estimates by education level (see Table 2.8). In Panel B we show that the increase in the probability of natives with a tertiary degree to hold managerial positions is driven by those employed in non-STEM occupations (p-value of 0.105). The chosen study field at tertiary education is typically closely linked to the major at the upper-secondary level.[34] Results therefore suggest that the increase in non-STEM enrollment can be either induced by lower opportunity costs of studying, higher returns to a tertiary degree or a combination of the two. The increase in STEM wages for upper-secondary and tertiary educated workers suggests that there

[34]Individuals who enroll in tertiary education generally advance their skills already developed at the upper-secondary level. For example, 92% of non-STEM vocationally educated enroll into non-STEM study fields at the tertiary level. The share for those with a STEM background is comparable at 89%.

may be complementarities within these occupations between native and foreign workers that could explain why we find no change in STEM enrollment despite the rise in foreign competition.

Individuals with a vocational and specialised matura enroll more often at Universities of Applied Sciences due to the reform. The rise in enrollment of vocationally educated is driven by those with a vocational matura major in business and services (results available upon request). Individuals with a specialised matura are typically trained in health, social work, pedagogy or art. Consistently, when we split the non-STEM fields into broad categories, we find that the positive post-reform effect comes from business and law, and health and welfare (see Figure D.5). Subjects that fall into the area of business and law are the most popular ones with an average enrollment share of 25%, while health and welfare receives approximately 15%. In particular, the skills acquired from a business and law study could be complementary to the technical skills brought by the commuters.

The literature has established a pattern between the skill types of native and immigrant workers. For the US, Hanson and Slaughter (2017) observe that high-skilled immigrants are more likely to be employed in STEM than in non-STEM professions. The literature explains these specializations through differences in the skill transferability across countries or in the quality of training which results in foreigners having a comparative advantage in STEM occupations (Hunt and Gauthier-Loiselle, 2010; Hanson and Slaughter, 2017). In line, in Tables 2.4 and 2.5 we show that the inflow of cross-border commuters is concentrated in STEM occupations. In our context, differences in education quality are a less likely explanation because the largest Swiss institutions providing tertiary level STEM education are world leaders.[35] We hence confirm the key finding of the literature that STEM skills are more transferable in a context where foreign workers are culturally and linguistically similar to the natives. In summary, natives respond to the reform by acquiring more non-STEM skills. This allows them to benefit from complementarities with the

[35] In the academic year 2019/2020, the ETH ranked 6th and the EPFL 18th out of 1,001 in the QS World University Ranking. In the same year, the ETH ranked 13th and the EPFL 38th out of 1,001 in the THE World University Ranking.

foreign workers and to avoid direct foreign competition.

2.5.3 Foreign Students

The literature on university enrollment and study field choice has established a link between the presence of foreign students and natives' decisions. Recent studies find on average no or a positive effect on native enrollment (Shih, 2017; Machin and Murphy, 2017). Earlier studies also document crowding-out effects (Borjas, 2004). At the field level, there is some evidence that foreign students reduce the likelihood that natives major in a STEM subject (Orrenius and Zavodny, 2015; Anelli *et al.*, 2020). In our context, the share of foreign students is sizeable (16% in 1997, close to 19% in 2017), which is why we take a closer look at this group. We distinguish between international students – non-Swiss without a Swiss matura – and immigrant students – non-Swiss with a Swiss matura.

The share of international students in total enrollment at the bachelor level was approximately 12% in 2017. International students are overrepresented in Universities and in STEM fields of study, which could crowd out natives from these studies. There is generally no cap on the maximum number of students enrolled in Switzerland, which is in contrast to the US where most of the above studies are conducted. Since tuition in Switzerland is to a large degree publicly funded, cross-subsidization of natives through higher tuition fees paid by the international students is also unlikely. Additionally, there is limited knowledge about the class composition when enrolling at the bachelor level so it is unlikely that a high share of international peers crowds natives in or out of certain institutions or fields. Finally, for international students to present a challenge to the empirical strategy, they need to affect differently natives coming from the treatment and the control region and we see no convincing reason why this should be the case.

Immigrant students represent about 7% of total enrollment in 2017 and this number is similar in Universities and Universities of Applied Sciences, in STEM and non-STEM fields. In contrast to international students, immigrant students have had prior contact with natives in the place of residence and

also within the educational system. To further mitigate any concerns that the differences in the composition of the peer group is driving our results, we introduce controls for the lagged share of immigrant students by institutional type (Table E.3) and by field of study (Table E.5).[36] Results are robust to the inclusion of these controls.

Overall, we find no evidence that enrollment results are likely to be driven by the presence of foreign students. Furthermore, we believe that our empirical strategy mitigates remaining concerns. We measure overall demand for two types of institutions and for broad groups of study fields. This alleviates the potential crowding-out or crowding-in effect at the institution × field level since switching between institutions and narrowly defined fields can help to avoid or to find more foreign peers.

2.5.4 Selection

In this section we test whether the enrolled natives have different characteristics across treatment and control groups. For example, if more females than males respond to the reform, the share of enrolled females in treated regions is expected to go up relative to the control regions. To explore changes in the student composition, we build new outcomes measured as the number of first-year students with a certain characteristics relative to all enrolled first-year students. Table E.7 presents first results for growing up in an urban origin and whether German is the majority-spoken language in the municipality. In the last column we look at gender. Results show no significant change in enrollment by any of these characteristics.

Similarly, we compare academic achievement as a proxy for student quality. We compute the graduation rate of students as $\textit{Graduation rate}_{rt} = \frac{\textit{Nr of graduates by 2017}_{rt}}{\textit{Nr of students enrolled}_{rt}}$ where t is the year of first enrollment. Results in Table E.8 show no significant differences in graduation rates at Universities of Applied Sciences between treated and control regions (see Cortés and Pan,

[36] In a few instances the total number of enrolled students from a region in a year is zero turning the share variable missing. In these cases we replace the variable with zero. To control for this adjustment we also include a dummy variable equal to one for such observations, zero otherwise.

2015, for a positive selection into nursing studies). The higher demand for tertiary degrees in affected regions is driven by students with an average quality similar to that in control regions. As a degree is considered a key signal for high ability, our evidence suggests that those who respond to the reform on average improve their labor market prospects (Arrow, 1973). Overall, our evidence shows no ex-ante selection into tertiary education and no differences in ex-post performance as measured by graduation rates due to the reform.

2.6 Conclusion

We examine the impact of the introduction of free movement of workers on native demand for tertiary education in Switzerland. We find that individuals from affected regions enroll more often at Universities of Applied Sciences and select study fields linked to non-STEM occupations. These results are driven by individuals with a vocational background at the upper-secondary level who have viable labor market options. This makes them sensitive to changes in the labor market conditions such as returns to skill. Our results suggest that natives specialize in non-STEM degrees, which are linked to occupations where foreign workers are underrepresented and complementarities between the two groups could arise.

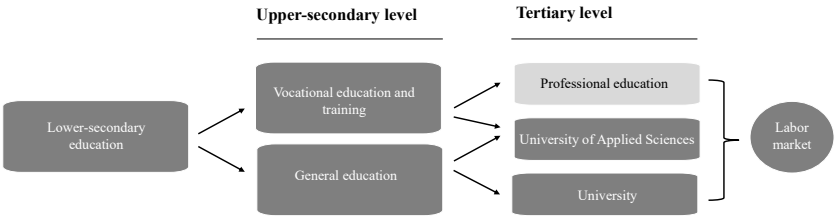
The education system in the Swiss context, similar to other European countries, grants access to tertiary degrees to individuals with a general and a vocational background at the upper-secondary level. At the tertiary level, they usually enroll at different institutions with a focus on general or specific skills, respectively. This institutional feature contributes to a labor force with a diverse skill set. As we have shown, the dual education system gives individuals with different training an important margin to respond to changes in labor market conditions. By providing opportunities to upgrade skills, governments can facilitate the adjustment processes we observe.

The study field choice of affected natives can reinforce initial occupational specialization of high-skilled native and foreign workers. Indeed, we find support for this in the data. On the other hand, a sudden outflow of foreigners

due to a more restrictive migration policy or deteriorating relative economic conditions in the host country could create a shortage of skills that foreign workers were previously supplying. Since skill acquisition is typically a long-term process, these findings should be taken into account when considering changes to immigration policies.

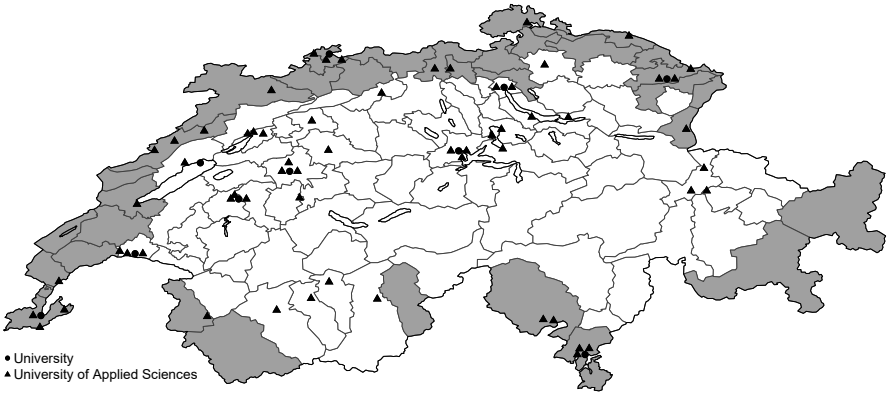
Figures

Figure 2.1: Swiss education system



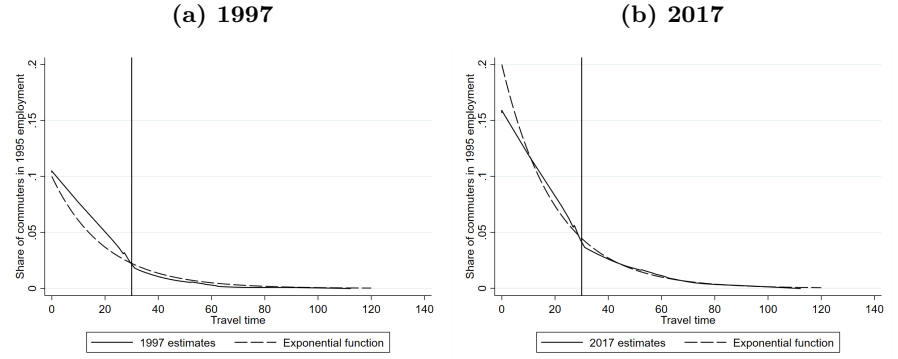
Note: The figure presents Swiss educational tracks at the upper-secondary and tertiary level of education. Arrows show most common choices given previous educational background. Compulsory education ends at the lower-secondary level. Individuals typically enter the labor market after the upper-secondary or tertiary education.

Figure 2.2: Tertiary institutions in treated and control regions



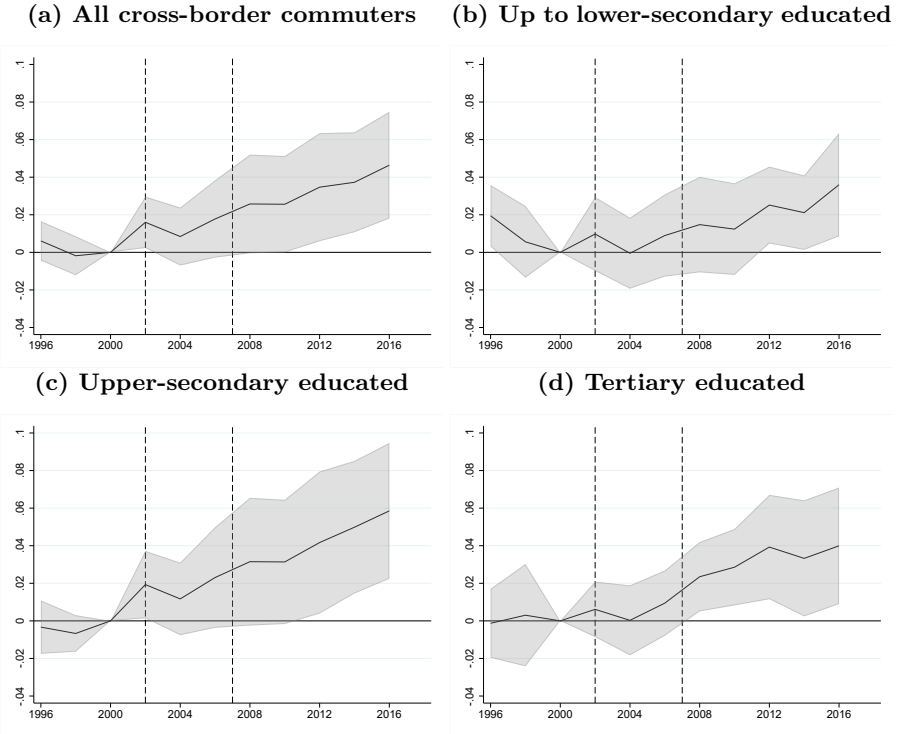
Note: The map shows Switzerland's 106 commuting zones split into treated (grey) and control regions (white). The locations of the tertiary institutions in 2017 are shown by institutional type.

Figure 2.3: Exposure to cross-border commuters and travel time



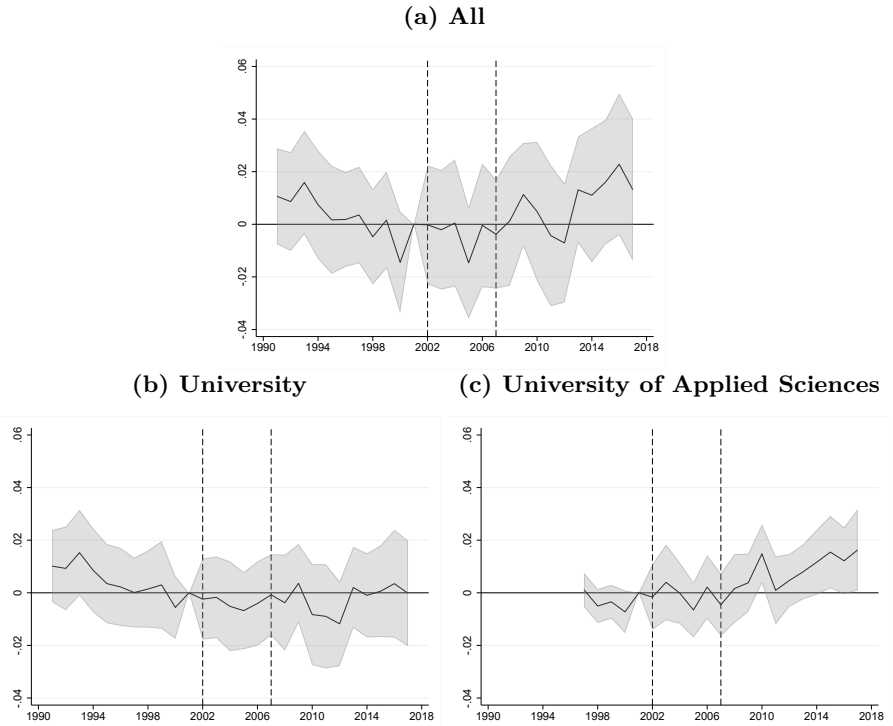
Note: The figure shows estimates from a locally weighted regression of the share of cross-border commuters in 1997 and 2017 (Panel a and Panel b, respectively) in 1995 employment, respectively, on travel time to the closest Swiss border crossing. The unit of observation is the commuting zone. The dashed line plots the function $\exp(-0.05 \times travel\ time)$ rescaled by ten in Panel a and five in Panel b. The vertical line is drawn at thirty minutes travel time. Source: FSO.

Figure 2.4: Exposure to cross-border commuters



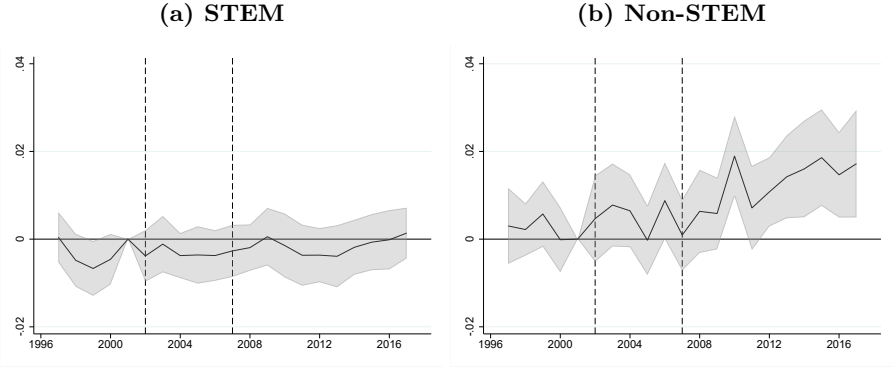
Note: The figure shows difference-in-differences estimates using biennial data at the commuting zone level for the period 1996–2016. The vertical lines indicate the beginning of the transition period (2002) and of the post-reform period (2007). The dependent variable is the share of cross-border commuters in total employment. Observations are weighed by the number of total employees in 1996. Standard errors are clustered at the commuting zone level, 95% confidence intervals shown. Source: SESS.

Figure 2.5: Native enrollment by institutional type



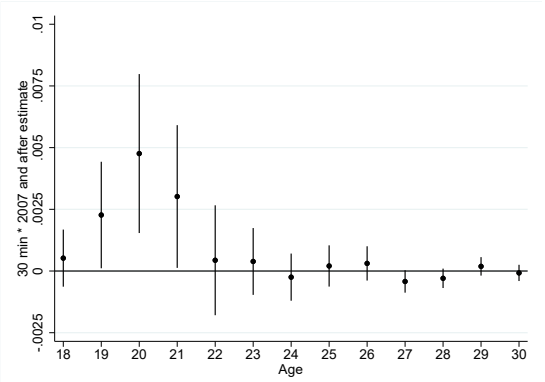
Note: The figure shows difference-in-differences estimates using annual data at the commuting zone level for the period 1991–2017. The vertical lines indicate the beginning of the transition period (2002) and of the post-reform period (2007). The dependent variable is the share of native first-year students in birth cohort. The denominator is specific to the institutional type. Observations are weighed by the cohort size in a specific institutional type in 1997. Standard errors are clustered at the commuting zone level, 95% confidence intervals shown. Source: SHIS-studex.

Figure 2.6: Native enrollment by type of study field at Universities of Applied Sciences



Note: The figure shows difference-in-differences estimates using annual data at the commuting zone level for the period 1997–2017. The vertical lines indicate the beginning of the transition period (2002) and of the post-reform period (2007). Affected fields are those with a supply shock measure above one as shown in Table 2.4. The dependent variable is the share of native first-year students enrolled in a specific group of study fields at Universities of Applied Sciences in birth cohort. Observations are weighed by the cohort size in 1997. Standard errors are clustered at the commuting zone level, 95% confidence intervals shown. Source: SHIS-studex.

Figure 2.7: Native enrollment by age cohort at Universities of Applied Sciences



Note: The figure shows difference-in-differences estimates of the coefficient of the "30min × 2007 and after" variable by age cohort. Each estimate is obtained from a separate regression. The dependent variable is the share of native first-year students at Universities of Applied Sciences in age-specific cohort. Observations are weighed by the age-specific cohort size in 1997. Standard errors are clustered at the commuting zone level, 95% confidence intervals shown. Source: SHIS-studex.

Tables

Table 2.1: Exposure to cross-border commuters by educational level

	Outcome: share of cross-border commuters			
	All	Up to lower-secondary	Upper-secondary	Tertiary
	(1)	(2)	(3)	(4)
30min * 2002-2006	0.013**	-0.002	0.021**	0.005
	(0.006)	(0.007)	(0.008)	(0.007)
30min * 2007 and after	0.033***	0.014	0.046***	0.032***
	(0.012)	(0.009)	(0.016)	(0.011)
Mean outcome	0.072	0.070	0.069	0.069
Sd outcome	0.109	0.129	0.103	0.098
Commuting zones	106	106	106	106
within 30 min	35	35	35	35
N	1166	1166	1166	1160

Note: The table shows difference-in-differences estimates using biennial data at the commuting zone level for the period 1996–2016. The dependent variable is the share of cross-border commuters in total employment. Observations are weighed by the number of total employees in 1996. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Source: SESS.

Table 2.2: Summary statistics

	Treatment group			Control group		
	N	Mean	Sd	N	Mean	Sd
Share of cross-border commuters	385	0.167	0.122	781	0.010	0.015
... with lower-secondary education	385	0.165	0.164	781	0.008	0.020
... with upper-secondary education	385	0.161	0.113	781	0.009	0.014
... with tertiary education	385	0.155	0.107	775	0.013	0.019
Share enrolled	735	0.356	0.093	1491	0.313	0.083
... at UNI	735	0.208	0.085	1491	0.171	0.061
... at UAS	735	0.150	0.053	1491	0.143	0.049
... in agriculture	735	0.003	0.002	1491	0.004	0.003
... in arts and humanities	735	0.039	0.017	1491	0.031	0.014
... in business and law	735	0.093	0.029	1491	0.082	0.027
... in education	735	0.037	0.017	1491	0.036	0.018
... in engineering	735	0.050	0.015	1491	0.048	0.014
... in health	735	0.046	0.028	1491	0.035	0.022
... in ICT	735	0.012	0.007	1491	0.011	0.006
... in math and sciences	735	0.033	0.012	1491	0.029	0.011
... in services	735	0.004	0.005	1491	0.004	0.004
... in social sciences	735	0.038	0.020	1491	0.031	0.015
Mean ln gross hourly wage	385	3.573	0.098	781	3.564	0.109
... of lower-secondary educated	385	3.298	0.082	781	3.297	0.083
... of upper-secondary educated	385	3.519	0.081	781	3.496	0.081
... of tertiary educated	385	3.934	0.088	774	3.937	0.085
Share employed in management	385	0.144	0.031	781	0.141	0.029
... with lower-secondary education	385	0.027	0.023	780	0.025	0.023
... with upper-secondary education	385	0.107	0.026	781	0.102	0.025
... with tertiary education	385	0.439	0.093	774	0.439	0.097
Share unemployed	735	0.034	0.022	1491	0.027	0.018
... with lower-secondary education	730	0.070	0.082	1354	0.055	0.077
... with upper-secondary education	735	0.035	0.026	1491	0.028	0.023
... with tertiary education	692	0.025	0.027	1445	0.017	0.023
Share employed	735	0.758	0.051	1491	0.786	0.046
... with lower-secondary education	735	0.445	0.117	1433	0.467	0.129
... with upper-secondary education	735	0.768	0.063	1491	0.799	0.057
... with tertiary education	711	0.889	0.057	1446	0.917	0.051

Note: The observation period for the enrollment outcomes is 1997–2017 and for the other outcome variables 1996–2016. Data is at the commuting zone level. Share of cross-border commuters is in total employment. Lower-secondary level of education is compulsory education as highest degree, upper-secondary is an apprenticeship or a matura, tertiary is a degree from a University or University of Applied Sciences. Share enrolled is the share of first-year students in birth cohort. UNI is short for University and UAS for University of Applied Sciences. One-digit ISCED fields of studies are considered. Share unemployed is the number of unemployed divided by the labor force. Share employed is the number of employed divided by the number of respondents. Weights assigned to the observations reflect the number of native employees in 1996, native cohort size in 1997, number of total employees in 1996, native labor force in 1996, and number of native respondents in 1996. Sources: SESS, SLFS, SHIS-studex.

Table 2.3: Native enrollment by institutional type

	Outcome: share of enrolled native first-year students		
	All	University	University of Applied Sciences
	(1)	(2)	(3)
30min * 2002-2006	-0.000	-0.004	0.003
	(0.007)	(0.004)	(0.004)
30min * 2007 and after	0.010	-0.002	0.011**
	(0.007)	(0.005)	(0.004)
Mean outcome	0.326	0.183	0.144
Sd outcome	0.089	0.072	0.050
Commuting zones	106	106	106
within 30 min	35	35	35
N	2226	2226	2226

Note: The table shows difference-in-differences estimates using annual data at the commuting zone level for the period 1997–2017. The dependent variable is the share of native first-year students in birth cohort. The denominator is specific to the institutional type. Observations are weighed by the cohort size in a specific institutional type. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Source: SHIS-studex.

Table 2.4: Cross-border commuters relative to resident workers by field of study

Field of study (1)	STEM field (2)	Skill supply of commuters relative to residents (3)
Education	0	0.495
Languages	0	0.596
Law	0	0.653
Welfare	0	0.663
Journalism and information	0	0.670
Personal services	0	0.719
Humanities (except languages)	0	0.728
Social and behavioral sciences	0	0.764
Health	0	0.800
Veterinary	0	0.819
Business and administration	0	0.883
Arts	0	1.179
Mathematics and statistics	1	1.318
Biological and related sciences	1	1.384
Agriculture	1	1.547
Manufacturing and processing	1	1.549
Environment	1	1.613
Physical sciences	1	1.652
Engineering and engineering trades	1	1.948
Forestry	1	1.968
Information and communication technologies (ICT)	1	2.304
Architecture and construction	1	2.470

Note: Column (1) lists two-digit ISCED study fields. Column (2) distinguishes between STEM and non-STEM fields. Column (3) shows the ratio of the share of commuters trained in a study field relative to the share of residents trained in the same field according to Equation 2.4. Sources: EHA (2003–2017), FSO (1999, 2000).

Table 2.5: Exposure to cross-border commuting by education and occupation

	Outcome: share of cross-border commuters			
	Upper-secondary		Tertiary	
	STEM (1)	non-STEM (2)	STEM (3)	non-STEM (4)
30min * 2002-2006	0.027***	0.009	0.038**	0.001
	(0.010)	(0.006)	(0.017)	(0.006)
30min * 2007 and after	0.036**	0.018*	0.053**	0.023**
	(0.015)	(0.010)	(0.022)	(0.010)
Mean outcome	0.086	0.040	0.101	0.051
Sd outcome	0.133	0.064	0.136	0.069
Commuting zones within 30 min	106	106	105	106
	35	35	35	35
N	848	848	814	840

Note: The table shows difference-in-differences estimates using biennial data at the commuting zone level for the period 1996–2010. The dependent variable is the share of cross-border commuters in total employment by educational level and occupation. Observations are weighed by the number of total employees in 1996. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Source: SESS.

Table 2.6: Native enrollment by type of study field

	Outcome: share of enrolled native first-year students			
	STEM (1)	Non-STEM (2)	Affected (3)	Non-affected (4)
Panel A: All institutions				
30min * 2002-2006	-0.001	0.000	-0.001	-0.001
	(0.003)	(0.006)	(0.003)	(0.005)
30min * 2007 and after	-0.000	0.008	0.001	0.007
	(0.003)	(0.006)	(0.003)	(0.006)
Mean outcome	0.092	0.240	0.103	0.229
Sd outcome	0.023	0.072	0.025	0.069
Commuting zones	106	106	106	106
within 30 min	35	35	35	35
N	2226	3975	2226	3975
Panel B: Universities				
30min * 2002-2006	-0.001	-0.004	-0.002	-0.003
	(0.002)	(0.003)	(0.002)	(0.003)
30min * 2007 and after	-0.002	-0.003	-0.002	-0.002
	(0.002)	(0.004)	(0.002)	(0.004)
Mean outcome	0.049	0.133	0.051	0.131
Sd outcome	0.019	0.058	0.019	0.057
Commuting zones	106	106	106	106
within 30 min	35	35	35	35
N	2226	3975	2226	3975
Panel C: Universities of Applied Sciences				
30min * 2002-2006	-0.000	0.004	0.001	0.002
	(0.002)	(0.003)	(0.002)	(0.003)
30min * 2007 and after	0.001	0.010***	0.003*	0.008**
	(0.002)	(0.003)	(0.002)	(0.003)
Mean outcome	0.043	0.108	0.053	0.098
Sd outcome	0.014	0.041	0.014	0.039
Commuting zones	106	106	106	106
within 30 min	35	35	35	35
N	2226	3975	2226	3975

Note: This table shows difference-in-differences estimates using annual data at the commuting zone level for the period 1997–2017. Affected fields are those with a supply shock measure above one as shown in Table 2.4. The dependent variable is the share of native first-year students enrolled in a specific group of study fields in birth cohort. Observations are weighed by the cohort size in 1997. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Source: SHIS-studex.

Table 2.7: Native enrollment at Universities of Applied Sciences by type of matura

	Outcome: share of enrolled native first-year students			
	Vocational (during)	Vocational (after)	Specialised	General
	(1)	(2)	(3)	(4)
30min * 2002-2006	-0.000	0.001	0.004*	-0.002
	(0.002)	(0.001)	(0.002)	(0.002)
30min * 2007 and after	0.006*	-0.001	0.007***	-0.002
	(0.003)	(0.002)	(0.002)	(0.002)
Mean outcome	0.043	0.033	0.016	0.033
Sd outcome	0.021	0.020	0.016	0.018
Commuting zones	106	106	106	106
within 30 min	35	35	35	35
N	2226	2226	2226	2226

Note: The table shows difference-in-differences estimates using annual data at the commuting zone level for the period 1997–2017. The dependent variable is the share of native first-year students at Universities of Applied Sciences in birth cohort. Observations are weighed by the cohort size in 1997. Column (1) shows first-year students with a vocational matura completed during the apprenticeship, column (2) first-year students with a vocational matura completed after the apprenticeship. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Source: SHIS-studex.

Table 2.8: Native labor market outcomes by educational level

	All	Up to lower-secondary	Upper-secondary	Tertiary
	(1)	(2)	(3)	(4)
Panel A: ln gross hourly wage rate of natives				
30min * 2002-2006	-0.007	-0.018	-0.011	0.018
	(0.008)	(0.012)	(0.008)	(0.011)
30min * 2007 and after	-0.010	-0.011	-0.012*	0.035**
	(0.007)	(0.016)	(0.006)	(0.016)
Mean outcome	3.567	3.297	3.504	3.936
Sd outcome	0.106	0.083	0.082	0.086
Commuting zones	106	106	106	106
within 30 min	35	35	35	35
N	1166	1166	1166	1159
Panel B: Share of natives in a managerial position				
30min * 2002-2006	0.006	-0.002	0.003	0.032**
	(0.004)	(0.003)	(0.005)	(0.014)
30min * 2007 and after	0.003	-0.001	0.000	0.039*
	(0.005)	(0.003)	(0.005)	(0.020)
Mean outcome	0.142	0.025	0.104	0.439
Sd outcome	0.030	0.023	0.025	0.096
Commuting zones	106	106	106	106
within 30 min	35	35	35	35
N	1166	1165	1166	1159

Note: The table shows difference-in-differences estimates using biennial data at the commuting zone level for the period 1996–2016. The dependent variable in Panel A is the mean natural log of gross hourly wage of natives in an education category and in Panel B the share of natives holding at least a middle management position in an education category. Observations are weighed by the number of native employees in a specific education category in 1996. Standard errors in parentheses are clustered at the commuting zone level. * $p<0.1$; ** $p<0.05$; *** $p<0.01$. Source: SESS.

Table 2.9: Native labor market outcomes by education and occupation

	Upper-secondary		Tertiary	
	STEM (1)	non-STEM (2)	STEM (3)	non-STEM (4)
Panel A: ln gross hourly wage rate of natives				
30min * 2002-2006	0.006	-0.013	0.021	0.009
	(0.006)	(0.008)	(0.019)	(0.020)
30min * 2007 and after	0.013**	-0.017*	0.037	0.035
	(0.007)	(0.010)	(0.025)	(0.030)
Mean outcome	3.498	3.469	3.894	3.994
Sd outcome	0.073	0.085	0.093	0.110
Commuting zones	106	106	101	105
within 30 min	35	35	35	35
N	848	848	790	832
Panel B: Share of natives in a managerial position				
30min * 2002-2006	0.006	-0.002	0.011	0.033*
	(0.007)	(0.006)	(0.025)	(0.018)
30min * 2007 and after	0.002	-0.007	0.016	0.040
	(0.008)	(0.007)	(0.032)	(0.024)
Mean outcome	0.075	0.124	0.367	0.510
Sd outcome	0.031	0.033	0.135	0.106
Commuting zones	106	106	101	105
within 30 min	35	35	35	35
N	848	848	790	832

Note: The table shows difference-in-differences estimates using biennial data at the commuting zone level for the period 1996–2010. The dependent variable in Panel A is the mean natural log of gross hourly wage of natives by educational level and occupation and in Panel B the share of natives holding at least a middle management position by educational level and occupation. Observations are weighed by the number of upper-secondary educated native employees in 1996 in columns (1)–(2) and tertiary educated native employees in 1996 in columns (3)–(4). Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Source: SESS.

References

Anelli, M., Shih, K. Y. and Williams, K. (2020). *Foreign Students in College and the Supply of STEM Graduates*. Working Paper.

Arrow, K. J. (1973). Higher education as a filter. *Journal of Public Economics*, **2** (3), 193 – 216.

Atkin, D. (2016). Endogenous Skill Acquisition and Export Manufacturing in Mexico. *American Economic Review*, **106** (8), 2046–85.

Ayllon, S. and Nollenberger, N. (2016). *Are recessions good for human capital accumulation?* NEGOTIATE working paper no. 5.1.

Bartik, T. (1991). *Who Benefits from State and Local Economic Development Policies?* W.E. Upjohn Institute for Employment Research.

Basso, G. and Peri, G. (2020). Internal mobility: The greater responsiveness of foreign-born to economic conditions. *The Journal of Economic Perspectives*, **34** (3), 77–98.

Beerli, A., Ruffner, J., Siegenthaler, M. and Peri, G. (2021). The Abolition of Immigration Restrictions and the Performance of Firms and Workers: Evidence from Switzerland. *American Economic Review*, **111** (3), 976–1012.

Beffy, M., Fougère, D. and Maurel, A. (2012). Choosing the Field of Study in Post-secondary Education: Do Expected Earnings Matter? *The Review of Economics and Statistics*, **94** (1), 334–347.

Betts, J. (1998). Educational Crowding Out: Do Immigrants Affect the Educational Attainment of American Minorities? In D. S. Hamermesh and F. D. Bean (eds.), *Help or Hindrance? The Economic Implications of Immigration for African Americans*, New York: Russell Sage Foundation, pp. 253–281.

Borjas, G. J. (1995). The economic benefits from immigration. *Journal of Economic Perspectives*, **9** (2), 3–22.

— (2003). The Labor Demand Curve is Downward Sloping: Reexamining the Impact of Immigration on the Labor Market. *The Quarterly Journal of Economics*, **118** (4), 1335–1374.

— (2004). *Do Foreign Students Crowd Out Native Students from Graduate Programs?* Working Paper 10349, National Bureau of Economic Research.

— and Doran, K. B. (2012). The Collapse of the Soviet Union and the Productivity of American Mathematicians. *The Quarterly Journal of Economics*, **127** (3), 1143–1203.

Bundesamt für Statistik (2018). *15 Bildung und Wissenschaft. Übergänge nach Abschluss der Sekundarstufe II und Integration in den Arbeitsmarkt*. Bundesamt für Statistik.

Bundesamt für Statistik (2020a). Erwerbstätige nach Wohn- und Arbeitsgemeinde, 2014 und 2018. Accessed 26.01.2021.

Bundesamt für Statistik (2020b). *Soziale und wirtschaftliche Lage der Studierenden*. Bundesamt für Statistik.

Cortés, P. and Pan, J. (2015). Immigration and Occupational Choice of Natives: the Case of Nurses in the United States. *CESifo Economic Studies*, **61** (3-4), 797–823.

Cristelli, G. and Lissoni, F. (2020). *Free movement of inventors: open-border policy and innovation in Switzerland*. Munich Personal RePEc Archive 104120, MPRA.

Dellas, H. and Sakellaris, P. (2003). On the cyclicality of schooling: Theory and evidence. *Oxford Economic Papers*, **55** (1), 148–172.

Denzler, S. and Wolter, S. C. (2010). Der Einfluss des lokalen Hochschulangebots auf die Studienwahl. *Zeitschrift für Erziehungswissenschaft*, **13** (4), 683–706.

Dustmann, C., Frattini, T. and Preston, I. P. (2012). The Effect of Immigration along the Distribution of Wages. *The Review of Economic Studies*, **80** (1), 145–173.

—, Schönberg, U. and Stuhler, J. (2016). The impact of immigration: Why do studies reach such different results? *Journal of Economic Perspectives*, **30** (4), 31–56.

—, Schönberg, U. and Stuhler, J. (2017). Labor supply shocks, native wages, and the adjustment of local employment. *The Quarterly Journal of Economics*, **132** (1), 435–483.

Goldsmith-Pinkham, P., Sorkin, I. and Swift, H. (2020). Bartik instruments: What, when, why, and how. *American Economic Review*, **110** (8), 2586–2624.

Hanson, G. H. and Slaughter, M. J. (2017). High-Skilled Immigration and the Rise of STEM Occupations in US Employment. In *Education, Skills, and Technical Change: Implications for Future US GDP Growth*, NBER Chapters, National Bureau of Economic Research, Inc, pp. 465–494.

Hoxby, C. M. (2009). The Changing Selectivity of American Colleges. *Journal of Economic Perspectives*, **23** (4), 95–118.

Hunt, J. (2017). The impact of immigration on the educational attainment of natives. *Journal of Human Resources*, **52** (4), 1060–1118.

— and Gauthier-Loiselle, M. (2010). How Much Does Immigration Boost Innovation? *American Economic Journal: Macroeconomics*, **2** (2), 31–56.

Johnson, M. T. (2013). The impact of business cycle fluctuations on graduate school enrollment. *Economics of Education Review*, **34** (C), 122–134.

Llull, J. (2018). Immigration, Wages, and Education: A Labour Market Equilibrium Structural Model. *The Review of Economic Studies*, **85** (3), 1852–1896.

Long, B. T. (2014). *The Financial Crisis and College Enrollment: How Have Students and Their Families Responded?*, University of Chicago Press, pp. 209–233.

Long, M. C., Goldhaber, D. and Huntington-Klein, N. (2015). Do completed college majors respond to changes in wages? *Economics of Education Review*, **49**, 1–14.

Machin, S. and Murphy, R. (2017). Paying out and crowding out? The globalization of higher education. *Journal of Economic Geography*, **17** (5), 1075–1110.

McHenry, P. (2015). Immigration and the human capital of natives. *Journal of Human Resources*, **50** (1), 34–71.

Moser, P., Voena, A. and Waldinger, F. (2014). German jewish émigrés and us invention. *American Economic Review*, **104** (10), 3222–55.

OECD (2020). Education at a Glance. Accessed 09.07.2021.

Orrenius, P. M. and Zavodny, M. (2015). Does immigration affect whether US natives major in science and engineering? *Journal of Labor Economics*, **33** (S1), S79–S108.

Ottaviano, G. and Peri, G. (2012). Rethinking the Effect of Immigration on Wages. *Journal of the European Economic Association*, **10** (1), 152–197.

Patnaik, A., Wiswall, M. J. and Zafar, B. (2020). *College Majors*. Working Paper 27645, National Bureau of Economic Research.

Peri, G., Shih, K. and Sparber, C. (2015). Stem workers, h-1b visas, and productivity in us cities. *Journal of Labor Economics*, **33** (S1), S225 – S255.

— and Sparber, C. (2009). Task Specialization, Immigration, and Wages. *American Economic Journal: Applied Economics*, **1** (3), 135–69.

— and — (2011). Highly Educated Immigrants and Native Occupational Choice. *Industrial Relations: A Journal of Economy and Society*, **50** (3), 385–411.

Ransom, T. and Winters, J. V. (2020). Do Foreigners Crowd Natives out of STEM Degrees and Occupations? Evidence from the US Immigration Act of 1990. *ILR Review*.

Schweri, J. and Hartog, J. (2017). Do wage expectations predict college enrollment? Evidence from healthcare. *Journal of Economic Behavior & Organization*, **141** (C), 135–150.

Shih, K. (2017). Do international students crowd-out or cross-subsidize Americans in higher education? *Journal of Public Economics*, **156**, 170 – 184.

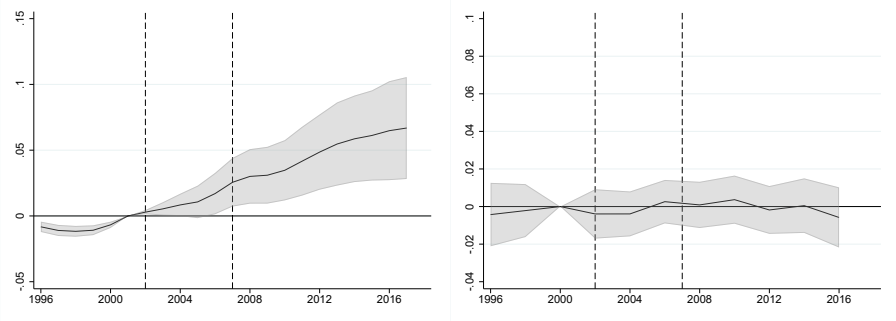
Wiswall, M. and Zafar, B. (2015). Determinants of College Major Choice: Identification using an Information Experiment. *The Review of Economic Studies*, **82** (2), 791–824.

Xia, X. (2016). Forming wage expectations through learning: Evidence from college major choices. *Journal of Economic Behavior & Organization*, **132** (PA), 176–196.

Appendix D: Figures

Figure D.1: Exposure to cross-border commuters and resident migrant workers

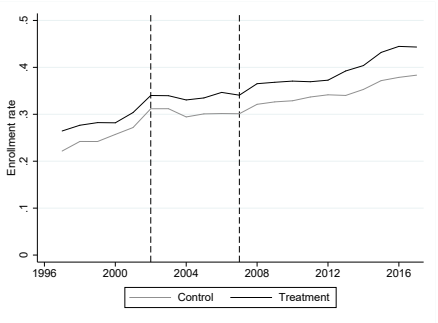
(a) Cross-border commuters **(b) Resident migrant workers**



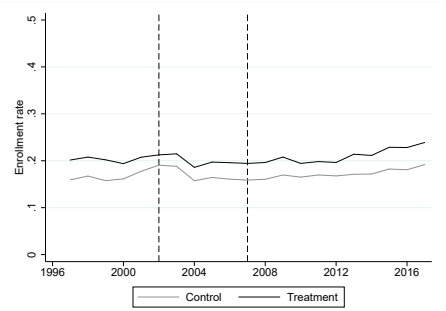
Note: The figure shows difference-in-differences estimates using annual (biennial) data at the commuting zone level for the period 1996–2017 (1996–2016) in Panel a (b). The vertical lines indicate the beginning of the transition period (2002) and the beginning of the post-reform period (2007). The dependent variable is the number of cross-border commuters divided by total employment in 1995 in Panel a and the number of resident migrant workers (excluding cross-border commuters) divided by total employment in Panel b. Weights assigned to observations equal total employment in 1995 in Panel a and total employment in 1996 in Panel b. Standard errors are clustered at the commuting zone level, 95% confidence intervals shown. Sources: FSO in Panel a and SESS in Panel b.

Figure D.2: Raw trends in native enrollment by institutional type

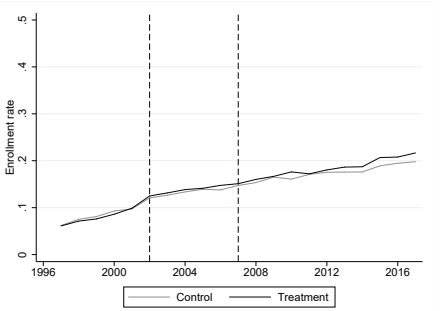
(a) All



(b) University



(c) University of Applied Sciences

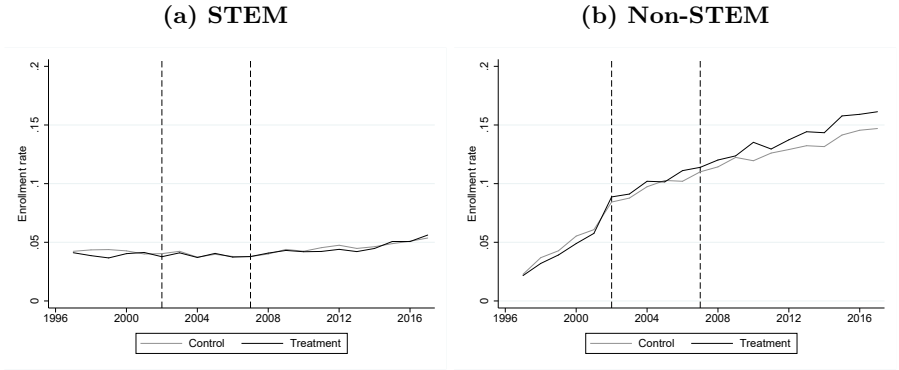


Note: The figure shows raw enrollment rates by institutional type in treatment and control regions for the period 1997–2017. The vertical lines indicate the beginning of the transition period (2002) and of the post-reform period (2007). The y-axis variable is the share of native first-year students in birth cohort. The denominator is specific to the institutional type. Source: SHIS-studex.

Figure D.3: *Ln* **number first-year native students at Universities of Applied Sciences (robustness check to outcome measure)**

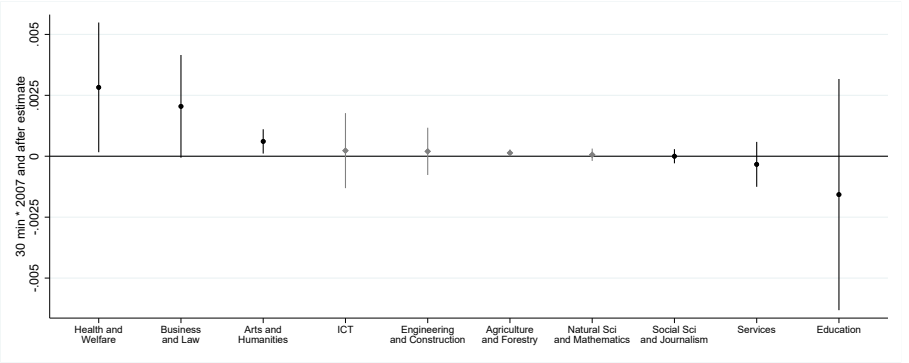
Note: The figure shows difference-in-differences estimates using annual data at the commuting zone level for the period 1997–2017. The vertical lines indicate the beginning of the transition period (2002) and of the post-reform period (2007). The dependent variable is the *ln* of native first-year students. Observations are weighed by the cohort size in 1997. Standard errors are clustered at the commuting zone level, 95% confidence intervals shown. Source: SHIS-studex.

Figure D.4: Raw trends in native enrollment by field of study at Universities of Applied Sciences



Note: The figure shows raw enrollment rates by field of study in treatment and control regions for the period 1997–2017. The vertical lines indicate the beginning of the transition period (2002) and of the post-reform period (2007). The y-axis variable is the share of native first-year students in birth cohort. Source: SHIS-studex.

Figure D.5: Native enrollment by detailed field of study at Universities of Applied Sciences



Note: The figure shows difference-in-differences estimates using annual data at the commuting zone level for the period 1997–2017. The coefficient of the "30min × 2007 and after" variable analogous to Panel C of Table 2.6 is plotted. Each estimate is obtained from a separate regression. ISCED-F 2013 classification is used for the study fields. The coefficients marked with black dots relate to non-STEM fields, and those with grey diamond markers relate to STEM fields. Observations are weighed by the cohort size in 1997. Standard errors are clustered at the commuting zone level, 95% confidence intervals shown. Source: SHIS-studex.

Appendix E: Tables

Table E.1: Exposure to cross-border commuters by educational level (robustness checks to treatment definition)

	Outcome: share of cross-border commuters			
	All	Up to lower-secondary	Upper-secondary	Tertiary
	(1)	(2)	(3)	(4)
Panel A: 25 min threshold value				
25min * 2002-2006	0.014*	-0.003	0.021**	0.013
	(0.007)	(0.009)	(0.010)	(0.009)
25min * 2007 and after	0.037***	0.017	0.049***	0.041***
	(0.014)	(0.011)	(0.018)	(0.013)
Mean outcome	0.072	0.070	0.069	0.069
Sd outcome	0.109	0.129	0.103	0.098
Commuting zones	106	106	106	106
within 25 min	28	28	28	28
N	1166	1166	1166	1160
Panel B: 35 min threshold value				
35min * 2002-2006	0.012**	-0.001	0.019**	0.006
	(0.005)	(0.007)	(0.007)	(0.006)
35min * 2007 and after	0.029***	0.012	0.040***	0.029***
	(0.010)	(0.008)	(0.014)	(0.010)
Mean outcome	0.072	0.070	0.069	0.069
Sd outcome	0.109	0.129	0.103	0.098
Commuting zones	106	106	106	106
within 35 min	41	41	41	41
N	1166	1166	1166	1160
Panel C: Continuous treatment				
Travel time * 2002-2006	0.016*	-0.003	0.026**	0.012
	(0.009)	(0.011)	(0.012)	(0.010)
Travel time * 2007 and after	0.044***	0.020	0.060***	0.048***
	(0.017)	(0.014)	(0.021)	(0.015)
Mean outcome	0.072	0.070	0.069	0.069
Sd outcome	0.109	0.129	0.103	0.098
Commuting zones	106	106	106	106
N	1166	1166	1166	1160

Note: The table shows difference-in-differences estimates using biennial data at the commuting zone level for the period 1996–2016. The continuous measure applies the function $\exp(-0.05 \times travel\ time)$. The dependent variable is the share of cross-border commuters in total employed. Observations are weighed by the total workforce in 1996. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Source: SESS.

Table E.2: Native enrollment by institutional type (robustness checks to treatment definition)

	Outcome: share of enrolled native first-year students		
	All	University	University of Applied Sciences
	(1)	(2)	(3)
Panel A: 25 min threshold value			
25min * 2002-2006	0.003	-0.005	0.007
	(0.007)	(0.005)	(0.005)
25min * 2007 and after	0.011	-0.005	0.015***
	(0.007)	(0.006)	(0.004)
Mean outcome	0.326	0.183	0.144
Sd outcome	0.089	0.072	0.050
Commuting zones	106	106	106
within 25 min	28	28	28
N	2226	2226	2226
Panel B: 35 min threshold value			
35min * 2002-2006	0.008	-0.001	0.008*
	(0.007)	(0.004)	(0.005)
35min * 2007 and after	0.020***	0.003	0.016***
	(0.007)	(0.005)	(0.005)
Mean outcome	0.326	0.183	0.144
Sd outcome	0.089	0.072	0.050
Commuting zones	106	106	106
within 35 min	41	41	41
N	2226	2226	2226
Panel C: Continuous treatment			
Travel time * 2002-2006	0.005	-0.005	0.010*
	(0.008)	(0.006)	(0.006)
Travel time * 2007 and after	0.014*	-0.004	0.017***
	(0.009)	(0.007)	(0.004)
Mean outcome	0.326	0.183	0.144
Sd outcome	0.089	0.072	0.050
Commuting zones	106	106	106
N	2226	2226	2226

Note: The table shows difference-in-differences estimates using annual data at the commuting zone level for the period 1997–2017. The continuous measure applies the function $\exp(-0.05 \times \textit{travel time})$. The dependent variable is the share of native first-year students in birth cohort. The denominator is specific to the institutional type. Observations are weighed by the cohort size in a specific institutional type in 1997. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Source: SHIS-studex.

Table E.3: Native enrollment at Universities of Applied Sciences (robustness checks)

	Outcome: share of enrolled native first-year students				
	Baseline	+ Education supply	+ Labor demand	No weights	+ Immigrant students
	(1)	(2)	(3)	(4)	(5)
30min * 2002-2006	0.003	0.003	0.003	0.007	0.002
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
30min * 2007 and after	0.011**	0.010**	0.012***	0.011**	0.010**
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)
UAS within 20km		0.008**			
		(0.003)			
Number of fields within 20km		0.001			
		(0.001)			
Bartik control			-0.038		
			(0.037)		
L Sh. immigrant students UNI					0.015
					(0.017)
L Sh. immigrant students UAS					-0.088***
					(0.016)
Mean outcome	0.144	0.144	0.144	0.141	0.144
Sd outcome	0.050	0.050	0.050	0.053	0.050
Commuting zones	106	106	106	106	106
within 30 min	35	35	35	35	35
N	2226	2226	2226	2226	2226

Note: The table shows difference-in-differences estimates using annual data at the commuting zone level for the period 1997–2017. The dependent variable is the share of native first-year students in birth cohort. The denominator is specific to the institutional type. Observations are weighed by the cohort size in a specific institutional type in 1997. Column (1) is the baseline specification from Table 2.3, columns (2) and (3) include additional control variables. We use two education supply controls – a dummy variable for an institution and the number of study fields at the ISCED level available within a 20km radius of the main city of the region. The Bartik control predicts employment growth with shares fixed in 1995. Column (4) is unweighed. Column (5) includes two additional controls for the lagged share of immigrant students from the same commuting zone. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Source: SHIS-studex.

Table E.4: Native enrollment by study field at Universities of Applied Sciences (robustness checks to treatment definition)

	Outcome: share of enrolled native first-year students			
	STEM (1)	Non-STEM (2)	Affected (3)	Non-affected (4)
Panel A: 25 min threshold value				
25min * 2002-2006	0.001	0.006	0.003	0.004
	(0.002)	(0.004)	(0.002)	(0.004)
25min * 2007 and after	0.004**	0.011***	0.006***	0.009***
	(0.002)	(0.003)	(0.002)	(0.003)
Mean outcome	0.043	0.101	0.053	0.091
Sd outcome	0.014	0.045	0.014	0.043
Commuting zones	106	106	106	106
within 25 min	28	28	28	28
N	2226	2226	2226	2226
Panel B: 35 min threshold value				
35min * 2002-2006	0.001	0.007*	0.003	0.006
	(0.002)	(0.004)	(0.002)	(0.004)
35min * 2007 and after	0.002	0.013***	0.004**	0.011***
	(0.002)	(0.004)	(0.002)	(0.004)
Mean outcome	0.043	0.101	0.053	0.091
Sd outcome	0.014	0.045	0.014	0.043
Commuting zones	106	106	106	106
within 35 min	41	41	41	41
N	2226	2226	2226	2226
Panel C: Continuous treatment				
Travel time * 2002-2006	0.002	0.008*	0.004	0.006
	(0.002)	(0.005)	(0.002)	(0.005)
Travel time * 2007 and after	0.004*	0.013***	0.006***	0.010***
	(0.002)	(0.003)	(0.002)	(0.003)
Mean outcome	0.043	0.101	0.053	0.091
Sd outcome	0.014	0.045	0.014	0.043
Commuting zones	106	106	106	106
N	2226	2226	2226	2226

Note: The table shows difference-in-differences estimates using annual data at the commuting zone level for the period 1997–2017. The continuous measure applies the function $\exp(-0.05 \times travel\ time)$. The dependent variable is the share of native first-year students in birth cohort. Observations are weighed by the cohort size in a specific study field in 1997. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Source: SHIS-studex.

Table E.5: Native enrollment in non-STEM fields at Universities of Applied Sciences (robustness checks)

	Outcome: share of enrolled native first-year students				
	Baseline	+ Education supply	+ Labor demand	No weights	+ Immigrant students
	(1)	(2)	(3)	(4)	(5)
30min * 2002-2006	0.003	0.003	0.003	0.008**	0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
30min * 2007 and after	0.010***	0.010***	0.010***	0.009***	0.010***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
UAS within 20km		0.004			
		(0.003)			
Number of fields within 20km		0.002**			
		(0.001)			
Bartik control			-0.020		
			(0.031)		
L Sh. immigrant students Non-STEM					0.015**
					(0.008)
L Sh. immigrant students STEM					0.005
					(0.010)
Mean outcome	0.101	0.101	0.101	0.096	0.101
Sd outcome	0.045	0.045	0.045	0.048	0.045
Commuting zones	106	106	106	106	106
within 30 min	35	35	35	35	35
N	2226	2226	2226	2226	2226

Note: The table shows difference-in-differences estimates using annual data at the commuting zone level for the period 1997–2017. The dependent variable is the share of native first-year students in birth cohort in non-affected fields. The denominator is specific to the institutional type. Observations are weighed by the cohort size in a specific institutional type in 1997. Column (1) is the baseline specification from Table 2.6, columns (2) and (3) include additional control variables. We use two education supply controls – a dummy variable for an institution and the number of study fields at the ISCED level available within a 20km radius of the main city of the region. The Bartik control predicts employment growth with shares fixed in 1995. Column (4) is unweighed. Column (5) includes two additional controls for the lagged share of immigrant students from the same commuting zone. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Source: SHIS-studex.

Table E.6: Native unemployment and employment rates by educational level

	Outcome: native unemployment or employment rate			
	All	Up to lower-secondary	Upper-secondary	Tertiary
	(1)	(2)	(3)	(4)
Panel A: Unemployment rate				
30min * 2002-2006	0.000	-0.025	0.004	-0.003
	(0.003)	(0.016)	(0.004)	(0.006)
30min * 2007 and after	0.003	-0.005	0.003	0.004
	(0.003)	(0.014)	(0.003)	(0.005)
Mean outcome	0.030	0.060	0.031	0.020
Sd outcome	0.020	0.079	0.024	0.024
Commuting zones	106	101	106	102
within 30 min	35	35	35	33
N	2226	2084	2226	2137
Panel B: Employment rate				
30min * 2002-2006	0.010	0.040	0.007	-0.004
	(0.008)	(0.027)	(0.010)	(0.009)
30min * 2007 and after	-0.002	-0.009	0.004	-0.005
	(0.007)	(0.023)	(0.010)	(0.012)
Mean outcome	0.776	0.459	0.788	0.907
Sd outcome	0.050	0.126	0.061	0.055
Commuting zones	106	104	106	103
within 30 min	35	35	35	34
N	2226	2168	2226	2157

Note: The table shows difference-in-differences estimates using annual data at the commuting zone level for the period 1996–2016. In Panel A, the dependent variable is the share of native unemployed in total labor force in an education category. In Panel B, the dependent variable is the share of native employed in total number of respondents in an education category. Observations are weighed by the labor force in a specific education category in Panel A and by the total number of respondents in a specific education category in Panel B in 1996. Standard errors in parentheses are clustered at the commuting zone level. * $p<0.1$; ** $p<0.05$; *** $p<0.01$. Source: SLFS.

Table E.7: Individual characteristics of native students at Universities of Applied Sciences

	Outcome: mean of individual level characteristics		
	Urban origin	German speaking origin	Female
	(1)	(2)	(3)
30min * 2002-2006	-0.003	-0.000	0.002
	(0.008)	(0.002)	(0.016)
30min * 2007 and after	-0.000	0.000	-0.010
	(0.009)	(0.001)	(0.018)
Mean outcome	0.610	0.721	0.490
Sd outcome	0.293	0.444	0.074
Commuting zones	106	106	106
within 30 min	35	35	35
N	2,224	2,224	2,224

Note: The table shows difference-in-differences estimates using annual data at the commuting zone level for the period 1997–2017. The dependent variable is the mean value of different characteristics among first-year students at Universities of Applied Sciences. Origin refers to the municipality of growing up. Municipalities are split into urban, rural or intermediate municipalities. German speaking origin refers to individuals who come from the German speaking part of Switzerland. Observations are weighed by the cohort size in 1997. Standard errors in parentheses are clustered at the commuting zone level. * $p<0.1$; ** $p<0.05$; *** $p<0.01$. Sources: FSO, SHIS-studex.

Table E.8: Graduation rates of native students at Universities of Applied Sciences and by Study Field

	Outcome: graduation rate		
	University of Applied Sciences	STEM	Non-STEM
	(1)	(2)	(3)
30min * 2002-2006	0.009	-0.003	0.025*
	(0.009)	(0.012)	(0.014)
30min * 2007 and after	0.004	-0.001	0.018
	(0.008)	(0.011)	(0.015)
Mean outcome	0.689	0.669	0.696
Sd outcome	0.298	0.298	0.305
Commuting zones	106	106	106
within 30 min	35	35	35
N	2224	2210	2208

Note: The table shows difference-in-differences estimates using annual data at the commuting zone level for the period 1997–2017. The dependent variable is the share of native first-year students who graduated within 1997–2017 relative to the number enrolled in Universities of Applied Sciences. Observations are weighed by the number enrolled in Universities of Applied Sciences in 1997. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Source: SHIS-studex.

Appendix F: Data

This appendix provides an overview of the main datasets obtained from the Swiss Federal Statistical Office (FSO) and the sample construction. We aggregate up data series available at the municipality level to commuting zones according to a concordance table provided by the FSO. We take the municipality definitions from April 2018. We use the survey weights provided where such are available.

Swiss Higher Education Information System (SHIS-studex)

The SHIS-studex dataset records all persons enrolled in tertiary education. Tertiary education includes a study at a Swiss University or Federal Institute of Technology (UNI) or at a University of Applied Sciences (UAS). Our dataset starts in 1990 for UNI and 1997 for UAS. Information on received degrees are available for UNI since 1990 and for UAS since 2000. The data on enrollment is reported yearly in the fall semester while degrees are shown by the date of graduation.

We take the following steps to build the relevant sample for our analysis. We only keep first-year students in a diploma and diploma/licentiate study before the Bologna reform and in a bachelor study in the period after because of our focus on undergraduate studies.[37] Furthermore, we take first time enrollments and disregard from subsequent decisions. The place of residence at the time of obtaining the certificate granting access to tertiary education must be in Switzerland in order to allocate students to a commuting zone. We drop non-Swiss nationals and first-year students younger than eighteen and older than thirty years (Shih, 2017). 18 years is the minimum age of entering the tertiary level when following the ordinary path of education. We exclude students above 30 years of age at entry because of our focus on Bachelor's degrees

[37] The structure of tertiary education changed after the implementation of the Bologna Agreement in 1999. The aim of this declaration was to have a European higher education area with unified rules. The system changed from a comprehensive one-tier (diploma or licentiate) to a two-tier degree structure with separate undergraduate (bachelor) and graduate (master) levels.

and due to the long time gap between obtaining the matura and enrollment. University of Applied Sciences students are on average older than University students. Thus, more of the former are dropped by this limitation (6.3% of UAS students versus 3% of UNI students). We disregard from institutions that are specialized on distance learning (Universitäre Fernstudien Schweiz and Fernfachhochschule Schweiz). To define study fields, we use the ISCED-F 2013 codes (International Standard Classification of Education: Fields of Education and Training) from the UNESCO and merge them to the Swiss-specific study field definitions based on a matching scheme provided by the FSO. Out of the available 25 ISCED 2-digit fields, we do not observe students pursuing a degree in hygiene and occupational health services, and transport services or fisheries. We further split health into health and welfare degrees. This leaves us with twenty-three categories.

Teacher education has belonged to the tertiary level since 2001. Cantons, which are responsible for this type of education, have either set up independent Universities of Teacher Education or integrated the study field into the Universities of Applied Sciences. The difference between the two types of institutions is only organizational. Throughout our study, we subsume all students enrolled in Teacher Education under UAS. This re-allocation also affects study fields at the University of Bern.

Survey of Higher Education Graduates (EHA)

The EHA survey looks at graduates with a focus on their work and educational outcomes one and five years after graduating. It is conducted every second year in autumn since 1981 and since 2009 mainly online. We have access to data from 2003 on. The first-wave survey covers the years up to 2017 while the second-wave survey goes from 2007–2017. In the first-wave all graduates from a Swiss higher education (undergraduates, graduates, PhDs) receive the questionnaire. The response rate is around 60%. Only respondents in the first-wave can participate in the second-wave four years later with a response rate of around 65%. The survey is representative at the level of study fields and institutions.

We pool all first-wave survey data from 2003 onwards to derive the mapping from study fields to occupations. Compared to the SHIS-studex dataset where we only look at first-year students in undergraduate degrees, we include master graduates as well. The reason is that the majority of bachelor students at Universities continue on to master's study. We take the sample of Swiss by nationality and with place of residence in Switzerland when obtaining the certificate granting access to tertiary education. In addition, we only keep graduates with an occupation and place of living in Switzerland at the time of the survey. We keep graduate students between 21 and 35 years of age in order to reflect the first-year students' age that we limit to 18–30 and the approximative length of a study. Since the first-wave survey is conducted one year after graduation, the respondents of interest are between 22 and 36 years. For our analysis we merge the FSO-specific study fields to the ISCED-F 2013 codes analogous to the SHIS dataset. The subject security services is part of the SHIS-studex dataset but it does not appear in the EHA. We are thus left with twenty-two categories that we use in our analysis of study field enrollment. The occupations are reported according to the ISCO-08 classification. We take a concordance table provided by the FSO to receive the older ISCO-88 occupation labels. This is a necessary step to make results comparable to the occupation data from other FSO sources, which are reported according to ISCO-88. In the Swiss context occupations in levels 1 and 2 of ISCO-08 typically require a bachelor degree or graduate level education. There are four occupations in level 1 (Chief Executives, Senior Officials and Legislators; Administrative and Commercial Managers; Production and Specialized Services Managers; Hospitality, Retail and Other Services Managers) and six occupations in level 2 (Science and Engineering Professionals; Health Professionals; Teaching Professionals; Business and Administration Professionals; Information and Communications Technology Professionals; Legal, Social and Cultural Professionals).

Swiss Earnings Structure Survey (SESS)

The SESS is conducted at the firm-level in the month of October every second year since 1994. It covers the secondary and tertiary sectors. The population includes firms with at least three employees and also the public sector (the cantonal public sector was added in 2000, the municipal public sector was added in 2006). Participation in the survey is mandatory. Companies provide information on a random subset of employees. The number of workers covered depends on the firm size, with data for at least one third of all workers. In 2016, around 37,000 firms with 1.7 million employees were surveyed. We identify cross-border commuters by their G-permit. Natives are defined as Swiss by nationality. When splitting the data by highest education attained, we disregard from professional degrees that are also considered tertiary. This is a necessary step in order to relate the relevant wage changes to the academic tertiary degrees we focus on.

We restrict the sample to employees of private sector establishments aged between 18 and 65, with available region of work, permit type, gender, education and wage. The industry classification follows the NOGA (General Classification of Economic Activity) framework. We use the standards defined in 2008 and use concordance tables for the survey years that report NOGA 2002.

We construct the gross hourly wage rate in CHF based on the variable called standardized gross wage. The gross wage includes social contributions and Sunday or night work compensation. Additionally, 1/12 of the 13th salary and other non-periodic payments are added while excluding overtime pay. This sum is divided by weekly working hours and multiplied by 40, which is the standardized number of working hours per month. We take this standardized gross wage to derive the gross hourly wage rate. Last, we calculate the real values using CPI data from the FSO that is indexed to December 2015.

We investigate wages for different education levels and types of occupations. Occupations are reported in a Swiss specific classification up to 2010 and from 2012–2016 it follows ISCO-08. For the first period, we split the occupations into STEM and non-STEM based on the broad descriptions in the

handbook.[38] Since the Swiss specific classification is not directly related to ISCO, we conduct the wage analysis by occupation only up to 2010.

Swiss Labor Force Survey (SLFS)

The SLFS is an individual-level survey. It was conducted annually in the second quarter of the year from 1991 to 2009 and quarterly afterwards. Since 2010 around 125,000 interviews are conducted yearly, whereas one person is interviewed four times within six consecutive quarters.

The SLFS covers individuals aged 15 years and older but we limit the sample to individuals in the age group 18–65. We use annual data. To construct the native employment and unemployment rates, we only keep Swiss by nationality. Definitions follow standards from the International Labor Organization. Employment is defined as employed for a salary, by a family member or self-employed. Unemployment is defined as not being employed, but searching and being available for a job. Students, retired individuals and people inactive for other reasons are considered to be out of the labor force.

[38] STEM occupations: manufacturing and processing of product; construction activities; installation, operating and maintaining; restoration, handicrafts; research and development; analysing, programming, operating; planning, constructing, drawing, and realizing. Non-STEM occupations: strategic management; accounting, personnel management; secretarial, clerical work; other commercial and administrative act; logistics, staff tasks; assessing, advising, certifying; purchase and sale of commodities and capital goods ; sale of consumer goods and retail services; transport of people and goods, communication; security and surveillance services; medical, social and care activities; personal and clothing care; educational activities; accommodation, food and domestic activities; culture, information, entertainment, sports; cleaning and public hygiene.

Chapter 3

Does Labor Protection Increase Support for Immigration? Evidence from Switzerland

Joint with Teodora Tsankova

3.1 Introduction

The number of international migrants has risen by nearly seventy percent since 1990, reaching 272 million people globally (UNPD, 2019). A small number of countries, mostly high-income, have received a disproportionately large share of immigrants. Among OECD members, the foreign population accounts for approximately nine percent of the population (OECD, 2020a). At the same time, immigration has come to the center of political debates in a number

of these countries. Anti-immigrant rhetoric dominated recent elections in the United States and several European countries, and the debates leading up to the Brexit referendum. The wide voter support that such campaigns receive is evidence of a rising concern about how foreigners are integrated into the society and the labor market of the receiving country.

In this paper, we investigate the role of labor market concerns in shaping native preferences over migration policies. Fears over deteriorating labor market conditions are a widely discussed determinant of voting outcomes on immigration issues. Labor protection offered by Collective Bargaining Agreements (CBAs) could reduce concerns because they set binding wage and working conditions for the contracting parties. We investigate how natives respond to the local presence of immigrants depending on their collective bargaining coverage. The analysis on voting outcomes is informative about the role of labor market concerns in shaping support for immigration. To understand the effect of labor protection on labor market outcomes, we further study wage and employment outcome responses to immigration at different levels of collective bargaining coverage.

Switzerland offers a favorable setting to study our research question. The share of foreigners in the population increased from 19.2% in 2000 to 24.2% in 2019. With such high levels, the country ranks second among the OECD member states (OECD, 2020a). Given the Swiss direct democracy that gives voters a say on national policies, we can measure revealed support for immigration. We focus on votes that are classified as Immigration Policy or European Foreign Policy by the Federal Statistical Office. These votes took place between 2000 and 2014. Moreover, the country ranks among the most liberal labor markets. As in other Western economies, collective agreements regulate wage and working conditions in Switzerland. The coverage rate was 40.3% in 2018 and a large proportion of the workers fall under centrally negotiated agreements that set binding conditions for an industry and region (Bundesamt für Statistik, 2019).

In our empirical analysis, we link native pro-immigration vote shares and labor market outcomes to local exposure to immigrants under different levels

of collective bargaining coverage. We use information on generally valid CBAs and employment by industry to build a regional measure of the share of workers employed in an industry with a collective agreement. Since immigrants could self-select into regions with better labor market conditions or more positive attitudes towards them, ordinary least squares estimations are likely to give biased results. To mitigate these concerns, we rely on an instrumental variable strategy that uses past settlement patterns to allocate immigrants to regions within Switzerland.

We start our analysis by comparing native skill levels to those of immigrant workers and calculate native collective bargaining coverage rates by level of skill. Immigrants are overrepresented to the left of the skill distribution and underrepresented to the right. Collective agreements set standards most relevant to low-skilled workers, such as minimum wages. We confirm that low-skilled natives are more likely to be employed in industries with a CBA than high-skilled natives. In summary, collective agreements protect labor market outcomes for the subset of natives who are likely to compete against foreign workers.

The analysis of voting outcomes reveals a negative but insignificant effect of a higher immigrant exposure on the share of pro-immigration votes. This effect varies with native educational attainment. Specifically, at the low end of the skill distribution we estimate that a rise in immigration equal to 1 percent of the native population leads to a decline in pro-immigration vote shares of 0.49 percentage points. The effect is positive at the upper end of the skill distribution. In low-skilled municipalities, the marginal effect of a rise in immigration at low coverage levels is -0.59 and at high coverage levels significantly lower (-0.33). At the upper end of the skill distribution, the response to a higher presence of immigrants depends little on the level of labor protection. Our findings are robust to various sensitivity and placebo checks.

To assess the relevance of labor market concerns as a determinant of voting behavior, we turn to native labor market outcomes. Our findings suggest that a rise in the exposure to immigration is linked to a reduction in wages of low-

to medium-skilled workers and an increase in wages of high-skilled workers. While results are not statistically significant, we find that collective bargaining agreements partially mitigate the negative wage effects for the lowest skill groups. We complement the analysis by looking at employment rates. We find on average a negative but insignificant effect of exposure to immigrants and of collective bargaining coverage. These estimates are driven by the subset of medium skilled natives, for whom we also find that negative employment effects are slightly mitigated by higher CBA coverage. Overall, we argue that the effect labor protection has on voting outcomes of the low-skilled natives is unlikely to be fully explained by changes in wages and employment. This suggests that collective bargaining agreements also improve other labor market conditions (e.g., Knepper, 2020) or alleviate concerns among the native population that cannot be directly linked to labor market outcomes.

With our analysis on voting outcomes, we contribute to the literature on attitudes towards immigration. Various determinants have been studied using social survey data with mixed evidence. Exposure to migrants could reduce prejudice as suggested by the intergroup contact theory (Allport *et al.*, 1954). Schindler and Westcott (2020) find that stated prejudice and implicit bias towards blacks is lower in regions with a higher historical presence of black American military units in the United Kingdom (UK). In contrast, Dustmann and Preston (2001) find that a high concentration of ethnic minorities can explain racial intolerance towards them again in the UK. Similarly, Card *et al.* (2012) and Tabellini (2019) argue that cultural differences are the main drivers of anti-migrant sentiment. Using Swiss data, Hainmueller and Hangartner (2013) and Diehl *et al.* (2018) find that preferences over migration policies vary with the country of origin of the migrant population. Instead of using social survey data, we rely on actual voting outcomes that show revealed preferences and focus on economic conditions as determinants of attitudes towards immigrants.

The literature has established a link between anti-migrant sentiment and economic concerns among the native population. Several studies investigate the fiscal burden of immigration and how this affects native attitudes towards

immigrants (see Dustmann and Preston, 2007; Facchini and Mayda, 2009; Alesina *et al.*, 2018). Our study focuses on the role of labor market conditions in the destination country. There is evidence that natives who are likely to compete against foreigners in the labor market hold more negative attitudes (see Scheve and Slaughter, 2001; Mayda, 2006; O'Rourke and Sinnott, 2006; Ortega and Polavieja, 2012; Pecoraro and Ruedin, 2019; Haaland and Roth, 2020). In contrast, Hainmueller *et al.* (2015) present evidence that concerns about labor market competition do not substantially affect native attitudes towards immigrants. D'Hombres and Nunziata (2016), Cavaille and Marshall (2019) and Margaryan *et al.* (2021) find that education decreases the probability of holding anti-migrant views, but that this is not driven by a labor market channel. We extend this literature by studying the effect of local immigrant exposure on preferences over immigration policies under different levels of labor protection. This link is important to understand, because it allows us to directly test the relevance of labor market concerns as a determinant of native preferences.

A growing literature links election outcomes and exposure to immigrants. Evidence from Austria (Halla *et al.*, 2017), Denmark (Dustmann *et al.*, 2019), Germany (Otto and Steinhardt, 2014), Italy (Barone *et al.*, 2016) and France (Edo *et al.*, 2019) suggests that a higher local migrant presence is associated with more votes for right-wing parties. Studies show that this can be driven by access to public housing of non-EU migrants (Cavaille and Ferwerda, 2017) or economic insecurity (Guiso *et al.*, 2017). Finally, Steinmayr (2021) finds differences between long-term and short-term interactions of natives and immigrants.

As election votes capture preferences over a variety of political issues, it is difficult to infer support for immigration using this approach. By studying outcomes of referendums directly linked to immigration policy we overcome this problem. Facchini and Steinhardt (2011) relate votes on immigration policy in the US House of Representatives to labor market concerns. Similarly to us, Brunner and Kuhn (2018) look at Swiss votes related to immigration regulation. Their results point at a sizeable increase in anti-immigration vote

shares as a response to the presence of culturally different migrants in the municipality. In contrast, our paper asks whether labor protection as measured by collective bargaining agreements can affect vote outcomes.

Union membership has received attention in the political and economics literature. A recent contribution to the former shows that union membership is associated with lower racial resentment among whites (Frymer and Grumbach, 2021). In the economics literature, the role of unions received significant attention in the 1990s among labor economists (see Card, 1996; Lemieux, 1998), and recently in the context of globalization (Slaughter, 2007) and specifically trade competition (Charles *et al.*, 2021). With respect to collective bargaining agreements, recent studies have found mixed evidence on the wage effects (Card and De La Rica, 2006; Gürtzgen, 2016) and some evidence of negative employment effects (Kahn, 2000; Magruder, 2012). Our focus is on how labor protection affects native labor market outcomes in the context of rising immigration.

In an early paper focusing on European countries, Angrist and Kugler (2003) argue that labor regulation can protect some native workers from immigrant competition, but it can also lead to worse employment outcomes. Recent work investigates the effect of immigration on labor market conditions at different levels of employment protection (D'Amuri and Peri, 2014), fixed versus indefinite term contracts (Edo, 2016) and minimum wages (Edo and Rapoport, 2019). A number of papers focus on negative employment effects of immigration under rigid wages (see Boeri and Brücker, 2005; Brücker and Jahn, 2011; Brücker *et al.*, 2014). In a meta-analysis, Foged *et al.* (forthcoming) argue that institutional differences are vital in reconciling findings from different countries. Collective bargaining, specifically, is not found to have a significant effect. We contribute to this literature by exploiting within country variation in collective bargaining coverage. Our coverage measure is based on generally valid collective bargaining agreements. It is arguably more exogenous to local economic conditions because the agreements are binding also for parties that did not participate in the bargaining process.

The literature has found mixed evidence of how immigration affects native

wages (see Borjas, 2003; Ottaviano and Peri, 2012; Dustmann *et al.*, 2016). Using a skill-cell approach and Swiss data, Gerfin and Kaiser (2010) document positive effects for low-skilled and negative effects for high-skilled natives, while Basten and Siegenthaler (2019) find no significant wage effects. Using a geographic area approach, Beerli *et al.* (2021) find positive effects of skilled immigrants on the wages of tertiary educated natives. Following a similar regional approach and the estimation strategy of Dustmann *et al.* (2012), we focus on the impact of foreigners on native wage and employment outcomes under different levels of labor protection.

3.2 Context and Data

3.2.1 Swiss Context

Migration regulation The Swiss direct democracy allows its citizens over eighteen years of age to take part in political decisions. With referendums, voters can challenge policies recently approved by the parliament and in addition can propose changes through popular initiatives.[39] Since only Swiss nationals are eligible to vote, voting outcomes reflect native preferences. Popular votes are scheduled three to four times per year and each eligible voter receives a voting booklet with details of the proposal. Media widely discusses the arguments for and against a proposal in the weeks up to the vote. Hence, we can expect that voters understand well the principles of direct democracy and have access to all relevant information to make an informed choice.

Voters approved the two major migration regulations that are currently in

[39]Constitutional amendments or accessions to supranational organizations are by default subject to a compulsory referendum. Optional referendums can challenge an act passed by parliament. A popular majority is sufficient for approval. Popular initiatives allow voters to submit proposals that will be incorporated into the federal constitution on condition that they are accepted. A sufficient condition for a popular initiative is that 100,000 signatures are collected within 18 months after having fulfilled some formalities that are confirmed by the Federal Chancellery. For comparison, a minimum of 50,000 signatures has to be collected within 100 days after the official publication of the act for an optional referendum to be called. Alternatively, a minimum of eight cantons can demand a vote. A majority of voters and a majority of cantons must vote in favor of the initiative for it to be approved. A double majority is also required for a compulsory referendum to pass.

place. They differentiate migrants on the basis of country of origin. Individuals from European Union (EU) and European Free Trade Association (EFTA) countries face preferential treatment relative to third-country nationals. The Agreement on the Free Movement of Persons (AFMP) was negotiated as a part of a set of bilateral agreements. Initially it applied to workers from EU-15/EFTA member states and was later extended to new EU members.[40] For example, EU-15/EFTA members have enjoyed unconditional free movement of persons since 2014. In contrast, immigration of non-EU/EFTA workers is strictly regulated. Rules are guided by the Federal Act on Foreign Nationals and Integration that came into force in January 2008. Quotas for working permits are decided on an annual basis by the Federal Government. Prerequisites for such a permit include a high skill level, non-violation of the local priority requirement, and wage and working conditions that correspond to local and professional standards to prevent wage dumping.[41]

According to data from the Swiss State Secretariat of Migration (SEM), the number of foreign residents in Switzerland rose by more than 53% between 2000 and 2018 to above 25% of the population. This observed rise in immigration is largely driven by individuals from EU/EFTA countries. They accounted for 69% of all immigrants at the end of the period. There are significant differences in motives for migration among the EU/EFTA and third-country nationals. In 2018 64.7% of EU/EFTA nationals entered for employment reasons and only 22.8% for family reasons. In contrast, 10% of the inflow of non-EU/EFTA nationals in the same year came for reasons of employment, while 47.3% of them entered for family reunification. This can be linked to the policies in place which make it difficult for non-EU/EFTA nationals to acquire a working permit.

[40] EU-15 member states are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom; EFTA are Iceland, Liechtenstein and Norway.

[41] High-skilled people are defined as tertiary educated with several years of professional experience as a manager or a specialist. To fulfil the local priority requirement employers need to present a proof that there are no other suitable Swiss or EU/EFTA candidates available for the specific position.

Collective bargaining The Swiss labor market is considered relatively unregulated – in 2019 it ranked 32 out of 37 countries according to the employment protection legislation index of the OECD where the US is ranked most liberal (OECD, 2020b). Switzerland has no national minimum wage and also had no cantonal minimum wages up to 2017. Collective Bargaining Agreements (CBA) are a widespread tool for setting working conditions in North America and in most of Europe including Switzerland.[42] These are fixed-term contracts with normative provisions such as the beginning and termination of a work contract, wages, working hours, holidays and wage eligibility during sickness, motherhood and military service. Where the law defines minimum requirements, a CBA may only offer better terms for the employees. Clauses such as those on minimum wages are updated regularly. Conditions are binding for the contracting parties, which are the involved employers and employees. Firms can decide to apply CBAs to unionized and non-unionized workers, while extension mechanisms can make the conditions generally valid for a whole occupation or industry within a geographical area.

According to the Survey on Collective Labour Agreements, the number of employees in Switzerland who are covered rose from 1.27 million to 1.98 million between 1999 and 2014 (Bundesamt für Statistik, 2019).[43] In the end of the period around 41% of all employed were covered, of which 87% were covered by agreements with minimum wage clauses. The increase in CBA coverage was due to unions starting new campaigns, in particular in the low-paid service industries, public sector firms becoming eligible for collective bargaining and political discussions related to the free movement of workers (Lampart and Kopp, 2013). The AFMP, specifically, was predicted to significantly increase the inflow of EU/EFTA workers with potentially negative implications on natives' labor market conditions.

Since 1956 it is possible to declare an existing CBA generally valid. The procedure starts with a written request from the contracting parties. A prerequisite for an agreement to be declared generally valid is that it is signed

[42] See the overview on the website of the OECD.

[43] While the number of those covered includes employers as well as employees, we consider the former as insignificant.

by an employer association. A sufficient number of workers and firms must be covered by the existing CBA to extend its validity to everyone in the industry or occupation within some geographical area.[44] Although only a small share of all CBAs are generally valid, they account for 50% of all the workers covered in 2014. The total number of such agreements rose from 31 in 2001 to 73 in 2014, and the number of workers covered increased by roughly 140% (Bundesamt für Statistik, 2019). Generally valid CBAs are negotiated at the cantonal or national level, where regions or cantons can be excluded. In comparison, our unit of observation is smaller, which offers advantages for identification purposes.

3.2.2 Data

We use a combination of administrative data and large-scale surveys for the period 2000–2014.

Voting outcomes The Federal Statistical Office (FSO) classifies votes by topic. We look at the set of votes that relate to immigration policy and European foreign policy. For a list of votes with more details see Table H.2 and the Data Appendix. The eleven votes we focus on took place in the period 2000–2014. Specifically, we cover seven votes on European foreign policy. Five of them are optional referenda and are directly related to the AFMP. The two others are popular initiatives and proposed joining the EU and restricting immigration in violation of the AFMP, respectively. The four votes on immigration policy consist of two popular initiatives, an optional referendum, and a counter-proposal from the Federal Government to one of the initiatives. All of them proposed the introduction of stricter measures. We use information on participation and acceptance rates at the municipality level.[45] In line with

[44] The following conditions defined by law must be fulfilled for an agreement to be declared generally valid: (1) necessity; (2) non-infringement of general interest and minority interests considered; (3) quorum conditions – more than half of the employers being covered by the generally valid CBA must be part of the current CBA; more than half of the employees being covered by the generally valid CBA must be part of the current CBA; the employers involved in the current CBA must employ more than half of the employees that will be covered under the generally valid CBA.

[45] Out of the 2,222 municipalities in 2018, seven do not have their own voting office leaving us with a sample of 2,215 municipalities.

Brunner and Kuhn (2018) in the Swiss context and Brey (2021) in the US context, we classify proposals as pro- or anti-immigration based on implications for aggregate immigration levels.

We supplement these data with information from the Vox Survey (Vox Survey, 2019). This is a post-vote telephone survey covering eligible voters. We restrict the sample to the eleven votes used in our main analysis. The questionnaire asks whether and how respondents voted in a specific vote, about demographic characteristics and income, and contains a set of attitudinal questions. We link self-reported voting behavior to stated attitudes towards foreigners in the country.

Labor market outcomes The Swiss Earnings Structure Survey (SESS) is a large-scale firm survey conducted biennially. It is a repeated cross-section of firms covering the secondary and tertiary sectors of the economy. Respondents provide information about a random subset of employees. The number of workers covered depends on firm size, with information available for at least one third of all workers. At the firm level there is information about the commuting zone where the firm is located, industry, and size. The SESS has information on the gross hourly wages of individual workers and their educational attainment. The data allow us to distinguish between native and foreign workers, and, within the latter group, between foreigners with different types of permits. We limit the sample to employees 18–65 years of age, working in private sector enterprises, with available region of work and permit type as well as gender. We collapse the employee-level data at the regional level. Our main outcome of interest is the hourly wage by skill level where we proxy skill with percentiles of the native wage distribution (see Dustmann *et al.*, 2012) and educational attainment. We differentiate between three skill levels based on highest education attained – at most up to lower-secondary, upper-secondary, and tertiary education.

While the SESS covers only employed individuals, the Swiss Labor Force Survey (SLFS) includes individuals aged 15 years and older. Quarterly and yearly information about municipality of residence, demographic characteristics such as sex, age and marital status, educational attainment and employ-

ment is available for the household head. We limit the sample to individuals in the age group 18–65. Employment is defined as being employed for a salary, being employed by a family member or being self-employed. The main outcome of interest is the native employment rate in a region – the number of employed relative to population 18–65 years of age. We use yearly data and construct outcomes by educational attainment defined as in the analysis of wage outcomes.

Immigration We use administrative data from the Swiss Central Migration Information System (ZEMIS). Among immigrants, we use information on individuals with short-term (L), resident (B) and settled status permit (C). Individuals are covered if they had been resident in the country on December 31. The database offers information on the stock of migrants by country of citizenship, permit type, gender, age and civil status. To calculate local exposure to immigrants, we combine the data with information from the FSO on population size at the municipality level r. We divide the number of immigrants by the native population, both measured at the end of the previous year.

$$m_{rt} = \frac{nr\ immigrants_{r,t}}{nr\ natives_{r,t}}$$

Collective bargaining The State Secretariat of Economic Affairs (SECO) provides a list of the universe of generally valid agreements from June 2000 onwards. Based on this raw information, we construct a database that shows for each CBA the name, the period when it was in force, its geographic coverage, and the 3-digit NOGA-08 industry. We restrict the sample to CBAs with clauses on wage and working conditions. CBAs with a specific purpose like regulating retirement or further education are excluded. Due to missing employment data for the primary sector, we exclude the one CBA that falls within this sector. Table H.3 gives an overview of the generally valid CBAs in 2014 and the 2-digit NOGA industry into which they fall. We proxy the share of workers employed in an industry with a CBA by combining information on coverage and employment.

$$Sh\,CBA\,Cov_{r,t} = \sum_{i=1}^{I} Sh\,Empl_{i,r,t} \times 1\{CBA_{r,i,t} = 1\}$$

A region is indicated with r, t is year, i is industry at the 3-digit NOGA-08 level, and I the total number of such industries (259). The first term on the right-hand side is the share of employees in region r that work in industry i in t. We combine two data sources to construct this variable – native employment by industry in 1995 and annual growth rates in total employment at the country level. The employment data from 1995 covers all firms and is available at the municipality level and for 4-digit NOGA industries. For the yearly variation, we use a survey that has been conducted quarterly since 1991 for 2-digit NOGA industries at the country level. It includes employees in the second and third sectors only. The second term in the equation is a dummy variable equal to one if there is a generally valid CBA in region r industry i and year t.

3.3 Empirical Strategy and Trends

3.3.1 Empirical Strategy

We are interested in how regional exposure to immigrants affects views on immigration policies and labor market outcomes. Our main contribution is to investigate whether these effects depend on the level of collective bargaining coverage. The empirical analysis builds on the following two regression equations.

$$y_{r,t} = \alpha_1 m_{r,t} + \alpha_2 Sh\,CBA\,Cov_{r,t} + \mathbf{X}'_{r,t}\gamma + \delta_r + \delta_t + \varepsilon_{r,t} \tag{3.1}$$

$$\begin{aligned} y_{r,t} =& \alpha_1 m_{r,t} + \alpha_2 Sh\,CBA\,Cov_{r,t} + \alpha_3 m_{r,t} \times Sh\,CBA\,Cov_{r,t} \\ &+ \mathbf{X}'_{r,t}\gamma + \delta_r + \delta_t + \varepsilon_{r,t} \end{aligned} \tag{3.2}$$

Region r and year t define the unit of observation. In the analysis of voting outcomes r stands for municipality. Municipalities are the smallest adminis-

trative units with a total of 2,215.[46] Their large number makes them attractive for the analysis of voting outcomes in the absence of individual-level data. In the labor market analysis, the geographical unit is the commuting zone or MS-region.[47] A commuting zone – 106 in total – consists of municipalities that are spatially similar, so obey the principles of small-scale labor market areas.

Outcome variables $y_{r,t}$ measure the share of pro-immigration votes, the natural log of gross hourly native wages and the native employment rate. The latter two outcomes are analysed by educational attainment. Wage effects are additionally estimated separately for each fifth percentile of the native wage distribution following Dustmann *et al.* (2012). Our main independent variables measure the migrant exposure $m_{r,t}$ and the level of CBA coverage $Sh\,CBA\,Cov_{r,t}$. We subtract the sample means from these two independent variables. The coefficient of interest is α_3 in Equation 3.2 that shows the effect of exposure to immigrants in regions with different CBA coverage levels.

The vector with control variables $\mathbf{X}_{r,t}$ contains information on gender, average age, and highest educational attainment. In the voting analysis, age and education are based on the 2000 census and interacted with a year variable. In the labor market analysis, the controls refer to time-varying native characteristics from the SESS and SLFS, respectively (for an overview of control variables see Table H.1). We include region fixed effects, referendum fixed effects in the voting analysis, and year fixed effects in the labor market analysis. Standard errors are clustered at the regional level.

We study the effect of local exposure to immigrants. The place of work and residence of immigrants likely depends on labor market conditions as well as native attitudes towards foreigners and is, therefore, not random. If immigrants select into places with higher wages or with a more immigrant-friendly community, it would result in a positive bias. To address this, we follow an instrumental variable approach where we create a shift-share instrument for immigration exposure (see Altonji and Card, 1991; Card, 2001). We fix the share of immigrants with nationality n across regions r in 1997, and use the stock of immigrants M by nationality n in year t as the yearly shift. To

[46] There are 2,222 municipalities in 2018, but seven do not have an own voting office.
[47] MS comes from the French "mobilité spatiale".

further mitigate endogeneity issues, we calculate the yearly shift as a leave-one-out variable dropping the number of immigrants residing in the own region r.[48]

$$\overline{M}_{r,t} = \sum_{n=1}^{N} Sh\,migr_{n,r,1996} \times M_{n,-r,t}$$

This identification strategy has been widely applied in the migration literature. The intuition is that past immigration can predict the location choice of newly arriving migrants. The key assumption is that past immigration is uncorrelated with current demand shocks. It is challenging to confirm the validity of this assumption and we therefore conduct several tests that have been proposed in recent papers.

In the migration context, Jaeger *et al.* (2018) argue that estimates based on a shift-share instrumental variable are likely positively biased as they reflect dynamic adjustments of economic conditions to previous migration waves. We consider this less of a concern for a number of reasons. First, the origin composition of migrants changed substantially over our observation period.[49] Second, we document negative wage effects for natives in skill groups affected by immigration, which is unlikely under dynamic adjustments to past migration. Third, our first stage F-statistics is around $39-44$ in the voting analysis and around $9-10$ in the wage analysis. This suggests that migrant destinations by origin in the past are far from perfect predictors of future flows, enhancing external validity.

[48] We divide the countries into fifteen groups following Dustmann *et al.* (2012). First, we take the eight countries that have the largest change in stock of migrants in Switzerland between 2000 and 2014 as separate units. These are Germany, Portugal, France, United Kingdom, the former Yugoslavia, Poland, Czechoslovakia, and Italy. Second, we group the remaining countries by geographic area. These are Latin America, North America, Africa, Asia, Oceania, Other Europe, and Unknown. Note that using all 160 countries as separate units in the construction of the instrument lowers the first stage F-statistics but leads to consistent results.

[49] The correlation between changes in immigrant stock by country from 1990 to 2000 and 2000 to 2010 is 0.11 and not significant. The correlation between changes from 1980 to 1990 and 1990 to 2000 is 0.86, indicating that the origin composition of immigrants remained very similar over the period.

Other studies raise general concerns with the use of a shift-share type of instrument (see Goldsmith-Pinkham *et al.*, 2020; Borusyak *et al.*, 2021). The underlying variation in our instrument comes from fifteen countries or country groups over a period of fifteen years. Following the literature, we compute the Rotemberg weight (RW) for each country. Estimates tend to be sensitive to misspecification for origins which receive high weights. We exclude the three countries with the highest weights in each analysis when constructing the instrumental variable in a robustness check and results are shown to be robust (available upon request).[50] Another source of endogeneity could be the time-varying denominator due to naturalizations or native regional outflows. In a robustness check, we show that results are robust when using a time invariant denominator with data from 2000.

Generally valid CBAs are attractive for identification purposes as they are binding for an industry within some geographical area. All employees are covered independent of their union membership, and firms cannot select out. Moreover, our geographic unit is smaller (municipality) or differently defined (commuting zones) than the level at which generally valid CBAs are negotiated. These aspects mitigate endogeneity issues compared to firm-level CBAs (Fanfani, 2019). Since our main interest is in the interaction between exposure to immigrants and CBA coverage, endogeneity can arise if immigrants favor work locations that are CBA-covered. The correlation between the change in the CBA coverage and the share of immigrants in the period 2000–2014 is 0.15 and not significant. This shows no evidence that the interacted specification suffers from an endogeneity problem.

3.3.2 Summary Statistics and Stylized Facts

Table 3.1 shows summary statistics for the main variables of interest over the period 2000–2014.

Voting outcomes across the individual votes, as measured by the share of

[50]The three origins receiving the highest positive weights in the analysis of voting outcomes are Portugal, Germany, and Asia. The three origins in the analysis of the wage and employment outcomes are Germany, Portugal, and France.

pro-immigration votes, are summarized first. There is substantial variation in outcomes and some proposals faced considerably higher voter approval than others. For example, the Bilateral Agreements with the EU, which is the first vote we consider (a pro-immigration proposal), was approved by a clear majority of voters. The vote on the Federal Law on Foreign Nationals which took place in 2006 (an anti-immigration proposal) also had wide voter support. In contrast, the initiative "Yes to Europe" that proposed joining the EU (a pro-immigration proposal) was rejected by around 77%. Additionally, there is considerable variation across municipalities for each of the votes included.

Wage and employment outcomes for native workers at the commuting zone level are presented next. The mean log gross hourly wage received by native workers is 3.6 (35 CHF in levels). There is a large wage premium to upper-secondary but particularly to tertiary education. For the average region, a low-skilled worker earns a gross hourly wage of about 28 CHF and a high-skilled worker approximately 48 CHF.[51] The average native employment rate is 77.6% and varies widely across skill groups. Among lower-secondary educated individuals it is 45.1% and among tertiary educated 90.9%.

Educational qualifications are not always comparable across countries. In addition, skills acquired abroad may not be perfectly transferable and, thus, be discounted. Wages allow an alternative view on how education is valued on the labor market. Figure 3.1a follows Dustmann *et al.* (2012) and plots the share of migrants along the native wage distribution. The horizontal line at 1% is a natural point of comparison as it represents the equal split of natives along own wage distribution. The graph shows that migrants are overrepresented up to the fortieth percentile of the income distribution. Overall, this evidence suggests that low- to medium-skilled natives face the strongest labor market competition with foreign workers.[52] This is confirmed by Figure G.1a which plots the share of native and migrant workers by educational attainment.

The share of native workers covered by a generally valid CBA is 17.9%.

[51] The exchange rate USD/CHF is approximately 0.95 (November, 2021).

[52] We plot the density of migrants along the native wage distribution by aggregate labor market regions to visually test the homogeneity of the relative density across the sixteen regions (see assumptions in Dustmann *et al.*, 2012). A visual check when pooling data over all years shows that the patterns in the regions are similar.

Given the objective of CBAs and the industries in which they fall, we expect that agreements apply in particular to workers with low levels of skills. Figure 3.1b shows that the share of covered workers is higher at lower percentiles of the wage distribution in 2000 and 2014. Therefore, coverage level drops as skill level rises. Figure G.1b offers similar evidence when proxying skill with educational attainment – it is among the tertiary educated that coverage is lowest. As in most agreements managers are explicitly excluded, coverage for the high-skilled workers is likely to be overestimated by simply looking at industry of employment.

3.4 Results

3.4.1 Votes and Preferences

Our proxy for support for immigration comes from vote outcomes in contrast to the majority of studies that use survey responses. The benefit of votes is that they show revealed rather than stated preferences. A potential concern with vote outcomes could be that they do not represent the preferences of the population because of participation rates of around 50% of eligible voters. Although abstention in single votes can be large, the share of permanent abstainers is estimated to be only between ten and twenty percent in the Swiss context (Sciarini *et al.*, 2016).

To compare voting outcomes with general immigration preferences, we rely on the Vox survey data. Respondents are asked whether they would prefer a Switzerland (1) that gives equal opportunities to foreigners or better chances for the Swiss; (2) that is more open to the outside or more closed. In Table H.4 we test if reported voting behavior and attitudes are correlated after controlling for individual-level attributes. All regressions include place of residence and referendum fixed effects.[53] Consistently, respondents who state that they are in favor of equal opportunities for foreigners and an open Switzerland are found to be more likely to cast a pro-immigration vote. This is suggestive evidence

[53] Note that place of residence is defined based on a separate classification with sixty-four categories, referred to as agglomerations.

that voting behavior is representative of general attitudes towards migrants.

3.4.2 Immigrant Exposure and Native Voting Behavior

We are motivated by a conceptual framework in which labor market concerns affect support for immigration (see Scheve and Slaughter, 2001). Given that immigrants are overrepresented at the lower end of the skill distribution, we expect that labor market concerns are especially relevant to low-skilled natives. Below we test whether such concerns lead to negative voting behavior.

Table 3.2 presents estimates of the impact of a higher immigrant exposure on the share of pro-immigration votes from Ordinary Least Squares (OLS) in Panel A and Instrumental Variable (IV) regressions in Panel B. The first stage is reported in columns (1) and (4) and is strong, with a Kleibergen-Paap F-statistic of 44.2 and 38.5 in columns (2) and (5) respectively.[54] Estimates in these two columns and both panels show that exposure to immigrants has, on average, a negative but insignificant impact on the voting behavior of natives.

We modify Equation 3.1 to allow for the direct effect of migrants to depend on native skill levels. We proxy the share of skilled voters using the proportion of upper-secondary or higher educated natives based on 2000 census data. We divide municipalities into three groups corresponding to the terciles of the native skill distribution. The share of individuals with at least an upper-secondary education is less than 65% in the bottom tercile and above 72% at the top of the distribution. There are important differences between municipalities in the three skill groups. Municipalities in the lowest tercile vote pro-immigration less often (44.2%) than those in the third tercile (54.7%). The share of immigrants in the bottom tercile is 16.0% and in the top one 29.7%. Moreover, the share that is CBA-covered decreases with the skill level in the

[54]Note that the most recent literature on the first stage F-statistic suggests a threshold of around 100 for reliable inference (Lee *et al.*, 2020). Alternatively, an F-statistic of 38.453 as in our preferred specification in column (5) demands an adjustment of the critical value for 5% significance of 1.143, which is relatively small. To account for clustering, we report the effective F-statistic and the 5% critical values in our specifications with one endogenous regressor following Olea and Pflueger (2013). Critical values are lower when accepting higher biases. Finally, we also report the ninety percent Anderson-Rubin confidence intervals in the table footnotes, which are applicable in the multiple endogenous variables specifications with heteroscedastic standard errors. Overall, we confirm that our instrument is strong.

population – coverage level is 26.9% in the first tercile and 16.2% at the third tercile.

In columns (3) and (6) of Table 3.2 we present results from an augmented specification where we interact exposure to immigrants with the top two terciles of the native skill distribution. Estimates without controls remain statistically insignificant, as reported in column (3). Adding controls in column (6) increases significance levels and it becomes evident that as the average skill level in a municipality rises, the response to immigration becomes more positive. A comparison between the two specifications shows that IV estimates of the immigration exposure are more pronounced – they are more negative in lower skilled municipalities and more positive in higher skilled municipalities. In our preferred specification in column (6), an increase in the number of immigrants equal to 1 percent of the native population decreases the share of pro-immigration votes by 0.33 percentage points in the bottom tercile. At the top of the distribution, the effect is positive but insignificant. In Panel A columns (1) and (2) of Table H.5 we present estimates from a regression with a fixed denominator of the migrant exposure measure. Results are overall robust and confirm that educational attainment shapes how natives respond to higher immigrant exposure.

The estimated responses to higher immigrant exposure are consistent with a labor market channel where natives who compete against migrants are less in favor of immigration. However, education is likely to affect support for immigration through a number of channels. Specifically, it is argued to directly promote tolerance and improve knowledge and appreciation of foreign cultures (see Hainmueller and Hopkins, 2014). Additionally, competition for public goods and services could affect low-skilled natives in particular if they are more likely to use them. If labor protection raises support for immigration among the natives who it aims to protect, we consider this as evidence that labor market concerns shape preferences over migration policies. Therefore, our main focus of analysis is on how immigrant presence interacts with collective bargaining coverage in determining vote outcomes.

3.4.3 Collective Bargaining and Native Voting Behavior

In the analysis of collective bargaining coverage, we follow Equation 3.2 and introduce triple interaction terms between the exposure to migrants measure, the terciles of the native skill distribution and the share CBA-covered. Panel A of Table 3.3 shows OLS regressions and Panel B the instrumented specification. The first stage F-statistic drops but is still between 11 and 13, depending on the controls.[55] In line with our hypothesis, we observe that it is in municipalities with low levels of native educational attainment that CBAs raise pro-immigration vote shares. Results are qualitatively similar in the OLS and IV regressions, while being more significant in the latter. They are also not driven by municipalities with coverage levels in the lowest or highest decile of the coverage distribution according to an unreported robustness check.

In Figure 3.2 we plot the estimates from column (2) in Panel B. The y-axis shows the marginal effect of a higher foreigner share on vote outcomes. Figure (a) shows the marginal effects at the mean value of coverage which is 19.4%. At mean values, a rise in immigration equal to 1 percent leads to a decline in pro-immigration vote shares of -0.49 percentage points in municipalities with low native educational attainment. Figure (b) calculates the marginal effects at low (tenth percentile, i.e., around ten percent coverage) and high (ninetieth percentile, i.e., around thirty-five percent coverage) levels of coverage. In low-skilled municipalities, a 1 percent rise in immigration decreases pro-immigration vote shares with 0.59 percentage points under low coverage. At high levels of coverage, the magnitude is smaller (-0.33). Using a continuous measure of skill instead of its terciles gives results which are qualitatively similar (see Figure G.2a). Results in the last column of Panel A in Table H.5 with a fixed denominator of the migrant exposure measure also confirm the baseline findings.

We conduct our analysis at the municipality level, which relates to the place of living of voters. Its advantage is the high number of units compared to more aggregated geographic regions. Since voters do not necessarily work in

[55] In the footnotes of Table 3.3 we report the ninety percent Anderson-Rubin confidence intervals for the newly introduced interaction terms. Estimates are consistently significant.

the municipality they live in, the CBA coverage at the place of residence is only a proxy for the effective coverage. By construction, generally valid agreements cover an industry in several municipalities in the same region, so local coverage correlates with coverage in nearby areas. Low-skilled occupations, which are typically the ones covered by CBAs, are more likely to be locally available than skilled jobs. Therefore, labor protection in the municipality of residence is likely to be applicable to the type of workers who are the focus of the study. To alleviate remaining concerns, we run the analysis at the commuting zone level and report the IV results in Panel B of Table H.5. The first stage F-statistic and overall significance levels tend to decline with a lower number of observations. In line with our baseline results, we observe that a higher level of labor market protection increases support for immigration in commuting zones where the native population is relatively low-skilled.

The baseline set of votes can be categorized into immigration policy votes and European foreign policy votes. We conduct the analysis separately for the two sets of votes and present results in Table H.6. Columns (1)–(3) show that our results are driven by the first set of votes which are more directly targeted towards issues relating to immigrants only. The European foreign policy votes, in contrast, are linked to other political aspects besides immigration. In Table H.7 we conduct five placebo tests by using groups of votes that are not related to immigration or labor market topics. Results confirm that the interaction terms between immigrant exposure, native skill level and CBA coverage are not significant, suggesting that our main results are consistent with attitudes towards immigrants being driven by labor market concerns rather than spurious correlations between our right-hand side variables.

In Table H.8 we study participation rates as an outcome of interest. The focus is on our preferred IV specification with controls. Estimates in columns (1) to (2) show that higher immigrant exposure does not affect turnout significantly, regardless of the skill level of the native population. CBA coverage has a negative effect on participation, and the last column presents evidence that the marginal effect of higher immigration by skill level depends on the level of labor protection. This matters for municipalities with relatively low-

skilled natives where the effect of higher immigrant exposure on participation is negative at low and insignificant at high coverage rates. In municipalities with lower labor market protection, a rise in immigration may disincentivize natives who intend to cast a pro-immigration vote from actually voting.

We have provided evidence that labor protection is linked to a more positive response to immigration in the subset of municipalities with a relatively low skill level and argue that this points to individual labor market concerns shaping voting behavior. In the next section we test how native labor market outcomes respond to immigration and whether this response depends on the extent to which native workers are covered by collective agreements.

3.4.4 Labor Market Analysis

In the analysis of wage outcomes, we follow Dustmann *et al.* (2012) and proxy returns to skill with percentiles of the native wage distribution. We first examine how native wages respond to migrant exposure. Table 3.4 presents estimates at the 50th, 5th, 10th and 95th percentiles. While results are largely statistically insignificant, the coefficients of the immigrant exposure measure are negative for the lower skill levels and positive for the 95th percentile regression. Including control variables changes the estimates only marginally. IV estimates are more pronounced in magnitude than those from OLS regressions. The first stage KP F-statistic is around 10 and potentially points to a weak instrument problem.[56] In Table 3.4 we also show that CBA coverage is not significant, but a higher coverage tends to have a positive effect on wages at the lower percentiles and a negative effect on the 95th percentile. This is suggestive evidence that CBA coverage reduces wage dispersion (Cardoso and Portugal, 2005).

Results in Panel A of Table H.9 are based on the specification with a fixed denominator of the migrant exposure measure. The pattern of the estimates is consistent with our baseline, but estimates become statistically significant for the 5th and 10th percentiles. Moreover, the positive coefficient on the

[56] The same conclusion is reached when looking at the effective F-statistic and its critical values following Olea and Pflueger (2013).

CBA coverage measure turns marginally significant for the 5th and 10th percentiles. In another robustness check, we run the analysis using educational attainment as a proxy for skill in Panel A of Table H.10. Coefficient signs are consistent with the results from the baseline specification while the immigration exposure coefficient is only statistically significant for individuals with an upper-secondary education.

We next test whether the magnitude of the wage effects depends on the level of labor protection in Table 3.5. Panels A and B report OLS estimates, while Panels C and D report IV results. In the IV specification with controls, the estimates of the interaction term are marginally insignificant with a p-value of 0.104 for the 5th percentile and 0.123 for the 10th percentile of the wage outcome. Figure 3.3a shows the marginal effect of an increase in immigration at every 5th percentile of the native wage distribution at mean values of coverage. Overall, differences in magnitude by skill levels are consistent with the distribution in Figure 3.1a where immigrants are overrepresented on the left side of the skill distribution and underrepresented to the right. In Figure 3.3b we show how wages respond to immigration under low and high levels of coverage. To the left of the wage distribution, the negative effect of a higher immigrant exposure is smaller under a higher level of collective bargaining coverage. Differences between coverage levels are small at all percentiles. To the right of the distribution, the level of coverage is not relevant.

The results with the fixed denominator are presented in Panel B of Table H.9. The interaction term is positive and statistically significant at the five percent level at the 5th and 10th percentiles. We conclude that estimates from our baseline specification tend to be conservative compared to the fixed denominator specification. In a further robustness check in Panel B of Table H.10, we run the analysis using educational attainment as a proxy for skill. Estimates for the interaction term are statistically insignificant. This analysis suggests that the three education categories are too broad to identify how labor protection changes the effect of immigration on wages.

Wage effects are of first-order interest given that we focus on CBAs with minimum wage regulation. However, evidence shows that collective bargain-

ing agreements can have negative employment effects because of the downward wage rigidities that they introduce (e.g., Card, 1990; Martins, 2021). In Table 3.6 we investigate effects on the employment rate. Our most stringent specification in which we instrument for migrant presence and include the full set of controls (see Panel D) shows an insignificant negative overall effect of the share of immigrants. We do not find evidence that immigration and labor protection negatively affect native employment for the lowest skilled. Estimates show, however, that an increase in CBA coverage decreases the employment rate of workers with an upper-secondary education. Table 3.7 shows that collective agreements mitigate the negative employment effects of immigration for natives in this education group. The findings from the analysis on the employment rate are broadly in line with those from an unreported analysis on the unemployment rate. In summary, the evidence does not show that labor protection mitigates the negative wage effect of immigration at the expense of employment for the lowest skilled. Overall, we are unable to rule out the possibility that collective agreements improve labor market conditions beyond wages and employment conditions (Knepper, 2020), and that such additional factors play a role in explaining the higher voter support we observe.

3.5 Conclusion

In this paper, we examine how exposure to migrants affects native support for immigration and we look at labor market outcomes to better understand underlying mechanisms. Our results show that support for looser immigration regulation of lower skilled natives declines as immigration rises. This negative effect is smaller under a higher level of labor protection. We find some evidence that this finding is consistent with how native wages respond to rising immigration under different levels of collective bargaining coverage. Overall, our study suggests that labor protection affects vote outcomes by improving, in addition, other labor market conditions or by alleviating existing fears among the native population. This study contributes to a debate on determinants of attitudes towards foreigners. Importantly, our findings have implications for

the design of policies to alleviate economic concerns arising from immigration.

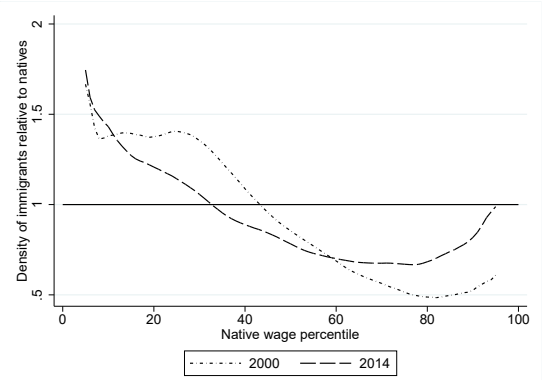
The need for social protection in the broader context of globalization has been emphasized in the literature (Rodrik, 1997). We add to the discussion of policies which affect attitudes towards immigration by assessing the role of labor market protection. In Switzerland, parental union organizations recommended a vote in favor of the Agreement on the Free Movement of Persons, as its accompanying measures were deemed sufficient to protect working conditions. These measures came into force in 2004, and include systematic wage controls to prevent abusive wage undercutting as well as sanctions for breaching the rules. There are also controls to enforce compliance with the CBA clauses. Other countries, such as Austria, have similarly introduced supporting measures to strengthen the enforcement of labor protection at the same time as removing restrictions on immigration. The general policy lesson of our findings is that setting common labor market standards within industries and enforcing them effectively raises support for immigration.

Our labor market results measure short-term effects. Capital adjustments, and incentives to switch occupations and acquire more skills likely offset any short-term effects of migrant inflows. Conversely, labor market regulations could slow down such adjustments and, thus, affect long-term native wage and employment outcomes. For example, D'Amuri and Peri (2014) provide evidence that natives are less likely to switch their occupations following an immigrant inflow if employment regulation is stricter. If such adjustments occur in the longer run, the evidence offered in this study is not indicative of how CBAs affect labor market outcomes after markets have adjusted. Thus, any policy recommendation needs to consider the trade-off between immediate outcomes and frictions that could slow down long-term labor market adjustments in particular.

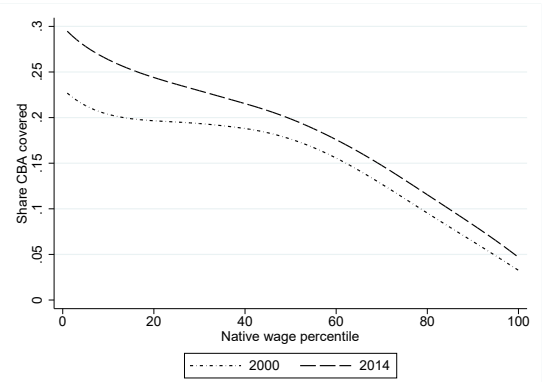
Figures

Figure 3.1: Skill level and CBA coverage

(a) Position of immigrant workers in native wage distribution



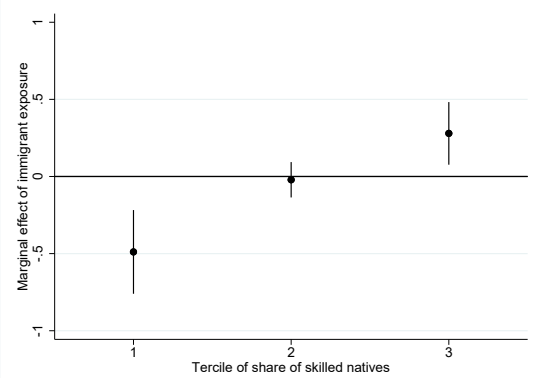
(b) Native CBA coverage by position in wage distribution



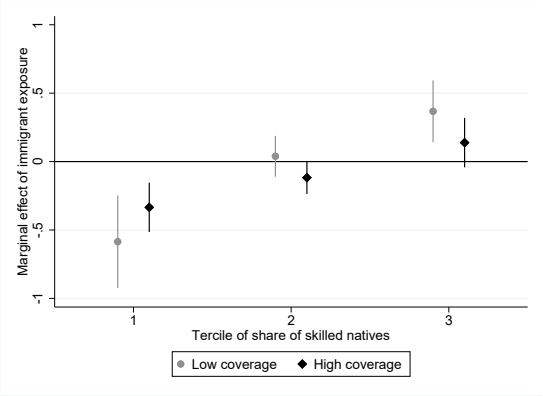
Note: Figure (a) presents kernel estimates of the density of migrant workers along the native wage distribution from its 5th to 95th percentile. Figure (b) presents a local linear smooth plot of the share of native workers employed in an industry with a CBA by percentile of the native wage distribution. Sources: SECO, SESS.

Figure 3.2: Voting analysis by terciles of native educational attainment

(a) Estimates at mean level of CBA coverage



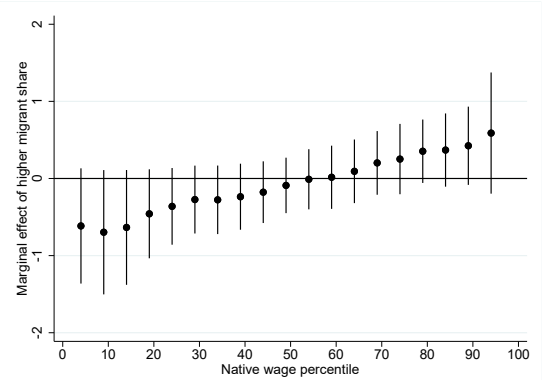
(b) Estimates at low and high CBA coverage



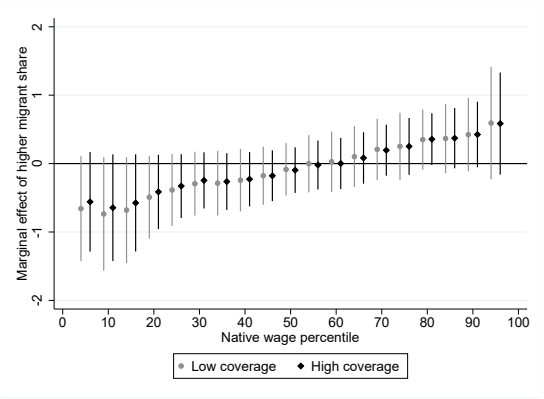
Note: The figure presents estimates from IV regressions using municipality-level data. The outcome is the share of pro-immigrant votes. Share of migrants is the number of foreign residents divided by native population. Share of skilled natives is the share of native residents with upper-secondary or higher level of education. Controls are listed in Table H.1; all specifications include municipality and vote fixed effects. Weights assigned to observations reflect the number of Swiss residents in 2000. Standard errors are clustered at the municipality level, 95% confidence intervals plotted. In Figure (b) effects are reported at the 10th and 90th percentile of the coverage measure. Sources: FSO, SECO, ZEMIS.

Figure 3.3: Wage analysis by native percentiles of the wage distribution

(a) Estimates at mean level of CBA coverage



(b) Estimates at low and high CBA coverage



Note: The figure presents estimates from IV regressions using biennial data at the commuting zone level. The outcome is the natural log of the real gross hourly wage at each fifth percentile. Share of migrants is the number of foreign residents divided by native population. Controls are listed in Table H.1; all specifications include commuting zone and year fixed effects. Weights assigned to observations equal the number of natives employed in commuting zone in 2000. Standard errors are clustered at the commuting zone level, 95% confidence intervals plotted. In Figure (b) effects are reported at the 10th and 90th percentile of the coverage measure. Sources: FSO, SECO, SESS, ZEMIS.

Tables

Table 3.1: Summary statistics

	N	Mean	Sd	Min	Max
Share pro-immigration	22150	0.505	0.165	0.000	0.960
... Bilateral agreements with EU	2215	0.671	0.119	0.059	0.960
... For a regulation on immigration	2215	0.638	0.091	0.191	0.947
... Yes to Europe	2215	0.231	0.108	0.000	0.688
... Bilateral agreements, Schengen and Dublin	2215	0.545	0.119	0.064	0.825
... AFMP extension and measures	2215	0.558	0.106	0.068	0.824
... Federal law on foreign nationals	2215	0.320	0.101	0.063	0.705
... Cooperation with Eastern Europe	2215	0.533	0.102	0.050	0.857
... AFMP continuation and extension	2215	0.595	0.110	0.081	0.860
... For the expulsion of criminal foreigners	2215	0.507	0.045	0.328	0.725
... Against mass immigration	2215	0.495	0.112	0.064	0.810
Mean ln gross hourly wage of natives	848	3.594	0.109	3.246	3.837
...lower-secondary educated	848	3.345	0.082	2.924	3.732
...upper-secondary educated	848	3.526	0.081	3.219	3.729
...tertiary educated	847	3.879	0.103	3.277	4.078
Native employment rate	1590	0.776	0.047	0.332	1.000
...lower-secondary educated	1576	0.451	0.117	0.000	1.000
...upper-secondary educated	1590	0.787	0.059	0.132	1.000
...tertiary educated	1585	0.909	0.053	0.000	1.000
Share of immigrants	33330	0.296	0.190	0.000	1.612
Share CBA covered	33330	0.179	0.075	0.000	0.690

Note: The table presents summary statistics for voting and native labor market outcomes, immigrant exposure, and collective bargaining agreement coverage. See Table H.2 for a description of the votes considered. Voting outcomes are weighed using the number of voters, labor market variables with the number of native workers in 2000 (SESS data), and the number of native respondents 18-65 years of age in 2000 (SLFS data). The migrant exposure measure is weighed with the total population level in 2000 and the share of CBA covered with the number of workers in 2000. SESS, SLFS, migrant exposure, and CBA coverage variables are measured at the commuting zone level, vote outcomes at the municipality level. Sources: FSO, SECO, SESS, SLFS, ZEMIS.

Table 3.2: Voting analysis by native educational attainment

	Outcome: share of pro-immigration votes					
	Without controls			With controls		
	First-stage			First-stage		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: OLS						
Sh. migrants		0.015	-0.022		-0.002	-0.087***
		(0.030)	(0.033)		(0.027)	(0.033)
Sh. CBA cov.		-0.045	-0.045		-0.031	-0.032
		(0.029)	(0.029)		(0.028)	(0.029)
Sh. migrants x T2 sh. skilled			0.021			0.070*
			(0.037)			(0.042)
Sh. migrants x T3 sh. skilled			0.064			0.141**
			(0.070)			(0.061)
N	.	22150	22150	.	22150	22150
Panel B: IV						
IV Sh. migrants	0.558***			0.558***		
	(0.084)			(0.090)		
Sh. migrants		0.057	-0.091		0.014	-0.333***
		(0.095)	(0.083)		(0.074)	(0.100)
Sh. CBA cov.	-0.001	-0.046	-0.043	-0.005	-0.032	-0.031
	(0.018)	(0.029)	(0.029)	(0.017)	(0.027)	(0.028)
Sh. migrants x T2 sh. skilled			0.034			0.218**
			(0.078)			(0.099)
Sh. migrants x T3 sh. skilled			0.183			0.455***
			(0.115)			(0.150)
First stage F-stat		44.251	36.130		38.453	33.200
MP Effective F-stat		39.827	.		34.609	.
MP Critical Value 5%		37.418	.		37.418	.
N	22150	22150	22150	22150	22150	22150

Note: The table presents estimates from OLS and IV regressions using municipality-level data. Share of migrants is the number of foreign residents divided by native population. Share skilled is the share of native residents with upper-secondary or higher level of education in 2000 and T stands for tercile of the variable. 90 percent Anderson-Rubin confidence intervals for estimates in column (6) of Panel B are as follows: Sh. migrants [-0.648,-0.176], Sh. migrants x T2 sh. skilled [-0.016,0.451], Sh. migrants x T3 sh. skilled [0.103,0.925]. Controls are listed in Table H.1; all specifications include municipality and vote fixed effects. Weights assigned to observations equal the number of Swiss residents in 2000. Standard errors in parentheses are clustered at the municipality level. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SECO, ZEMIS.

Table 3.3: Voting analysis by native educational attainment and CBA coverage

	Outcome: share of pro-immigration votes	
	Without controls	With controls
	(1)	(2)
Panel A: OLS		
Sh. migrants	-0.069*	-0.123***
	(0.036)	(0.037)
Sh. CBA cov.	0.143***	0.128***
	(0.035)	(0.034)
Sh. migr. x Sh. CBA cov.	0.249	0.197
	(0.179)	(0.190)
Sh. migr. x T2 sh. skilled	0.061	0.095**
	(0.040)	(0.044)
Sh. migr. x T3 sh. skilled	0.112*	0.169***
	(0.062)	(0.057)
Sh. migr. x Sh. CBA cov. x T2 sh. skilled	-0.775***	-0.751**
	(0.293)	(0.306)
Sh. migr. x Sh. CBA cov. x T3 sh. skilled	-0.943***	-0.908***
	(0.258)	(0.263)
N	22150	22150
Panel B: IV		
Sh. migrants	-0.165*	-0.405***
	(0.090)	(0.111)
Sh. CBA cov.	0.209***	0.184***
	(0.040)	(0.042)
Sh. migr. x Sh. CBA cov.	0.668*	0.964**
	(0.345)	(0.387)
Sh. migr. x T2 sh. skilled	0.141*	0.331***
	(0.086)	(0.108)
Sh. migr. x T3 sh. skilled	0.327***	0.607***
	(0.110)	(0.141)
Sh. migr. x Sh. CBA cov. x T2 sh. skilled	-1.217***	-1.564***
	(0.455)	(0.501)
Sh. migr. x Sh. CBA cov. x T3 sh. skilled	-1.451***	-1.842***
	(0.407)	(0.436)
First stage KP F-stat	12.825	11.274
N	22150	22150

Note: The table presents estimates from OLS and IV regressions using municipality-level data. Share of migrants is the number of foreign residents divided by native population. Share skilled is the share of native residents with upper-secondary or higher level of education in 2000 and T stands for tercile of the variable. 90 percent Anderson-Rubin confidence intervals for estimates in column (2) of Panel B are as follows: Sh. migrants x Sh. CBA cov. [0.206,1.722], Sh. migrants x T2 sh. skilled x Sh. CBA cov. [-2.545,-0.582], Sh. migrants x T3 sh. skilled x Sh. CBA cov. [-2.696,-0.989]. Controls are listed in Table H.1; all specifications include municipality and vote fixed effects. Weights assigned to observations equal the number of Swiss residents in 2000. Standard errors in parentheses are clustered at the municipality level. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SECO, ZEMIS.

Table 3.4: Wage analysis by native percentiles of the wage distribution

	Outcome: ln **real gross hourly wage at m-th percentile**				
	First-stage	50th pct	5th pct	10th pct	95th pct
	(1)	(2)	(3)	(4)	(5)
Panel A: OLS					
Sh. migrants		-0.083	-0.131	-0.157*	0.245
		(0.088)	(0.086)	(0.085)	(0.199)
Sh. CBA cov.		0.004	0.132	0.089	-0.156
		(0.084)	(0.129)	(0.116)	(0.207)
Mean outcome		3.553	3.062	3.157	4.224
Sd outcome		0.103	0.070	0.068	0.195
N	.	848	848	848	848
Panel B: OLS with controls					
Sh. migrants		-0.061	-0.121	-0.146**	0.268
		(0.063)	(0.073)	(0.067)	(0.182)
Sh. CBA cov.		-0.020	0.115	0.063	-0.169
		(0.067)	(0.131)	(0.116)	(0.192)
Mean outcome		3.553	3.062	3.157	4.224
Sd outcome		0.103	0.070	0.068	0.195
N	.	848	848	848	848
Panel C: IV					
IV Sh. migrants	0.441***				
	(0.144)				
Sh. migrants		-0.061	-0.486	-0.573*	0.614
		(0.138)	(0.307)	(0.327)	(0.373)
Sh. CBA cov.	0.011	0.001	0.175	0.139	-0.200
	(0.076)	(0.084)	(0.133)	(0.119)	(0.208)
Mean outcome	0.295	3.553	3.062	3.157	4.224
Sd outcome	0.130	0.103	0.070	0.068	0.195
First stage KP F-stat		9.396	9.396	9.396	9.396
MP Effective F-stat		8.228	8.228	8.228	8.228
MP Critical Value 5%		37.418	37.418	37.418	37.418
N	848	848	848	848	848
Panel D: IV with controls					
IV Sh. migrants	0.442***				
	(0.137)				
Sh. migrants		-0.102	-0.503	-0.593*	0.581
		(0.164)	(0.323)	(0.349)	(0.365)
Sh. CBA cov.	0.005	-0.015	0.159	0.115	-0.205
	(0.077)	(0.068)	(0.129)	(0.110)	(0.199)
Mean outcome	0.295	3.553	3.062	3.157	4.224
Sd outcome	0.130	0.103	0.070	0.068	0.195
First stage KP F-stat		10.456	10.456	10.456	10.456
MP Effective F-stat		9.152	9.152	9.152	9.152
MP Critical Value 5%		37.418	37.418	37.418	37.418
N	848	848	848	848	848

Note: The table presents estimates from OLS and IV regressions using biennial data at the commuting zone level. Share of migrants is the number of foreign residents divided by native population. Controls are listed in Table H.1; all specifications include commuting zone and year fixed effects. Weights assigned to observations equal the number of natives employed in the commuting zone in 2000. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SECO, SESS, ZEMIS.

Table 3.5: Wage analysis by native percentiles of the wage distribution and CBA coverage

	Outcome: ln **real gross hourly wage at m-th percentile**			
	50th pct	5th pct	10th pct	95th pct
	(1)	(2)	(3)	(4)
Panel A: OLS interaction				
Sh. migrants	-0.086	-0.134	-0.160*	0.239
	(0.089)	(0.086)	(0.082)	(0.212)
Sh. CBA cov.	-0.110	0.023	-0.013	-0.373
	(0.093)	(0.152)	(0.144)	(0.268)
Sh. migr. x Sh. CBA cov.	0.650	0.618	0.580	1.234*
	(0.396)	(0.504)	(0.463)	(0.676)
Mean outcome	3.553	3.062	3.157	4.224
Sd outcome	0.103	0.070	0.068	0.195
N	848	848	848	848
Panel B: OLS interaction with controls				
Sh. migrants	-0.062	-0.124*	-0.147**	0.261
	(0.063)	(0.073)	(0.065)	(0.191)
Sh. CBA cov.	-0.042	0.058	0.033	-0.315
	(0.067)	(0.147)	(0.132)	(0.251)
Sh. migr. x Sh. CBA cov.	0.127	0.320	0.169	0.825
	(0.297)	(0.476)	(0.393)	(0.568)
Mean outcome	3.553	3.062	3.157	4.224
Sd outcome	0.103	0.070	0.068	0.195
N	848	848	848	848
Panel C: IV interaction				
Sh. migrants	-0.101	-0.577	-0.667*	0.576
	(0.149)	(0.371)	(0.399)	(0.384)
Sh. CBA cov.	-0.074	0.005	-0.038	-0.272
	(0.097)	(0.143)	(0.144)	(0.234)
Sh. migr. x Sh. CBA cov.	0.452	1.025	1.067	0.435
	(0.460)	(0.637)	(0.672)	(0.693)
Mean outcome	3.553	3.062	3.157	4.224
Sd outcome	0.103	0.070	0.068	0.195
First stage KP F-stat	4.817	4.817	4.817	4.817
N	848	848	848	848
Panel D: IV interaction with controls				
Sh. migrants	-0.094	-0.572	-0.657	0.586
	(0.173)	(0.373)	(0.401)	(0.385)
Sh. CBA cov.	-0.001	0.027	-0.006	-0.196
	(0.071)	(0.135)	(0.122)	(0.213)
Sh. migr. x Sh. CBA cov.	-0.082	0.785	0.721	-0.056
	(0.391)	(0.522)	(0.493)	(0.622)
Mean outcome	3.553	3.062	3.157	4.224
Sd outcome	0.103	0.070	0.068	0.195
First stage KP F-stat	5.049	5.049	5.049	5.049
N	848	848	848	848

Note: The table presents estimates from OLS and IV regressions using biennial data at the commuting zone level. Share of migrants is the number of foreign residents divided by native population. Controls are listed in Table H.1; all specifications include commuting zone and year fixed effects. Weights assigned to observations equal the number of natives employed in the commuting zone in 2000. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SECO, SESS, ZEMIS.

Table 3.6: Employment analysis by native educational attainment

	Outcome: share natives employed in population 18-65				
	First-stage	All	Up to lower-secondary	Upper-secondary	Tertiary
	(1)	(2)	(3)	(4)	(5)
Panel A: OLS					
Sh. migrants		-0.171**	-0.387	-0.088	-0.059
		(0.070)	(0.260)	(0.074)	(0.112)
Sh. CBA cov.		-0.146*	0.180	-0.292***	-0.016
		(0.085)	(0.354)	(0.092)	(0.098)
Mean outcome		0.776	0.451	0.787	0.909
Sd outcome		0.047	0.117	0.059	0.053
N	.	1590	1576	1590	1585
Panel B: OLS with controls					
Sh. migrants		-0.092	-0.320	-0.098	-0.065
		(0.069)	(0.257)	(0.077)	(0.112)
Sh. CBA cov.		-0.127	0.256	-0.269***	-0.028
		(0.093)	(0.384)	(0.089)	(0.097)
Mean outcome		0.776	0.451	0.787	0.909
Sd outcome		0.047	0.117	0.059	0.053
N	.	1590	1576	1590	1585
Panel C: IV					
IV Sh. migrants	0.490***				
	(0.153)				
Sh. migrants		-0.593	-0.488	-0.383	-0.378
		(0.379)	(0.467)	(0.284)	(0.325)
Sh. CBA cov.	0.018	-0.086	0.194	-0.251***	0.029
	(0.057)	(0.079)	(0.368)	(0.080)	(0.105)
Mean outcome	0.272	0.776	0.451	0.787	0.909
Sd outcome	0.126	0.047	0.117	0.059	0.053
First stage KP F-stat		10.210	10.087	10.210	10.189
MP Effective F-stat		9.534	9.534	9.534	9.534
MP Critical Value 5%		37.418	37.418	37.418	37.418
N	1590	1590	1576	1590	1585
Panel D: IV with controls					
IV Sh. migrants	0.491***				
	(0.153)				
Sh. migrants		-0.308	-0.160	-0.396	-0.432
		(0.275)	(0.428)	(0.284)	(0.346)
Sh. CBA cov.	0.022	-0.096	0.233	-0.226***	0.025
	(0.056)	(0.092)	(0.390)	(0.079)	(0.102)
Mean outcome	0.272	0.776	0.451	0.787	0.909
Sd outcome	0.126	0.047	0.117	0.059	0.053
First stage KP F-stat		10.280	10.180	10.280	10.262
MP Effective F-stat		9.599	9.599	9.599	9.599
MP Critical Value 5%		37.418	37.418	37.418	37.418
N	1590	1590	1576	1590	1585

Note: The table presents estimates from OLS and IV regressions using annual data at the commuting zone level. Share of migrants is the number of foreign residents divided by native population. Controls are listed in Table H.1; all specifications include commuting zone and year fixed effects. Lower-secondary level of education is compulsory education as highest attainment, upper-secondary is an apprenticeship or a matura, tertiary is a degree from a university, university of applied sciences, university of teacher education or a professional degree. Weights assigned to observations equal the number of native respondents 18-65 years of age in the commuting zone in 2000. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SECO, SLFS, ZEMIS.

Table 3.7: Employment analysis by native educational attainment and CBA coverage

	Outcome: share natives employed in population 18-65			
	All	Up to lower-secondary	Upper-secondary	Tertiary
	(1)	(2)	(3)	(4)
Panel A: OLS interaction				
Sh. migrants	-0.169**	-0.426*	-0.088	-0.051
	(0.076)	(0.236)	(0.082)	(0.110)
Sh. CBA cov.	-0.139*	0.033	-0.292***	0.011
	(0.083)	(0.350)	(0.099)	(0.146)
Sh. migr. x Sh. CBA cov.	-0.051	1.020	-0.005	-0.190
	(0.457)	(1.354)	(0.493)	(0.518)
Mean outcome	0.776	0.451	0.787	0.909
Sd outcome	0.047	0.117	0.059	0.053
N	1590	1576	1590	1585
Panel B: OLS interaction with controls				
Sh. migrants	-0.103	-0.371	-0.099	-0.056
	(0.075)	(0.229)	(0.084)	(0.109)
Sh. CBA cov.	-0.168*	0.050	-0.274***	0.006
	(0.086)	(0.354)	(0.099)	(0.144)
Sh. migr. x Sh. CBA cov.	0.287	1.437	0.035	-0.238
	(0.428)	(1.315)	(0.481)	(0.512)
Mean outcome	0.776	0.451	0.787	0.909
Sd outcome	0.047	0.117	0.059	0.053
N	1590	1576	1590	1585
Panel C: IV interaction				
Sh. migrants	-0.681	-0.637	-0.454	-0.396
	(0.455)	(0.519)	(0.327)	(0.371)
Sh. CBA cov.	-0.182*	0.028	-0.328***	0.009
	(0.098)	(0.354)	(0.104)	(0.153)
Sh. migr. x Sh. CBA cov.	0.727	1.252	0.585	0.151
	(0.479)	(1.563)	(0.416)	(0.637)
Mean outcome	0.776	0.451	0.787	0.909
Sd outcome	0.047	0.117	0.059	0.053
First stage KP F-stat	4.373	4.365	4.373	4.368
N	1590	1576	1590	1585
Panel D: IV interaction with controls				
Sh. migrants	-0.395	-0.303	-0.467	-0.451
	(0.339)	(0.455)	(0.326)	(0.395)
Sh. CBA cov.	-0.194**	0.067	-0.306***	0.004
	(0.091)	(0.354)	(0.104)	(0.152)
Sh. migr. x Sh. CBA cov.	0.748*	1.252	0.609	0.160
	(0.411)	(1.585)	(0.412)	(0.653)
Mean outcome	0.776	0.451	0.787	0.909
Sd outcome	0.047	0.117	0.059	0.053
First stage KP F-stat	4.423	4.414	4.423	4.416
N	1590	1576	1590	1585

Note: The table presents estimates from IV regressions using annual data at the commuting zone level. Share of migrants is the number of foreign residents divided by native population. Controls are listed in Table H.1; all specifications include commuting zone and year fixed effects. Lower-secondary level of education is compulsory education as highest attainment, upper-secondary is an apprenticeship or a matura, tertiary is a degree from a university, university of applied sciences, university of teacher education or a professional degree. Weights assigned to observations equal the number of native respondents 18-65 years of age in the commuting zone in 2000. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SECO, SLFS, ZEMIS.

References

Alesina, A., Miano, A. and Stantcheva, S. (2018). *Immigration and Redistribution*. NBER Working Papers 24733, National Bureau of Economic Research, Inc.

Allport, G. W., Clark, K. and Pettigrew, T. (1954). *The nature of prejudice*. Addison-Wesley Reading, MA.

Altonji, J. and Card, D. (1991). The effects of immigration on the labor market outcomes of less-skilled natives. In *Immigration, Trade, and the Labor Market*, National Bureau of Economic Research, Inc, pp. 201–234.

Angrist, J. D. and Kugler, A. D. (2003). Protective or counter-productive? Labour market institutions and the effect of immigration on natives. *The Economic Journal*, **113** (488), F302–F331.

Barone, G., D'Ignazio, A., de Blasio, G. and Naticchioni, P. (2016). Mr. Rossi, Mr. Hu and politics. The role of immigration in shaping natives' voting behavior. *Journal of Public Economics*, **136** (C), 1–13.

Basten, C. and Siegenthaler, M. (2019). Do immigrants take or create residents' jobs? Evidence from Free Movement of Workers in Switzerland. *Scandinavian Journal of Economics*, **121** (3), 994–1019.

Beerli, A., Ruffner, J., Siegenthaler, M. and Peri, G. (2021). The Abolition of Immigration Restrictions and the Performance of Firms and Workers: Evidence from Switzerland. *American Economic Review*, **111** (3), 976–1012.

Boeri, T. and Brücker, H. (2005). Why are Europeans so tough on migrants? *Economic Policy*, **20** (44), 629–703.

Borjas, G. J. (2003). The Labor Demand Curve is Downward Sloping: Reexamining the Impact of Immigration on the Labor Market. *The Quarterly Journal of Economics*, **118** (4), 1335–1374.

Borusyak, K., Hull, P. and Jaravel, X. (2021). Quasi-Experimental Shift-Share Research Designs. *The Review of Economic Studies*, rdab030.

Brey, B. (2021). *The effect of recent technological change on US immigration policy*. Discussion Papers 2021-02, Nottingham Interdisciplinary Centre for Economic and Political Research (NICEP).

Brücker, H., Hauptmann, A., Jahn, E. and Upward, R. (2014). Migration and imperfect labor markets: Theory and cross-country evidence from Denmark, Germany and the UK. *European Economic Review*, **66** (C), 205–225.

— and Jahn, E. (2011). Migration and Wage-setting: Reassessing the Labor Market Effects of Migration. *Scandinavian Journal of Economics*, **113**, 286–317.

Brunner, B. and Kuhn, A. (2018). Immigration, cultural distance and natives' attitudes towards immigrants: Evidence from Swiss voting results. *Kyklos*, **71** (1), 28–58.

Bundesamt für Statistik (2019). Gesamtarbeitsverträge nach Typ, Grösse und Wirtschaftssektor. Accessed 07.07.2021.

Card, D. (1990). Unexpected Inflation, Real Wages, and Employment Determination in Union Contracts. *The American Economic Review*, **80** (4), 669–688.

— (1996). The effect of unions on the structure of wages: A longitudinal analysis. *Econometrica*, **64** (4), 957–79.

— (2001). Immigrant inflows, native outflows, and the local labor market impacts of higher immigration. *Journal of Labor Economics*, **19** (1), 22–64.

— and De La Rica, S. (2006). Firm-Level contracting and the structure of wages in Spain. *ILR Review*, **59** (4), 573–592.

—, Dustmann, C. and Preston, I. (2012). Immigration, wages, and compositional amenities. *Journal of the European Economic Association*, **10** (1), 78–119.

Cardoso, A. R. and Portugal, P. (2005). Contractual wages and the wage cushion under different bargaining settings. *Journal of Labor Economics*, **23** (4), 875–902.

Cavaille, C. and Ferwerda, J. (2017). *How Distributional Conflict over Public Spending Drives Support for Anti-Immigrant Parties*. Cage online working paper series, Competitive Advantage in the Global Economy (CAGE).

— and Marshall, J. (2019). Education and Anti-Immigration Attitudes: Evidence from Compulsory Schooling Reforms across Western Europe. *American Political Science Review*, **113** (01), 254–263.

Charles, K. K., Johnson, M. S. and Tadjfar, N. (2021). *Trade Competition and the Decline in Union Organizing: Evidence from Certification Elections*. Working Paper 29464, National Bureau of Economic Research.

D'Amuri, F. and Peri, G. (2014). Immigration, jobs, and employment protection: Evidence from Europe before and during the Great Recession. *Journal of the European Economic Association*, **12** (2), 432–464.

D'Hombres, B. and Nunziata, L. (2016). Wish you were here? Quasi-experimental evidence on the effect of education on self-reported attitude toward immigrants. *European Economic Review*, **90** (C), 201–224.

Diehl, C., Hinz, T. and Auspurg, K. (2018). Who is afraid of skilled migrants from Europe? Exploring support for immigration control in Switzerland. *Swiss Journal of Sociology*, **44** (1), 59 – 88.

Dustmann, C., Frattini, T. and Preston, I. (2012). The Effect of Immigration along the Distribution of Wages. *The Review of Economic Studies*, **80** (1), 145–173.

— and Preston, I. (2001). Attitudes to Ethic Minorities, Ethnic Context and Location Decisions. *Economic Journal*, **111** (470), 353–73.

— and — (2007). Racial and economic factors in attitudes to immigration. *The B.E. Journal of Economic Analysis & Policy*, **7** (1), 1–41.

—, Schönberg, U. and Stuhler, J. (2016). The impact of immigration: Why do studies reach such different results? *Journal of Economic Perspectives*, **30** (4), 31–56.

—, Vasiljeva, K. and Damm, A. (2019). Refugee migration and electoral outcomes. *The Review of Economic Studies*.

Edo, A. (2016). How do rigid labor markets absorb immigration? Evidence from France. *IZA Journal of Migration and Development*, **5** (1), 1–20.

—, Giesing, Y., Öztunc, J. and Poutvaara, P. (2019). Immigration and electoral support for the far-left and the far-right. *European Economic Review*, **115**, 99–143.

— and Rapoport, H. (2019). Minimum wages and the labor market effects of immigration. *Labour Economics*, **61**, 101753.

Facchini, G. and Mayda, A. M. (2009). Does the welfare state affect individual attitudes toward immigrants? Evidence across countries. *The Review of Economics and Statistics*, **91** (2), 295–314.

— and Steinhardt, M. (2011). What drives U.S. immigration policy? Evidence from congressional roll call votes. *Journal of Public Economics*, **95** (7-8), 734–743.

Fanfani, B. (2019). *The Employment Effects of Collective Bargaining*. Working papers 064, Department of Economics and Statistics (Dipartimento di Scienze Economico-Sociali e Matematico-Statistiche), University of Torino.

Foged, M., Hasager, L. and Yasenov, V. (forthcoming). The Role of Labor Market Institutions in the Impact of Immigration on Wages and Employment. *The Scandinavian Journal of Economics*.

Frymer, P. and Grumbach, J. M. (2021). Labor unions and white racial politics. *American Journal of Political Science*, **65** (1), 225–240.

Gerfin, M. and Kaiser, B. (2010). The effects of immigration on wages: An application of the structural skill-cell approach. *Swiss Journal of Economics and Statistics*, **146** (4), 709–739.

Goldsmith-Pinkham, P., Sorkin, I. and Swift, H. (2020). Bartik instruments: What, when, why, and how. *American Economic Review*, **110** (8), 2586–2624.

Guiso, L., Herrera, H., Morelli, M. and Sonno, T. (2017). Populism: Demand and supply. *CEPR Discussion Paper No. DP11871*.

Gürtzgen, N. (2016). Estimating the wage premium of collective wage contracts: Evidence from longitudinal linked employer–employee data. *Industrial Relations: A Journal of Economy and Society*, **55** (2), 294–322.

Haaland, I. and Roth, C. (2020). Labor market concerns and support for immigration. *Journal of Public Economics*, **191** (C), S0047272720301201.

Hainmueller, J. and Hangartner, D. (2013). Who gets a Swiss passport? A natural experiment in immigrant discrimination. *American Political Science Review*, **107** (01), 159–187.

—, Hiscox, M. J. and Margalit, Y. (2015). Do concerns about labor market competition shape attitudes toward immigration? new evidence. *Journal of International Economics*, **97** (1), 193–207.

— and Hopkins, D. J. (2014). Public attitudes toward immigration. *Annual Review of Political Science*, **17**, 225–249.

Halla, M., Wagner, A. F. and Zweimüller, J. (2017). Immigration and voting for the far right. *Journal of the European Economic Association*, **15** (6), 1341–1385.

Jaeger, D., Ruist, J. and Stuhler, J. (2018). *Shift-share instruments and the impact of immigration*. NBER Working Papers 24285, National Bureau of Economic Research, Inc.

Kahn, L. M. (2000). Wage inequality, collective bargaining, and relative employment from 1985 to 1994: Evidence from fifteen OECD countries. *Review of Economics and Statistics*, **82** (4), 564–579.

Knepper, M. (2020). From the Fringe to the Fore: Labor Unions and Employee Compensation. *The Review of Economics and Statistics*, **102** (1), 98–112.

Lampart, D. and Kopp, D. (2013). *Dossier Nr. 95. GAV in der Schweiz: Probleme, Handlungsbedarf, Lösungen*. Schweizerischer Gewerkschaftsbund (SGB).

Lee, D. S., McCrary, J., Moreira, M. J. and Porter, J. (2020). *Valid t-ratio Inference for IV*. Papers, arXiv.org.

Lemieux, T. (1998). Estimating the effects of unions on wage inequality in a panel data model with comparative advantage and nonrandom selection. *Journal of Labor Economics*, **16** (2), 261–91.

Magruder, J. (2012). High unemployment yet few small firms: The role of centralized bargaining in South Africa. *American Economic Journal: Applied Economics*, **4** (3), 138–66.

Margaryan, S., Paul, A. and Siedler, T. (2021). Does Education Affect Attitudes Towards Immigration? Evidence from Germany. *Journal of Human Resources*, **56** (2), 446–479.

Martins, P. S. (2021). 30,000 minimum wages: The economic effects of collective bargaining extensions. *British Journal of Industrial Relations*, **59** (2), 335–369.

Mayda, A. M. (2006). Who is against immigration? A cross-country investigation of individual attitudes toward immigrants. *The Review of Economics and Statistics*, **88** (3), 510–530.

OECD (2020a). Foreign population (indicator). Accessed 01.03.2020.

— (2020b). Strictness of employment protection – individual and collective dismissals (regular contracts). Accessed 06.07.2021.

Olea, J. L. M. and Pflueger, C. (2013). A robust test for weak instruments. *Journal of Business & Economic Statistics*, **31** (3), 358–369.

O'Rourke, K. and Sinnott, R. (2006). The determinants of individual attitudes towards immigration. *European Journal of Political Economy*, **22** (4), 838–861.

Ortega, F. and Polavieja, J. G. (2012). Labor-market exposure as a determinant of attitudes toward immigration. *Labour Economics*, **19** (3), 298–311.

Ottaviano, G. and Peri, G. (2012). Rethinking the effect of immigration on wages. *Journal of the European Economic Association*, **10** (1), 152–197.

Otto, A. and Steinhardt, M. (2014). Immigration and election outcomes — Evidence from city districts in Hamburg. *Regional Science and Urban Economics*, **45** (C), 67–79.

Pecoraro, M. and Ruedin, D. (2019). Occupational exposure to foreigners and attitudes towards equal opportunities. *Migration Studies*.

Rodrik, D. (1997). *Has Globalization Gone Too Far?* Washington, DC: Institute for International Economics.

Scheve, K. F. and Slaughter, M. J. (2001). Labor market competition and individual preferences over immigration policy. *The Review of Economics and Statistics*, **83** (1), 133–145.

Schindler, D. and Westcott, M. (2020). Shocking Racial Attitudes: Black G.I.s in Europe. *The Review of Economic Studies*, **88** (1), 489–520.

Sciarini, P., Cappelletti, F., Goldberg, A. C. and Lanz, S. (2016). The underexplored species: Selective participation in direct democratic votes. *Swiss Political Science Review*, **22** (1), 75–94.

Slaughter, M. J. (2007). Globalization and Declining Unionization in the United States. *Industrial Relations: A Journal of Economy and Society*, **46** (2), 329–346.

Steinmayr, A. (2021). Contact versus Exposure: Refugee Presence and Voting for the Far Right. *The Review of Economics and Statistics*, **103** (2), 310–327.

Tabellini, M. (2019). Gifts of the Immigrants, Woes of the Natives: Lessons from the Age of Mass Migration. *The Review of Economic Studies*, **87** (1), 454–486.

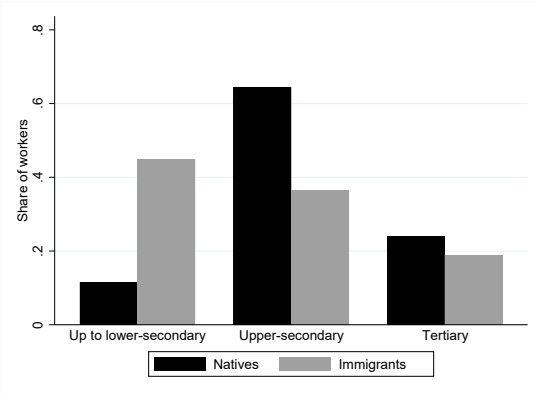
UNPD (2019). International Migrant Stock 2019 (United Nations database, POP/DB/MIG/Stock/Rev.2019).

Vox Survey (2019). Standardized Surveys VoxIt 1981-2016 [Dataset]. Distributed by FORS, Lausanne.

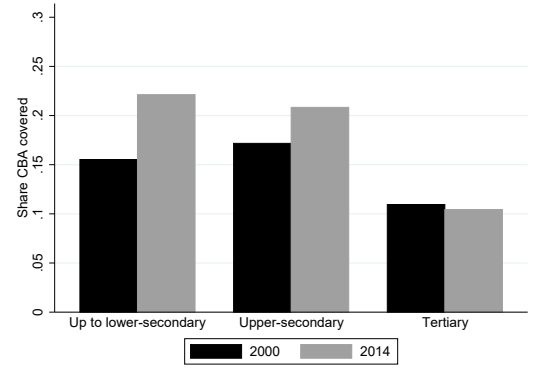
Appendix G: Figures

Figure G.1: Educational attainment and CBA coverage

(a) Native and immigrant workers by educational attainment



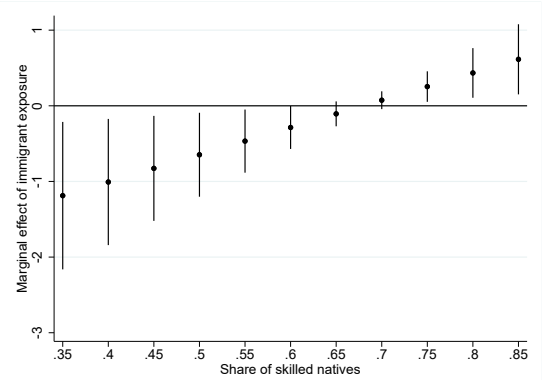
(b) Native CBA coverage by educational attainment



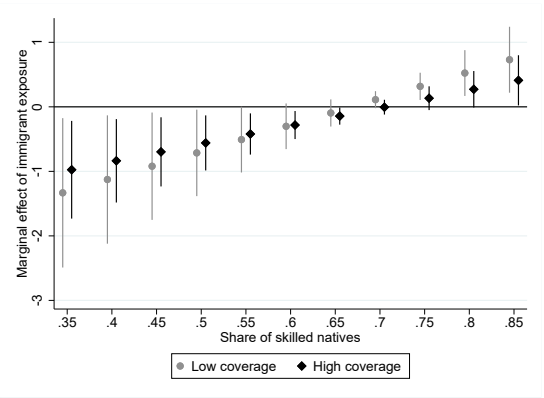
Note: Figure (a) presents the share of native and immigrant workers by highest level of educational attainment. Lower-secondary level of education is compulsory education as highest attainment, upper-secondary is an apprenticeship or a matura, tertiary is a degree from a university, university of applied sciences, university of teacher education or a professional degree. Figure (b) presents the share of native workers employed in an industry with a CBA by highest level of educational attainment and year. Sources: SECO, SESS.

Figure G.2: Voting analysis by continuous native educational attainment

(a) Estimates at mean level of CBA coverage



(b) Estimates at low and high CBA coverage



Note: The figure presents estimates from IV regressions using municipality-level data. The outcome is the share of pro-immigrant votes. Share of migrants is the number of foreign residents divided by native population. Share of skilled natives is the share of native residents with upper-secondary or higher level of education in 2000. Controls are listed in Table H.1; all specifications include municipality and vote fixed effects. Weights assigned to observations reflect the number of Swiss residents in 2000. Standard errors are clustered at the municipality level, 95% confidence intervals plotted. In Figure (b) effects are reported at the 10th and 90th percentile of the coverage measure. Sources: FSO, SECO, ZEMIS.

Appendix H: Tables

Table H.1: Summary statistics of control variables

	N	Mean	Sd	Min	Max
Swiss Earnings Structure Survey (SESS)					
Share women	848	0.376	0.053	0.070	0.690
Mean age	848	40.623	1.059	31.394	46.135
Share above lower-secondary educated	848	0.875	0.043	0.429	0.985
Swiss Labor Force Survey (SLFS)					
Share women	1590	0.509	0.041	0.169	0.839
Mean age	1590	42.113	1.318	33.185	51.463
Share above lower-secondary educated	1590	0.866	0.042	0.507	1.000
Federal Statistical Office					
Share women	8860	0.504	0.016	0.331	0.606
Mean age (2000)	2215	39.099	2.393	29.487	58.655
Share above lower-secondary educated (2000)	2215	0.713	0.069	0.313	0.872

Note: The table presents summary statistics for control variables from the SESS and SLFS surveys, and the census. In the wage analysis weights equal the number of native workers in 2000 (SESS), in the employment analysis the number of native respondents 18-65 years of age (SLFS), the number of Swiss residents in municipality in 2000 for census data. SESS and SLFS variables are measured at the commuting zone level, census variables at the municipality level. Sources: FSO, SESS, SLFS, ZEMIS.

Table H.2: Votes on immigration policy and European foreign policy 2000–2014

Nr.	Date	Title	Type	Category	Impact	Approval (%)
464	21.05.2000	Bilateral Agreements with the EU	Optional	European politics	Positive	67.2
467	24.09.2000	Initiative "for regulation of immigration"	Initiative	Immigration policy	Negative	36.2
474	04.03.2001	Initiative "yes to Europe!"	Initiative	European politics	Positive	23.2
517	05.06.2005	Approval and implementation of the Bilateral Agreements on the association to Schengen and to Dublin	Optional	European politics	Positive	54.6
519	25.09.2005	Extension of the Agreement for Free Movement of Persons (AFMP)	Optional	European politics	Positive	56.0
524	24.09.2006	Federal Act on Foreign Nationals	Optional	Immigration policy	Negative	68.0
526	26.11.2006	Cooperation with Eastern European countries	Optional	European politics	Positive	53.4
540	08.02.2009	Approving the continuation of the AFMP and extension to Bulgaria and Romania	Optional	European politics	Positive	59.6
552.1	28.11.2010	Initiative "for the expulsion of criminal foreigners"	Initiative	Immigration policy	Negative	52.9
552.2	28.11.2010	Federal Decree on the expulsion of criminal foreigners	Counter proposal	Immigration policy	Negative	45.8
580	09.02.2014	Initiative "against mass immigration"	Initiative	European politics	Negative	50.3

Note: The table presents the list of votes considered in the analysis. Impact refers to the expected effect of the vote on the level of immigration in Switzerland. We classify proposals with an expected positive impact as "pro-immigration" and proposals with an expected negative impact as "anti-immigration" votes.

Table H.3: Overview of generally valid CBAs in 2014 by 2-digit NOGA industry

NOGA industry	CBAs
C16: Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	CBA for the timber construction industry, CBA for the carpentry trade
C23: Manufacture of other non-metallic mineral products	CBA for the Swiss concrete industry, CBA for the Swiss brick industry, CBA for the Swiss marble and granite industry
C25: Manufacture of fabricated metal products, except machinery and equipment	CBA for locksmith, metal, agricultural machinery, forging and steel industry in the canton of Baselland, CBA for the metal construction industry in the canton of Vaud, CBA for the metal construction industry in the canton of Valais, CBA for the metal industry
C29: Manufacture of motor vehicles, trailers and semi-trailers	CBA for the Swiss bodywork industry
C31: Manufacture of furniture	CBA for the Swiss furniture industry
C32: Other manufacturing	CBA for the dental laboratories in Switzerland
F41: Construction of buildings	CBA for the main construction industry
F42: Civil engineering	CBA for the industrial pipeline construction in the canton of Valais, CBA for rail construction
F43: Specialised construction activities	CBA for the roofing and wall trade in the canton of Baselland, CBA for the plastering industry in the canton of Baselland, CBA for the painting industry in the canton of Baselland, CBA for the plastering industry in the canton of Basel-Stadt, CBA for the metal construction industry in the canton of Geneva, CBA for the glass industry in the canton of Ticino, CBA for the tile and mosaic lying industry in the canton of Ticino, CBA for the plasters, fillers, dry fitters and ceiling lamps industry in the canton of Ticino, CBA for the carpet, linoleum, plastic, parquet and raised flooring industry in the canton of Ticino, CBA for tinsmithing, roofing, sanitary installations, heating, air conditioning and ventilation in the canton of Vaud, CBA for the electrical, installation and transmission industry in the canton of Valais, CBA for the paving industry in the canton of Valais, CBA for building services engineering and the building facade in the canton of Valais, CBA for the plastering trade in the city of Zurich, CBA for the scaffolding industry, CBA of the Swiss electrical and telecommunications installation industry, CBA for the ceiling and interior design industry, CBA for the Swiss insulation industry, CBA for the Swiss roofing and wall trade, CBA for the Swiss building envelope industry, CBA for the Swiss building technology industry, CBA for the finishing trade in Western Switzerland, CBA for the finishing trade in the canton of Basel-Stadt, CBA for the painting and plastering industry, CBA for the paving industry in the cantons AG, BE, GL, LU, NW, OW, SO, SZ, UR, ZG and ZH, CBA for the paving industry in the cantons of Basel-Stadt and Baselland
G45: Wholesale and retail trade and repair of motor vehicles and motorcycles	CBA for the automotive industry in the canton of Ticino, CBA for the automotive industry in the canton of Vaud, CBA for the automotive industry in the canton of Valais, CBA for the automotive industry in the canton of Fribourg, CBA for the automotive industry in Eastern Switzerland
G47: Retail trade, except of motor vehicles and motorcycles	CBA for the retail trade in the canton of Geneva (simplified procedure), CBA for the retail trade in the canton of Neuchatel, CBA for the petrol station shops in the canton of St. Gallen, CBA for the petrol station shops in the canton of Fribourg, CBA for the retail trade in the city of Lausanne, CBA for the retail trade in the city of Nyon, CBA for the Swiss butcher's trade
I55: Accommodation	CBA for the hospitality industry
I56: Food and beverage service activities	CBA for the hospitality industry
M71: Architectural and engineering activities; technical testing and analysis	CBA of construction engineers and building trades in the canton of Geneva, CBA for draftsmen in the canton of Ticino, CBA for the engineering surveyors' offices in the canton of Vaud
N78: Employment activities	CBA for recruitment services
N80: Security and investigation activities	CBA for private security services
N81: Services to buildings and landscape activities	CBA for the cleaning industry and facility services in the canton of Ticino, CBA for the gardeners in the canton of Ticino, CBA of landscape architects and gardeners in the canton of Vaud, CBA for the park, garden and landscaping industry in the French speaking part in the canton of Valais, CBA for the cleaning industry in Western Switzerland, CBA for the gardeners in the cantons of Basel-Stadt and Baselland, CBA for the cleaning industry in German-speaking Switzerland, CBA for the cleaning industry in German-speaking Switzerland (simplified procedure)
S96: Other personal service activities	CBA for the Swiss hairdressing industry, CBA for the industrial cleaning of textiles in French-speaking Switzerland

Note: The NOGA classification contains in total twenty-one 1-digit NOGA industries (A to U) and eighty-seven 2-digit NOGA industries. For an overview see here. The seventy generally valid CBAs in 2014 fall into eighteen 2-digit NOGA industries. Source: SECO.

Table H.4: Voting behavior and stated preferences

	Outcome: equal to one if respondent voted pro-immigration					
	(1)	(2)	(3)	(4)	(5)	(6)
Prefers equal opportunities	0.245***	0.225***	0.238***			
	(0.012)	(0.012)	(0.012)			
Prefers open Switzerland				0.277***	0.254***	0.271***
				(0.015)	(0.015)	(0.015)
Age		0.002	0.001		0.001	0.000
		(0.002)	(0.002)		(0.002)	(0.002)
Age squared		-0.000	-0.000		-0.000	-0.000
		(0.000)	(0.000)		(0.000)	(0.000)
Female		0.035***	0.018		0.035***	0.015
		(0.011)	(0.011)		(0.011)	(0.011)
Teacher education		-0.118***			-0.126***	
		(0.014)			(0.014)	
Upper-secondary		-0.040**			-0.048***	
		(0.016)			(0.017)	
Lower-secondary		-0.138***			-0.154***	
		(0.024)			(0.024)	
Hh inc. 7001-9000 CHF			-0.012			-0.019
			(0.017)			(0.017)
Hh inc. 5001-7000 CHF			-0.046***			-0.063***
			(0.016)			(0.016)
Hh inc. 3001-5000 CHF			-0.042**			-0.052***
			(0.017)			(0.018)
Hh inc. <3000 CHF			-0.063***			-0.070***
			(0.024)			(0.024)
N	6801	6801	6801	6835	6835	6835

Note: The table presents estimates from an OLS voting analysis using individual-level data. All specifications include place of residence and vote fixed effects. We code an individual with a response 1–3 as in favor of equal opportunities / open Switzerland, and 4–7 as not in favor. Base category for education is tertiary, base category for household income is above 9000 CHF per month. Robust standard errors in parentheses. * p<0.1; ** p<0.05; *** p<0.01. Source: Vox Survey.

Table H.5: Voting analysis by native educational attainment and CBA coverage: robustness checks

	Outcome: share of pro-immigration votes		
	(1)	(2)	(3)
Panel A: Fixed denominator			
Sh. migrants	-0.120	-0.312***	-0.319***
	(0.088)	(0.078)	(0.080)
Sh. CBA cov.	-0.024	-0.022	0.168***
	(0.026)	(0.027)	(0.039)
Sh. migr. x T2 sh. skilled		0.077	0.146*
		(0.081)	(0.080)
Sh. migr. x T3 sh. skilled		0.279**	0.374***
		(0.131)	(0.119)
Sh. migr. x Sh. CBA cov.			0.729**
			(0.314)
Sh. migr. x Sh. CBA cov. x T2 sh. skilled			-1.259***
			(0.452)
Sh. migr. x Sh. CBA cov. x T3 sh. skilled			-1.391***
			(0.350)
First stage KP F-stat	32.904	15.933	5.968
N	22150	22150	22150
Panel B: Commuting zone			
Sh. migrants	-0.062	-0.469*	-0.378
	(0.191)	(0.249)	(0.242)
Sh. CBA Cov.	-0.088	-0.099	0.253
	(0.167)	(0.162)	(0.159)
Sh. migr. x T2 sh. skilled		0.409*	0.353
		(0.230)	(0.251)
Sh. migr. x T3 sh. skilled		0.460	0.682**
		(0.294)	(0.305)
Sh. migr. x Sh. CBA cov.			1.625
			(1.088)
Sh. migr. x Sh. CBA cov. x T2 sh. skilled			-1.033
			(1.494)
Sh. migr. x Sh. CBA cov. x T3 sh. skilled			-3.969***
			(1.203)
First stage KP F-stat	8.610	5.886	2.785
N	1060	1060	1060

Note: The table presents estimates from IV regressions using data at the commuting zone level. Share of migrants is the number of foreign residents divided by native population in 2000 in Panel A and by native population in Panel B. Share skilled is the share of native residents with upper-secondary or higher level of education in 2000 split into terciles T. Controls are listed in Table H.1; all specifications include municipality and vote fixed effects in Panel A and commuting zone and vote fixed effects in Panel B. Weights assigned to observations equal the number of Swiss residents in 2000. Standard errors in parentheses are clustered at the municipality level in Panel A and at the commuting zone level in Panel B. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SECO, ZEMIS.

Table H.6: Voting analysis by native educational level and CBA coverage: subset of votes

	Outcome: share of pro-immigration votes					
	Immigration policy			European foreign policy		
	(1)	(2)	(3)	(4)	(5)	(6)
Sh. migrants	-0.085	-1.016***	-1.174***	0.026	-0.083	-0.108
	(0.141)	(0.230)	(0.264)	(0.064)	(0.105)	(0.114)
Sh. CBA cov.	-0.094**	-0.090**	0.060	-0.070***	-0.070***	0.009
	(0.042)	(0.044)	(0.086)	(0.026)	(0.026)	(0.044)
Sh. migr. x T2 sh. skilled		1.026***	1.167***		-0.072	0.017
		(0.226)	(0.264)		(0.105)	(0.113)
Sh. migr. x T3 sh. skilled		0.957***	1.241***		0.221	0.283*
		(0.326)	(0.361)		(0.142)	(0.145)
Sh. migr. x Sh. CBA cov.			2.082**			0.633
			(0.931)			(0.438)
Sh. migr. x Sh. CBA cov. x T2 sh. skilled			-2.294**			-1.270*
			(0.994)			(0.652)
Sh. migr. x Sh. CBA cov. x T3 sh. skilled			-2.557**			-1.636***
			(1.021)			(0.520)
First stage KP F-stat	37.355	19.137	5.261	39.149	35.413	12.858
N	6645	6645	6645	15505	15505	15505

Note: The table presents estimates from IV regressions with controls using municipality-level data. The split of the votes into the two subgroups follows Table H.2. Share of migrants is the number of foreign residents divided by native population. Share skilled is the share of native residents with upper-secondary or higher level of education in 2000 split into terciles T. Controls are listed in Table H.1; all specifications include municipality and vote fixed effects. Weights assigned to observations equal the number of Swiss residents in 2000. Standard errors in parentheses are clustered at the municipality level. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SECO, ZEMIS.

Table H.7: Voting analysis by native educational attainment and CBA coverage: placebo tests

	Outcome: share of pro-liberal votes				
	Health	Defense	Energy & Environment	Law	Transport
	(1)	(2)	(3)	(4)	(5)
Sh. migrants	0.133	0.373***	-0.410***	-0.932***	0.530***
	(0.096)	(0.119)	(0.142)	(0.233)	(0.132)
Sh. CBA cov.	-0.324***	0.049	0.066	0.400***	0.725***
	(0.091)	(0.064)	(0.050)	(0.090)	(0.090)
Sh. migr. x Sh. CBA cov.	-0.547	-0.569	0.274	0.271	0.036
	(0.539)	(0.489)	(0.346)	(0.815)	(0.628)
Sh. migr. x T2 sh. skilled	0.019	0.034	0.533***	0.257	-0.053
	(0.092)	(0.133)	(0.141)	(0.247)	(0.140)
Sh. migr. x T3 sh. skilled	0.137	0.349**	0.320	0.355	0.231
	(0.101)	(0.153)	(0.232)	(0.317)	(0.234)
Sh. migr. x Sh. CBA cov. x T2 sh. skilled	0.281	0.996	0.221	-0.328	1.100*
	(0.605)	(0.632)	(0.389)	(0.963)	(0.667)
Sh. migr. x Sh. CBA cov. x T3 sh. skilled	0.738	-0.023	-0.365	0.186	1.357*
	(0.569)	(0.538)	(0.632)	(1.106)	(0.772)
First stage KP F-stat	14.926	8.289	6.331	12.233	14.588
N	15505	15505	19935	15505	13290

Note: The table presents estimates from IV regressions with controls using municipality-level data. To construct the outcome variables we use votes on different topics and categorize them into liberal and conservative. Share of migrants is the number of foreign residents divided by native population. Share skilled is the share of native residents with upper-secondary or higher level of education in 2000 split into terciles T. Controls are listed in Table H.1; all specifications include municipality and vote fixed effects. Weights assigned to observations equal the number of Swiss residents in 2000. Standard errors in parentheses are clustered at the municipality level. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SECO, ZEMIS.

Table H.8: Voting analysis by native educational attainment and CBA coverage: participation rate

	Outcome: share eligible voters who voted		
	(1)	(2)	(3)
Sh. migrants	-0.046	-0.018	-0.127
	(0.105)	(0.114)	(0.142)
Sh. CBA cov.	-0.042**	-0.041**	0.014
	(0.017)	(0.016)	(0.050)
Sh. migr. x T2 sh. skilled		0.047	0.128
		(0.119)	(0.146)
Sh. migr. x T3 sh. skilled		-0.076	-0.008
		(0.187)	(0.213)
Sh. migr. x Sh. CBA cov.			1.901***
			(0.513)
Sh. migr. x Sh. CBA cov. x T2 sh. skilled			-1.329**
			(0.602)
Sh. migr. x Sh. CBA cov. x T3 sh. skilled			-1.371**
			(0.555)
First stage KP F-stat	38.455	33.200	11.274
N	22150	22150	22150

Note: The table presents estimates from IV regressions with controls using municipality-level data. Share of migrants is the number of foreign residents divided by native population. Share skilled is the share of native residents with upper-secondary or higher level of education in 2000 split into terciles T. Controls are listed in Table H.1; all specifications include municipality and vote fixed effects. Weights assigned to observations equal the number of Swiss residents in 2000. Standard errors in parentheses are clustered at the municipality level. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SECO, ZEMIS.

Table H.9: Wage analysis by native percentiles of the wage distribution and CBA coverage: fixed denominator

	Outcome: mean ln of native gross hourly wage			
	50th pct (1)	5th pct (2)	10th pct (3)	95th pct (4)
Panel A: IV with controls				
Sh. migrants	-0.113	-0.589**	-0.661**	0.423
	(0.139)	(0.242)	(0.252)	(0.327)
Sh. CBA cov.	-0.006	0.211*	0.170*	-0.217
	(0.071)	(0.112)	(0.093)	(0.214)
Mean outcome	3.553	3.062	3.157	4.224
Sd outcome	0.103	0.070	0.068	0.195
First stage KP F-stat	13.971	13.971	13.971	13.971
N	848	848	848	848
Panel B: IV interaction with controls				
Sh. migrants	-0.108	-0.680**	-0.747**	0.429
	(0.145)	(0.288)	(0.301)	(0.359)
Sh. CBA cov.	0.009	-0.019	-0.048	-0.203
	(0.070)	(0.133)	(0.120)	(0.209)
Sh. migr. x Sh. CBA cov.	-0.083	1.282**	1.218**	-0.078
	(0.387)	(0.501)	(0.482)	(0.728)
Mean outcome	3.553	3.062	3.157	4.224
Sd outcome	0.103	0.070	0.068	0.195
First stage KP F-stat	6.706	6.706	6.706	6.706
N	848	848	848	848

Note: The table presents estimates from IV regressions using biennial data at the commuting zone level. Share of migrants is the number of foreign residents divided by native population in 2000. Controls are listed in Table H.1; all specifications include commuting zone and year fixed effects. Lower-secondary level of education is compulsory education as highest attainment, upper-secondary is an apprenticeship or a matura, tertiary is a degree from a university, university of applied sciences, university of teacher education or a professional degree. Weights assigned to observations equal the number of natives employed in commuting zone in 2000. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SECO, SESS, ZEMIS.

Table H.10: Wage analysis by native educational attainment and CBA coverage

	Outcome: mean ln **of native gross hourly wage**			
	All	Up to lower-secondary	Upper-secondary	Tertiary
	(1)	(2)	(3)	(4)
Panel A: IV with controls				
Sh. migrants	-0.060	-0.711	-0.322*	0.080
	(0.153)	(0.688)	(0.182)	(0.142)
Sh. CBA cov.	-0.010	0.241	0.012	0.003
	(0.060)	(0.345)	(0.063)	(0.090)
Mean outcome	3.594	3.345	3.526	3.879
Sd outcome	0.109	0.082	0.081	0.103
First stage KP F-stat	10.456	10.456	10.456	10.456
N	848	848	848	847
Panel B: IV interaction with controls				
Sh. migrants	-0.078	-0.659	-0.359	0.048
	(0.181)	(0.716)	(0.225)	(0.133)
Sh. CBA cov.	-0.046	0.345	-0.060	-0.060
	(0.081)	(0.324)	(0.087)	(0.125)
Sh. migr. x Sh. CBA cov.	0.210	-0.610	0.426	0.376
	(0.358)	(1.045)	(0.405)	(0.508)
Mean outcome	3.594	3.345	3.526	3.879
Sd outcome	0.109	0.082	0.081	0.103
First stage KP F-stat	5.049	5.049	5.049	5.048
N	848	848	848	847

Note: The table presents estimates from IV regressions using biennial data at the commuting zone level. Share of migrants is the number of foreign residents divided by native population. Controls are listed in Table H.1; all specifications include commuting zone and year fixed effects. Lower-secondary level of education is compulsory education as highest attainment, upper-secondary is an apprenticeship or a matura, tertiary is a degree from a university, university of applied sciences, university of teacher education or a professional degree. Weights assigned to observations equal the number of natives employed in commuting zone in 2000. Standard errors in parentheses are clustered at the commuting zone level. * p<0.1; ** p<0.05; *** p<0.01. Sources: FSO, SECO, SESS, ZEMIS.

Appendix I: Data

We use different datasets from the Swiss Federal Statistical Office (FSO) and the State Secretariat for Migration (SEM). Raw data from the State Secretariat for Economic Affairs (SECO) are obtained to construct a new dataset on generally valid collective bargaining agreements (CBA). The voting analysis is conducted at the municipality level and the labor market analysis at the commuting zone level. We aggregate up data series available at the municipality level (e.g., exposure to immigrants, CBA coverage) to commuting zones according to a concordance table provided by the FSO. We take the municipality definitions from April 2018. The following sections give a detailed overview of the main datasets used and the variable construction.

Swiss Earnings Structure Survey (SESS)

The SESS has been conducted in October every second year since 1994. The survey is sent out to firms in the secondary and tertiary sectors with at least three employees. The public sector has been integrated gradually (the cantonal public sector was added in 1998, the municipal public sector was added in 2006). Participation in the survey is mandatory. In 2014, it included about 32,000 public and private enterprises with approximately 1.6 million workers.

We restrict the sample to employees of private sector establishments aged between 18 and 65 with available region of work, permit type, gender, education, and wage. Native workers are defined as Swiss by nationality. Foreign workers can be distinguished by permit type. We construct the gross hourly wage rate in CHF based on the variable called standardized gross wage. The gross wage includes social contributions and Sunday or night work compensation. Additionally, 1/12 of the 13th salary and other non-periodic payments are added while excluding overtime pay. This sum is divided by weekly working hours and multiplied by 40, which is the standardized number of working hours per month. We take this standardized gross wage to derive the gross hourly wage rate. Last, we calculate the real values using Consumer Price Index data from the Federal Statistical Office that is indexed to December

2015. Following Dustmann *et al.* (2012), we trim observations above the 99th and below the 1st percentile of the wage distribution in each region. Our main outcome of interest is the natural log of gross hourly wage rate at different percentiles and the mean natural log wage by highest educational level obtained. The three education levels are tertiary, upper-secondary, and up to lower-secondary education.

Swiss Labor Force Survey (SLFS)

The SLFS is an individual-level survey. It was conducted annually in the second quarter of the year from 1991 to 2009 and quarterly in the period between 2010 and 2018. Since 2010, around 125,000 interviews are conducted yearly, whereby one person is interviewed four times within six consecutive quarters. The SLFS covers employed, and unemployed people, as well as people outside of the labor force.

The SLFS includes individuals aged 15 years and older, but we limit the sample to individuals in the age group 18–65. We use annual data. To construct the native employment rate, we keep only Swiss by nationality. Employment is defined according to the International Labor Organization and includes individuals employed for a salary, employed by a family member, or self-employed. The native employment rate is the number of employed relative to the number of survey participants.

Central Migration Information System (ZEMIS)

The register data from the ZEMIS are maintained by the SEM. This system was introduced in 2008 and includes information from the predecessor databases. Data between 1996 and 2002 are available at the municipality level only, while later data are at the individual level. The ZEMIS covers all non-Swiss (including asylum seekers and cross-border commuters) by their permit type and personal characteristics. The stock of foreign nationals is reported yearly on December 31st.

Our sample includes all foreign nationals who reside in Switzerland and are

not asylum seekers. The individuals of interest have a C (settled status), B (resident) or L (short-term) permit and must be present in the stock dataset. C-permits are typically issued after a stay of ten years. The B-permit is valid for one to five years and the L-permit up to 364 days. We construct the exposure to foreigners as the number of non-Swiss individuals relative to the native population at the municipality level in the voting analysis, and at the commuting zone level in the labor market analysis.

Dataset "Generally valid CBAs"

The SECO provides a list of the universe of generally valid agreements from June 2000 onwards. Up to 2006 these lists included the CBAs active by the end of June and were published yearly in the journal "Die Volkswirtschaft". Since November 2005, the active CBAs have been published monthly, with data reported on the first of the month. These lists contain information on the name of the CBA, its geographic validity, the dates of the basic decision, changes, enforcements, and the period of validity.

The year when a CBA comes into force is called the year of the basic decision. CBAs can be adjusted and extended within the same contractual framework or as a new agreement. The variation that we use comes from changes in basic decisions. We build a yearly dataset based on the monthly information on CBAs. A CBA is counted as active in a year if it was valid for at least one month in that year.

There are national and cantonal CBAs. Cantonal CBAs are typically defined at the cantonal level. There are three exceptions where the agreement is valid for a single city. We drop them because the most disaggregated administrative unit that we consider is the district. National CBAs are valid for at least two cantons, while certain districts can be excluded. Although these CBAs are most often valid for multiple cantons, conditions can be canton-specific.

CBAs relate to one or several industries or occupations. The FSO matches each CBA to one 2-digit NOGA-2008 industry and within that to the relevant 3-digit industries. If two or more 2-digit industries are affected, the industry

having the highest share of people covered is chosen by the FSO. As an exception, we allocate the CBA in the hospitality industry to I55 (accommodation) and I56 (food and beverage activities) because both two-digit industries are similarly covered by the CBA.

We manually select the subset of generally valid CBAs that fall into the secondary and tertiary sectors and include general clauses on wage and working conditions. Thus, we exclude all CBAs with a specific purpose such as regulating early retirement or further education. Our CBA coverage variable measures labor market protection at the extensive margin. If at least one generally valid CBA falls within a 3-digit NOGA industry, we consider it as covered. We combine local employment by industry in 1995 and annual growth rates in employment at the country level to build the regional coverage. We construct this measure at the municipality level in the voting analysis, and at the commuting zone level in the labor market analysis.

Data on Voting Outcomes

We use a municipality level dataset which is provided by the FSO and covers all national vote outcomes since 1960. The key information is the share of votes in favor of the proposal. It is calculated as the number of yes votes divided by the number of valid votes. We combine this information with the predicted impact of the proposal on immigration levels in constructing our outcome variable – the share of pro-immigration votes.

We use all votes that are either categorized as immigration policy or as European foreign policy votes and occurred between 2000 and 2014. The classification is provided by the FSO following the *Année Politique Suisse 1980ff* from the Institute for Political Science at the University of Bern. Because of their similarity, we take the average of the initiative on the expulsion of criminal foreigners and its counter proposal. Note that this does not affect our results. The following overview outlines the content of the votes included in our analysis:[57]

[57]The FSO provides an overview with a short description of all votes here.

Bilateral Agreements with the EU The Bilateral Agreement includes seven agreements on immigration, land transport, air transport, trade barriers, public procurement, research, and agriculture. The Agreement on the Free Movement of Persons (AFMP) is a key part. It enables free movement for individuals from EU and EFTA countries and the same conditions hold for Swiss nationals within the EU and EFTA.

Initiative "for regulation of immigration" The purpose of this initiative is to limit the share of foreigners in the population to 18%. In addition, the initiative wants to reduce financial incentives for non-resident foreigners, asylum seekers and other groups of temporary migrants to remain in the country. Last, foreign criminals who should be judicially expelled from the country can be jailed until enforcement.

Initiative "yes to Europe!" The initiative proposes that Switzerland joins the European Union and that the Federal Council starts immediate negotiation.

Approval and implementation of the Bilateral Agreements on the association to Schengen and to Dublin The Schengen agreement abandons systematic passport controls which simplifies travelling. At the same time, international cooperation is intensified to reduce crime. The Dublin agreement requires that an asylum application is processed only once in the EU area and Switzerland.

Extension of the Agreement for Free Movement of Persons (AFMP) This act gradually extends the AFMP to the ten new EU member countries. Moreover, it introduces accompanying measures for the labor market to prevent deterioration in work and wage conditions.

Federal Law on Foreign Nationals This act regulates immigration in particular from non-EU/EFTA countries. Labor migration from non-EU/EFTA countries is limited to high-skilled individuals. Occupational and geographic mobility within the country is simplified for resident immigrants.

Cooperation with Eastern European countries This act enables Switzerland to support the building of democracy and a social market economy in former communist countries in Eastern Europe and in soviet countries. The

form of cooperation is manifold: technical, financial, measures to promote participation in world trade, and measures to promote the use of private sector funds.

Approving the continuation of the AFMP and extension to Bulgaria and Romania This act continues the Agreement on the Free Movement of Persons for an unlimited period. In addition, the AFMP is extended to the new EU member countries Bulgaria and Romania.

Initiative "for the expulsion of criminal foreigners" This initiative wants to automatically revoke the right to residence of foreigners who have committed certain criminal offences or have misused social benefits.

Federal Decree on the expulsion of criminal foreigners The counterproposal to the initiative "for the expulsion of criminal foreigners" requires revoking the right to residence based on the severity of the offence.

Initiative "against mass immigration" This initiative proposes limiting immigration by introducing quotas defined on national needs.

For the placebo tests in Table H.7 we use the following vote categories: health, welfare, and sports (9 votes), national defense (9 votes), energy and environmental policies (11 votes), the subgroups criminal and private law of the category law (7 votes), transport policy (8 votes). From this set of votes we drop those we cannot categorize into liberal or conservative, based on voting recommendations of the four largest parties.

Curriculum Vitae

Mirjam Bächli

EDUCATION

Ph.D. in Economics and Finance, University of St.Gallen, 2021

Swiss Program for Beginning Doctoral Students in Economics, Study Center Gerzensee, 2017

M.A. in Economics, University of St.Gallen, 2016

B.A. in Economics, University of St.Gallen, 2014

VISITS

Visiting Ph.D. Student, Universitat Pompeu Fabra (Spain), 10/2020–07/2021

Visiting Ph.D. Student, University of Warwick (UK), 02/2019

Visiting Student, Graduate School of Management St. Petersburg (Russia), 08/2013–01/2014

WORK EXPERIENCE

Research Assistant, SIAW-HSG, University of St.Gallen, 11/2015–01/2022

Employee in various functions, Neue Aargauer Bank AG, 08/2003–10/2020

Administrative and Teaching Support, Madurai Seed, India, 07/2015–08/2015

TEACHING ASSISTANCE

Data Handling: Import, Cleaning and Visualisation (undergraduate), 2019

International Economics (undergraduate), 2017–2019

Advanced Macroeconomics (graduate), 2017

CONFERENCES

2021: RES Annual Conference (virtual), 2nd Workshop of the Swiss Public Economic Network (virtual), Spring Meeting of Young Economists (virtual), Warsaw International Economic Meeting (virtual), IIPF Annual Congress (virtual), CEMIR Junior Economist Workshop on Migration Research (Munich, Germany), 3rd Swiss Workshop on Local Public Finance and Regional Economics (Lugano), Workshop on Trade Unions and Migration (virtual)

2020: Swiss Meeting of Young Economists (Zurich), 13th PhD Workshop in Economics, Collegio Carlo Alberto and University of Turin (virtual)

2019: Warsaw International Economic Meeting (Warsaw, Poland), Neuchâtel Conference on Mobility and Migration (Neuchâtel), 2nd HSG-KN Applied Micro Workshop (St.Gallen), EALE Annual Conference (Uppsala, Sweden), 9th OECD-CEPII-LISER Annual Immigration Conference (Paris, France)

AWARDS AND GRANTS

SNSF Doc.Mobility Scholarship, 2019

Jöhr Price for best Master's Degree in Economics at University of St.Gallen, 2016