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1. Introduction

1 The economic literature [e.g., di Giovanni et al., 2015] suggests that international migration has positive long-run welfare effects for the destination countries. Still, the journey to the long-term equilibrium may be a long wait for the "losers" of labour market integration: Local workers with relatively low skills are observed to suffer short-run losses, both in terms of employment and wages. Short-run adverse effects thus counterbalance long-run gains, which may explain the widespread opposition to immigration in high-income countries.

2 Cross-border commuting is another form of spatial labour mobility, whereby persons work in one country but live in a different one. While the effects of migration have been widely investigated, little is known about the welfare effects or even the labour market effects of cross-border mobility. Nevertheless, these effects might differ for several reasons [Russo et al., 2014]. First, cross-border workers[1] live abroad and therefore travel in and out daily while immigrants stay in the destination country; the impact of the former on workplace consumption and hence local labour demand is likely weaker than that of the latter. Moreover, the education level of immigrants is expected to be lower compared to that of border workers [Shield & Swenson, 2000]; the impact of both groups on the local labour supply will therefore be unequal.

3 The scarcity of empirical evidence on the effects of commuting probably stems from its limited importance in major economies. For instance, border workers represent less than

1 % of the EU-28 workforce (Eurostat, 2015), even though important national and regional differences exist and an upward trend is expected as European integration develops and geographic flexibility becomes easier. Van Houtum & Van Der Velde [2004] explain European labour (im)mobility using the sociological principle of spatial belonging, which brings about an attitude of indifference towards the market on the other side of the border.

4 Important regional differentials exist nevertheless and legislation changes have taken place, whose possible impacts have been investigated empirically. Buettner & Rincke [2007], for instance, discuss the labour market effects of the German re-unification by comparing West German regions at the border separating West Germany from East Germany against other West German regions in the hinterlands, before and after 1990. In line with the standard theoretical framework used by economists, they find that workers from East Germany commuting to West German border regions enlarged the local labour supply, leading to lower wages and higher unemployment among resident workers. In the spirit of the search unemployment literature [Mortensen & Pissarides, 1999 ; Pierrard, 2008] constructs a model to understand the competition between residents and border workers. Simulations based on this model show that a combination of a foreign shock (i.e., an increase in the foreign labour supply) and a domestic shock (i.e., an increase in the domestic labour supply) is needed to explain the simultaneous increase in employment and unemployment observed in Luxembourg over the period 2004-2006. Job competition alone cannot explain the observed evolution, which also implies that border workers generate positive externalities by increasing employment in the host country.

5 Focusing on the case of Switzerland, Beerli & Peri [2015] investigate the impacts of the Agreement on the Free Movement of Persons (AFMP), which was signed between this country and the EU. Exploiting the different timing of the policy implementation between border and non-border regions, they find a significant increase in the number of new immigrants (i.e., border workers and immigrant workers with a short-term residency permit), but no significant wage or employment effects for local workers (i.e., both Swiss workers and foreign workers entitled with a permanent work permit). However, when decomposing the effect along the skill distribution, they find small negative employment impacts for semi-skilled workers, while the highly skilled natives experienced wage increases. Losa et al. [2014] investigate the same policy change and also find that it had mixed effects, creating new jobs in some sectors but unemployment in others.

6 Using a spatial approach, Lalive et al. [2013] do not find any negative effect of the AFMP on local workers' employment. However, they find a small but significant impact on the unemployment probability of highly skilled workers born in Switzerland. Such a result is also in line with the findings of Müller et al. [2013], who analyse the impact of the AFMP on wages and find a slightly negative but significant impact on the wages of highly skilled local workers.

7 Compared to the existing literature on Switzerland, our analysis offers a more systematic and broader stance. Indeed, while several other papers have examined the impact of border workers in Switzerland, they are mainly restricted to specific cantons (or group of cantons) and usually based on a single year of observation (cross-sectional data). For example, Flückiger et al. [2012] investigated Geneva's employers' hiring practices by responding to real openings of vacancies using fictitious resumes. They find that employers generally contact local and currently unemployed job applicants before job applicants living abroad. Ramirez & Asensio [2013] study potential minimum (collective

agreement's) wage violation in Geneva, but they do not find any significant result in favour of this hypothesis, except for the accommodation and food service activities. Kempeneers & Flückiger [2012] compare the characteristics of the unemployed and the border workers in Geneva, finding that the two groups are significantly dissimilar and that, possibly and approximately, only one out of ten border workers could have been substituted for an unemployed worker. Péclat & Weber [2016] provide a comparable analysis and reach similar conclusions for the canton of Neuchâtel.

8 Whether a genuine causal relationship exists between the numbers of border workers and the level of unemployment remains open.[2] In fact, even though the popular feeling considers border workers and unemployment as related, a thorough econometric analysis of this relationship is still lacking for Switzerland. To be precise, even though a correlation might be observed between the two, this still does not necessarily establish causality. Moreover, if a causal relationship does exist, its direction is not obvious. The following assumptions can be formulated and investigated:

1. Border workers cause unemployment to increase, in line with popular feelings and the simple theoretical framework, as discussed before. Said otherwise, local workers would be substitutable for border workers and more intense competition for jobs would crowd out the less competitive local workers. Some wage rigidity (e.g., due to collective agreements or occupational minimum wages) generates unemployment in those occupations where the supply of border workers increases. Findings supportive of such effects are provided by Buettner & Rincke [2007] and Hazans [2004], in their respective investigations of the German re-unification and of commuting patterns in the Baltic States.
2. Border workers cause unemployment to *decrease*. While this might sound counterintuitive to many, it is merely based on the assumption that border workers are complementary to local workers and therefore generate positive externalities on the host labour market. For instance, it is possible that a firm decides to remain at its current location because it can hire the workers it needs among border workers not found among local ones. Instead of offshoring its activities, such a firm would stay thanks to border workers, who thus help in keeping jobs in the region for local workers. If output expands for such firms, then employment increases for both local and border workers. Even if border workers are not complementary, one could in principle observe a rise in employment of border workers with constant employment of local workers if the underlying cause of hiring is an increase in the demand for labour. Findings supportive of these effects were obtained in Pierrard [2008] for Luxembourg and by Russo et al. [2014] for regional commuter flows in Germany.
3. Unemployment causes the number of border workers to decrease. If unemployment increases in Switzerland, this may discourage border workers to search for a job in the country. This relation is akin to the "discouraged worker effect" in the measurement of unemployment, where people fail to enter the labour force when unemployment is high. We can however expect such effects to be quite small, especially for workers coming from Italy or France given the structural differences existing between Switzerland and these neighbouring countries.

9 In fact, while much "casual" discussion takes place about the relation between border workers and unemployment, little is known about their true mutual influence in the long run. We aim at filling this gap, by bringing two important improvements to the existing literature on the effects of border workers on the local labour force. First, we conduct an exhaustive analysis, in the sense that our empirical investigation is based on Switzerland as a whole (time series) and all cantons or regions (panel data). Moreover, we rely on a long observation period (1996-2017) and a relatively high frequency (quarters), while former studies (both in Switzerland and abroad as discussed above) typically use cross-

sectional data or focus on a specific policy change. A wide time span is indeed necessary to investigate the various assumptions mentioned above, which describe relations that are only observable over the long run. Second, we use sophisticated econometric techniques borrowed from the most recent developments in time series and panel data techniques, which have never been implemented in this context. By employing a sound statistical methodology, we can investigate precisely the nature of the relationship between border workers and unemployment.

10 The remainder of this paper is structured as follows. Section 2 provides a quick overview of the main institutional aspects of immigration in Switzerland. The data is presented in Section 3, and we then conduct time-series analyses at the country level (Section 4) and panel data analyses at the canton- and region-level (Section 5). The final Section 6 provides a summary and concludes the paper with some policy implications.

2. Immigration in the Swiss labour market in a nutshell

11 Switzerland's labour market is a combination of high wages, low unemployment rate, and relatively peaceful labour relations, therefore attracting direct investment and numerous international workers [Flückiger, 2008 ; OCDE, 2015, 2017]. Foreign workers are classified into four main categories which entail different economic rights:

1. annual workers: "B permit";
2. settled workers: "C permit";
3. (cross-)border workers: "G permit";
4. short-term workers: "L permit".

12 Since the beginning of the century, immigration is mainly composed of skilled workers, modifying substantially the "historical" skill composition of the foreign workforce in Switzerland, particularly compared to what prevailed at the end of the 1960s. Back then, the Swiss immigration policy was essentially focused on Southern European countries and mainly short-term oriented. At that time, a populist political movement emerged for the first time in Switzerland with explicit goal to reduce the number of foreigners.[3]

13 The traditional guest-worker policy that was applied by the Swiss government since the end of World War II pushed firms to recruit essentially unskilled or low skilled workers, most of whom came from Italy, Spain and Portugal. Most of these immigrants were first granted a seasonal work permit and could only work in a limited number of sectors. It was only after several years of uninterrupted seasonal work that they could be entitled to a more stable work permit ("B permit"), with no barriers to sectoral/professional mobility. Many of these workers finally obtained a permanent residence permit entailing the same economic rights than Swiss citizens ("C permit").

14 It was only during the 2000s that the Swiss government reoriented its policy by negotiating bilateral agreements related to persons' mobility with the European Union, putting an end to the seasonal permit (former "A permit"). With a maximal length of 12 months, the "new" short-term work permit ("L permit") offers different economic rights than the former seasonal permit. Overall, the "new waves" of immigration in Switzerland are essentially composed of skilled and highly skilled people. In other words, skill composition of the foreign workforce covers a larger spectrum of jobs today than in the 1990s, which has broadened the social impact of the foreign workforce.

15 Today, foreign-born workers occupy more than one job out of four. Furthermore, the labour market traditionally accommodates many border workers: Their number has increased more rapidly than other categories of foreign workers over the past few years and is currently larger than 300 000, corresponding to almost 7 % of the workforce. Their concentration has become particularly high in the Western (French-speaking) and Southern (Italian-speaking) parts of Switzerland. In the cantons of Geneva and Ticino, border workers nowadays account for more than 30 % of the workforce. The fact that Switzerland shares languages with its neighbouring countries of course facilitates integration of workers coming from outside the country.

16 Several deep changes have affected border workers' status in the past fifteen years. In the early 2000s, access to the Swiss labour market was made easier to foreign workers. In June 2002, the Agreement on the Free Movement of Persons (AFMP) came into force, lifting restrictions for EU citizens who want to live or work in Switzerland. In June 2007, the requirement for border workers to live and work in border regions was lifted: They are since allowed to work in any Swiss canton and do not necessarily have to return home every night.

17 Yet, more recently, populist political parties have intensified pressure for stricter controls of the foreign workforce, and this culminated in February 2014 with the Swiss accepting an initiative "against mass immigration", granting the government the ability to limit the flow of migrants. The enforcement specifics of the vote have been issued in February 2017 with almost no reference to foreign workers. In order not to jeopardize the whole array of bilateral agreements on trade, the government has cautiously changed the application law, where companies are required to make their job vacancies available in priority to unemployed residents in occupations where the unemployment rate is above average.[4] In any case, and as in other European countries, these sequential political decisions reveal obvious changes in the acceptance of foreign workers.

3. Data

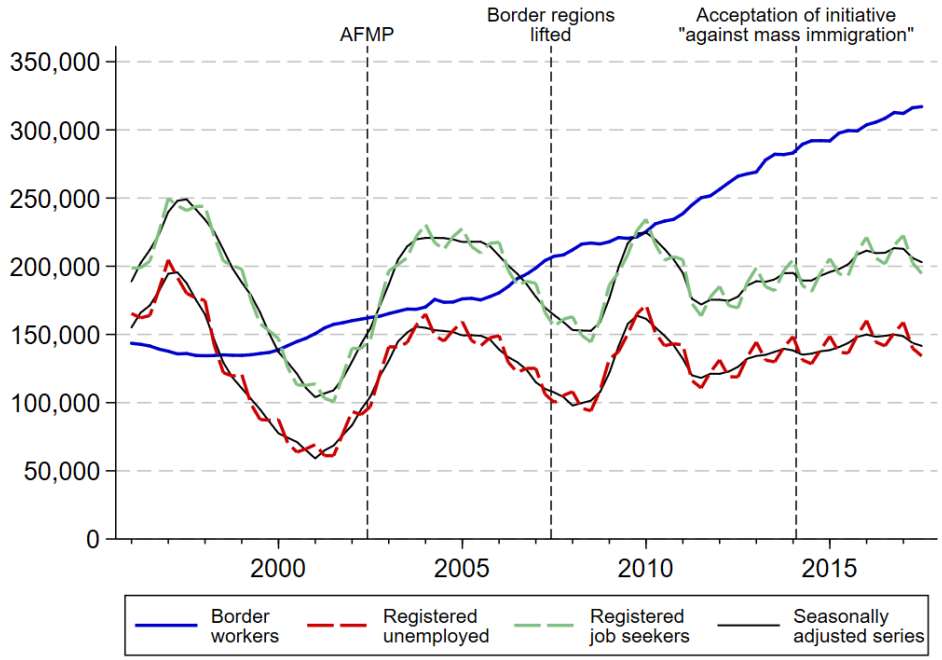
18 To investigate the relationship between border workers and unemployment in Switzerland, we collected and combined data from various public sources. Detailed figures related to unemployment are available on a monthly basis and at the cantonal level from the State Secretariat for Economic Affairs (SECO), which aggregates information from all employment offices in Switzerland. These figures are exhaustive, in the sense that every individual registered as unemployed or job seeker is counted in the database. SECO's data constitute the basis for the "official" unemployment rate in Switzerland, ILO's unemployment rate being also computed but mostly for the purpose of international comparison.

19 The number of border workers is available from the Swiss Federal Statistical Office (SFSO), through its Cross-border Commuters Statistics (CCS). These are available since 1996 on a quarterly basis, and at a fine regional level ("*communes*").

20 Combining both sets of data, the longest observation window that can be constructed ranges from the first quarter of 1996 to the third one of 2017, and thus contains 87 quarterly observations. Quarterly unemployment figures have been obtained by averaging monthly figures. Figure 1 plots the evolution of border workers, registered unemployed, and registered job seekers in Switzerland. While the number of border

workers has been rising continuously since 2000, the legislation changes discussed above do not appear to have exerted a great impact. No significant change in the growth rate of the number workers can be observed at the time the AFMP was introduced or when border regions were lifted.

Figure 1: Border workers and unemployed in Switzerland



Source : SFSO-CCS: https://www.bfs.admin.ch/bfs/fr/home/statistiques/travail-remuneration/enquetes/staf.html (border workers), SECO: https://www.amstat.ch (unemployed and job seekers)

21 It is worth noting that the numbers of unemployed and job seekers are strongly affected by seasonality. Over the period, the average unemployment rate in the third quarter is almost 0.5 percentage point lower than in the first quarter. We therefore deseasonalise the unemployment series by removing the quarter effects (averaged over the entire observation period) from the original series (see Baum, 2006, section 7.3 for details of the procedure). The seasonally adjusted series are displayed as thin dark lines in Figure 1. Next, we also observe that the number of unemployed evolves non-monotonically, with periods of ups and downs generated by recessions and expansions. Since the end of the subprime crisis, unemployment seems to be slowly on the rise. Overall, the impression one gets from Figure 1 is that the numbers of border workers and of unemployed appear completely disconnected.

22 In addition, we collected data on Switzerland's GDP and the exchange rate EUR|CHF, which can also be expected to affect unemployment and border workers in Switzerland. Total GDP in real terms is available from the SECO on a quarterly basis. We transformed it to a measure of GDP per capita by dividing it by the Swiss population, available from the SFSO. Unfortunately, cantonal GDPs are only available (from SFSO) yearly over 2008-2014, making this variable unusable in our longitudinal analyses. As an alternative, we collected the number of employed persons (available from the SFSO) for seven NUTS-2 regions in Switzerland. The results we obtain support the fact that GDP and the number

of employed persons are closely related. The EUR|CHF exchange rate comes from the Swiss National Bank (SNB).[5] Further details concerning the data are provided in Appendix Table 5.

23 Figure 2 and Figure 3 display the unemployment rate and the border worker rate for all cantons and regions.[6] Panel A of Figure 2 depicts the 11 non-border cantons, i.e., those which have no border with foreign countries, while Panel B shows the 15 border cantons (see the map in Appendix Figure 5). Note that the scales of the vertical axes are different in the two Panels.

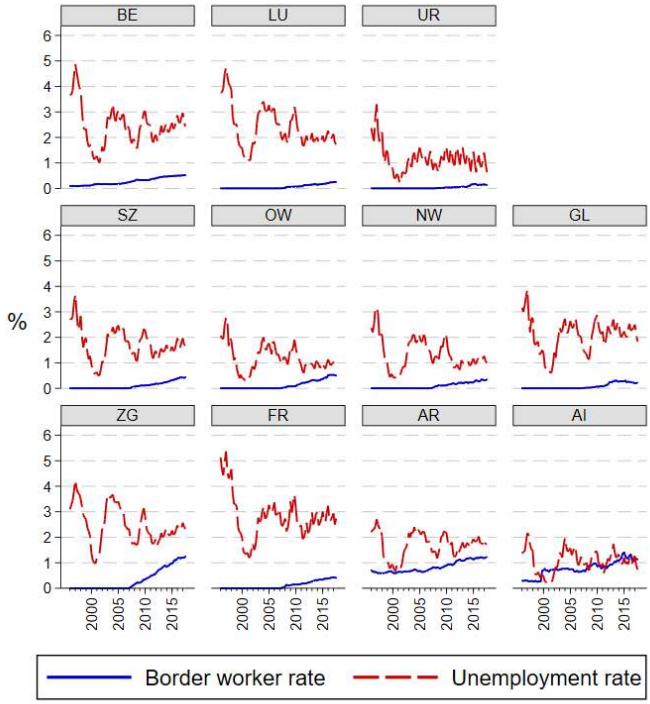
24 We naturally observe that the border worker rates are lower in non-border cantons. For most of these, the number of border workers is smaller than the number of unemployed during the entire observation period. On the other hand, there are (much) more border workers than unemployed in most of the border cantons. Also, it should come as no surprise that political pressures against border workers arise mainly from these specific cantons. In some estimations below, we will therefore focus on the border cantons.

25 We also note that unemployment rates are much more comparable across cantons than border worker rates. For instance, in the third quarter of 2017, unemployment rates range from 0,6 % (in Uri) to 5,2 % (in Neuchâtel), while border worker rates range from 0,1 % (in Uri) to 39 % (in Ticino). The unemployment seasonal pattern observed at the country-level is also present in most cantons, but it is stronger in the alpine cantons (in particular Valais and Ticino) where tourism constitutes one of the main industries. For all cantons, we therefore deseasonalise the unemployment rate before conducting the estimations.

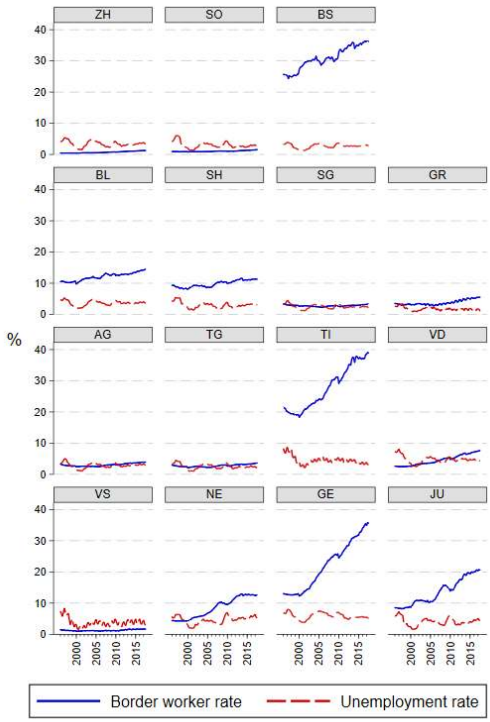
26 Figure 3 depicts the same series for the regions. We again observe that the order of magnitude of the number of border workers differs widely across regions. Among the seven regions, only “Central Switzerland” shares no border with foreign countries. As such, this region could not host any border workers until the obligation for these workers to live and work in border regions was lifted in 2007.

Figure 2: Cantonal unemployment and border worker rates

A. Non-border cantons



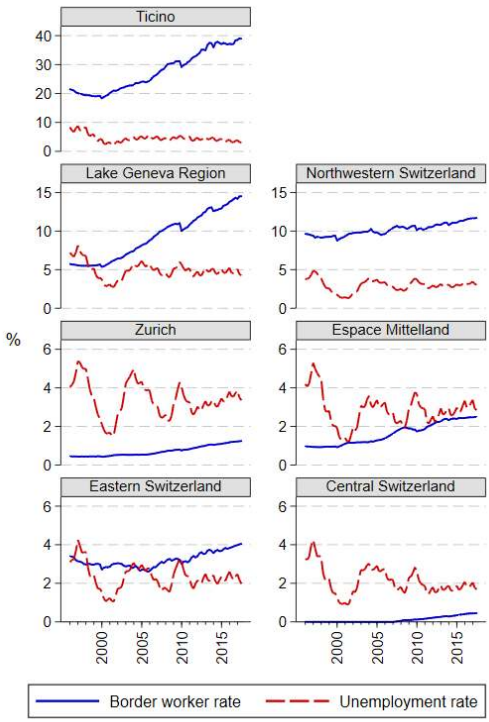
B. Border cantons



Note: Cantons' full names are provided in Appendix Table 9.

Source : SFSO-CCS: https://www.bfs.admin.ch/bfs/fr/home/statistiques/travail-remuneration/enquetes/staf.html (border workers), SECO: https://www.amstat.ch (unemployed and job seekers)

Figure 3: Regional unemployment and border worker rates



Note: The scales of the vertical axes are different.

Source : SFSO-CCS: https://www.bfs.admin.ch/bfs/fr/home/statistiques/travail-remuneration/enquetes/staf.html (border workers), SECO: https://www.amstat.ch (unemployed and job seekers)

4. Time series analysis at the country-level

27 We begin our empirical analysis by investigating the situation at the national level. To this end, we make use of time-series econometric tools to estimate the relationships between the number of unemployed (or alternatively the unemployment rate) and the number of border workers (or alternatively the border worker rate). In particular, we build the following autoregressive distributed lag model $ARDL(p,q_1,q_2,q_3)$:

$$u_t = \alpha + \sum_{i=1}^{p} \beta_i u_{t-i} + \sum_{i=0}^{q_1} \gamma_i bw_{t-i} + \sum_{i=0}^{q_2} \delta_i gdp_{t-i} + \sum_{i=0}^{q_3} \theta_i eur_{t-i} + \lambda' Z_t + \varepsilon_t \qquad (1)$$

where u_t stands for the number of unemployed (or alternatively the unemployment rate) in quarter t, bw_t is the number of border workers (or alternatively the border worker rate), gdp_t is the GDP per capita growth rate,[7] eur_t is the EUR|CHF exchange rate, and Z_t is a vector of exogenous covariates (quarter of year dummies and a linear time trend). The error term is denoted by ε_t. The number of lags to be included in the model will be selected by minimising the Bayesian Information Criterion (BIC).

28 The dependent variable being u_t, model (1) allows to investigate how the right-hand-side variables affect unemployment. Considering the various hypotheses formulated above, we also estimate opposite models in which and are swapped so that the number of border

workers becomes the dependent variable, and which therefore allow to investigate the factors influencing the number of border workers.

29 *ARDL* models can be implemented on a mix of *I(0)* and *I(1)* series, but this technique will however crash in presence of *I(2)* (or beyond) series [Nkoro & Uko, 2016]. As a pre-requisite to our analysis, we therefore determine the number of unit roots in all series to be considered in our analysis. Table 6 (in Appendix) displays the results of augmented Dickey-Fuller unit root tests, showing that the series related to unemployment are *I(0)* (i.e., stationary), while the series related to border workers are *I(1)* (i.e., non-stationary while their first-differences are stationary). The bounds testing approach proposed by Pesaran et al. [2001], which allows to test whether there exists a level relationship irrespective of whether the series are integrated of order 0 or 1, *I(0)* or *I(1)*, is thus the most adapted econometric tool in our case.

30 The empirical estimations of model (1) are displayed in Table 7 (numbers of unemployed and border workers) and Table 8 (unemployment and border worker rates) in Appendix. In Table 7, the numbers of unemployed and border workers are taken in logarithms, so that the coefficients should be interpreted as elasticities or semi-elasticities. In Table 8, the coefficients indicate the effect of a one-unit change of the right-hand side variable on the unemployment rate (respectively border worker rate) in percentage points.

31 The number of lags were selected optimally based on the Bayesian Information Criterion (BIC), considering all possible combinations between 0 and 6 lags (i.e., 6 past quarters) for all series. Because there are several lags for most variables, it is complicated to interpret the coefficients displayed in Table 7 and Table 8 directly, and we therefore compute the long run effect by setting all occurrences of each variable equal over time (e.g., $u_t = u_{t-1} = \cdots = u_{t-p} = u$) in equation (1), and combine the various coefficients related to the same variable. The coefficients thus obtained are displayed in Table 1 and Table 2 and can be interpreted as long run effects. In this process, standard errors are obtained using the delta method [Papke & Wooldridge, 2005].

Table 1 Long-run coefficients from estimations explaining numbers of unemployed and border workers

	ln(Number of unemployed)		**ln(Number of border workers)**	
ln(Number of unemployed)	-	-	-0,266*	-0,158*
			(0,138)	(0,087)
ln(Number of border workers)	0,101	1,500	-	-
	(1,721)	(2,242)		
GDP per capita growth rate	0,043	-	0,018	-
	(0,064)		(0,012)	
Employment growth rate	-	-0,018	-	0,020
		(0,082)		(0,015)

Exchange rate (EUR|CHF)	-0,037	0,008	0,012	0,007
	(0,048)	(0,054)	(0,016)	(0,012)
# Obs.	82	82	86	86
F-stat	5,742**	6,121**	15,909***	14,663***
t-stat	-4,589**	-4,250**	-2,559	-3,321+

*/**/***: significant at 10/5/1%. +/++/+++: F-stat or t-stat is between the 10/5/1% I(0) and I(1) critical values. Standard errors are obtained using the delta method. Number of unemployed is seasonally adjusted.

Table 2 Long-run coefficients from estimations explaining unemployment and border worker rates

	Unemployment rate		**Border worker rate**	
Unemployment rate	-	-	0,127	0,220***
			(0,093)	(0,073)
Border worker rate	-0,080	0,641	-	-
	(0,698)	(0,769)		
GDP per capita growth rate	-0,566***	-	0,190*	-
	(0,163)		(0,104)	
Employment growth rate	-	-0,456**	-	0,355***
		(0,206)		(0,100)
Exchange rate (EUR|CHF)	0,161	0,091	-0,056	-0,077
	(0,119)	(0,139)	(0,069)	(0,049)
# Obs.	82	82	85	85
F-stat	16,896***	5,511**	4,768*	7,763***
t-stat	-4,873***	-4,509**	-2,940	-4,120*

*/**/***: significant at 10/5/1%. +/++/+++: F-stat or t-stat is between the 10/5/1% I(0) and I(1) critical values. Standard errors are obtained using the delta method. Number of unemployed is seasonally adjusted.

32 Two steps are necessary to establish that cointegration exists between the series considered. First, the model in (1) is re-parameterised into a conditional error-correction model (ECM). In this setting, one should find significant coefficients for the lagged values,

a hypothesis which can be tested by performing an *F*-test. Second, as in a usual error-correction model, one should find a significant coefficient for the error-correction term (ECT), implying that the system corrects back to the equilibrium relationship, and hence that there is indeed cointegration. This second hypothesis is tested via a *t*-test.[8] The distribution of both the *F*-statistic and the *t*-statistic are non-standard, and Pesaran et al. [2001] supply bounds on the critical values for the asymptotic distribution. The lower bound is based on the assumption that all series are *I(0)*, and the upper bound on the assumption that all series are *I(1)*. If the test statistic is lower than the bottom critical value, then there is no cointegrating relationship between the series. If it is within the bounds defined by the bottom and top critical values, no conclusion can be drawn. If the test statistic is larger than the top critical value, there is a cointegrating relationship between the series.

33 To ascertain the existence of a relationship based on equation (1), one should therefore obtain large *F*-statistics and large (absolute values of) *t*-statistics for the ECT. In our case, we obtain very significant test statistics in relationships determining the number of unemployed (Table 1) and the unemployment rate (Table 2). When determining the number of border workers however, the relationships are less well identified. The *F*-statistics are significant, but the *t*-statistic are below or only close to the 10% critical values. Such a result could have been expected, considering that border workers come from various countries for which our determinants do not encompass precise push factors.[9] We also note that the *F*-statistics are much larger in the estimations explaining the unemployment rate compared to the ones explaining the number of unemployed, while the estimations explaining the number of border workers show larger *F*-statistics than the ones explaining the border worker rate. Our interpretations of the long run coefficients displayed in Table 1 and Table 2 therefore mostly focus on these more significant relationships.

34 Our findings indicate that border workers have no impact of any kind on unemployment. Both coefficients from border workers to unemployment are indeed non-significant. Hence, there is no apparent substitution between the two groups. On the other hand, the coefficient from the number of unemployed toward the number of border workers is negative and significant, suggesting that local unemployment constitutes a repelling factor for border workers.[10]

35 In addition, we find that economic growth (either measured by GDP per capita or by employment) lowers the unemployment rate and attracts border workers. Every additional percentage point of GDP or employment growth yields a decrease of around 0.5 percentage point in the unemployment rate and at the same time an increase of almost 2 percent (not significantly estimated) in the number of border workers. This is important to emphasize that the effect of economic growth takes place in addition to the identified relationships between unemployment and border workers. Having an opposite effect on the two variables of interest, growth could in fact create an apparently negative (but non-causal) relationship. Our finding of a negative effect from unemployment to border workers cannot therefore be explained by a simple rise in economic activity that would benefit both local and foreign labor supply, but more likely because a higher local unemployment discourages border workers to look for a job in Switzerland.

5. Longitudinal analysis on cantons and regions

36 The second part of our empirical analysis is based on longitudinal data at the cantonal and regional level. We investigate the same relationships between unemployment and border workers over the same observation window (first quarter of 1996 to third quarter of 2017), but using a panel dataset of all Swiss cantons or NUTS-2 regions (i.e., groups of cantons) instead of a single time series at the country-level.[11] This will allow us to take advantage of the variability across cantons and not only over time. To this end, we rely on equations of two forms:

$$u_{it} = \alpha + \sum_{k=1}^{K} \beta_k u_{i,t-k} + \sum_{k=1}^{K} \gamma_k bw_{i,t-k} + \varepsilon_{it} \quad (2)$$

$$u_{it} = \alpha + \gamma bw_{it} + \delta emp_{it} + \lambda' Z_t + \mu_i + \varepsilon_{it} \quad (3)$$

where u_{it} is the unemployment rate in canton (or region) i at time t, bw_{it} is the border worker rate, emp_{it} is employment growth rate (only available at regional level), and Z_t is a vector of exogenous covariates common to all cantons or regions (quarter of year dummies and linear time trend or time fixed effects). In the longitudinal models, we do not consider GDP per capita, because it is not available at the cantonal/regional level over a sufficiently long period nor a sufficiently high frequency. In estimations based on regional data, we nevertheless include the employment growth rate, which will serve as a proxy for the GDP per capita growth rate. In addition, we do not consider the exchange rate by assuming that is identical for all cantons or regions, and whose effects can thus be captured through time fixed effects.

37 Like in the time-series analysis, we investigate the relationship in both direction, swapping u_{it} and bw_{it} in equations (2) and (3). Nevertheless, we only investigate the relations between unemployment and border worker *rates*, and not between the absolute numbers of unemployed and border workers. We do so because the cantons and regions differ widely in size, so that considering absolute numbers would not make much sense. In each canton, the rates are computed by dividing respectively the numbers of unemployed and border workers by the same active population.

38 Equation (2) is used to investigate whether the two variables are causally related at the panel level, based on a test proposed by Dumitrescu & Hurlin [2012] and implemented by Lopez & Weber [2017]. The test is the panel equivalent to the one proposed by Granger [1969] for time series. The basic idea is that if past values of one variable are significant predictors of the current value of another variable even when past values of the latter have been included in the model, then the first variable exerts a causal influence on the second. Equation (3) is a fixed effect panel model, which will then be used to investigate in which direction and intensity border worker rates affect unemployment rates (and vice versa).

39 To implement Dumitrescu & Hurlin's [2012] panel causality test, we need to establish that variables u_{it} and bw_{it} are both stationary, so that they can be meaningfully introduced in equation (2). The results of a series of panel unit root tests [Levin et al., 2002] are reported in Appendix Table 10. The results are consistent with those obtained at the country-level:

Unemployment rate is stationary but border worker rate is non-stationary. Nevertheless, we find that border worker rate is trend-stationary. As a preliminary step to our panel causality tests, we therefore detrend the border worker rate individually for each canton and region, a process which allows to retain the variations in the series while removing its deterministic linear trend. As shown in the last column of Table 10, the series thus obtained is indeed stationary. Hence, when estimating equation (2), u_{it} is the seasonally adjusted unemployment rate and is the detrended border worker rate.

40 The results of the panel causality tests are displayed in Table 3 and provide a picture largely consistent with that obtained in the time-series analysis conducted in Section 4. There is clear causality from the unemployment rate toward the border worker rate. Whether the test is conducted on cantons or regions, restricted to border areas or not, the test statistic is always large and very significant. However, we find almost no indication that border worker rate causes unemployment rate. The only significant test statistic for this direction is obtained when we restrict the sample to border cantons (i.e., the 15 cantons displayed in dark in Figure 5). The test statistic is moreover much smaller than for all the opposite relationships.

Table 3: Panel causality tests

	Cantons/Regions	Lags	Test statistic	p-value
Cantons				
BW rate → U rate	All (26)	2	1,204	0,229
U rate → BW rate	All (26)	1	9,235***	0,000
BW rate → U rate	Border (15)	2	2,937***	0,003
U rate → BW rate	Border (15)	1	9,833***	0,000
Regions				
BW rate → U rate	All (7)	2	0,732	0,464
U rate → BW rate	All (7)	1	5,772***	0,000
BW rate → U rate	Border (6)	2	0,723	0,470
U rate → BW rate	Border (6)	1	4,598***	0,000

*/**/***: significant at 10/5/1%. H0: left variable does not Granger-cause right variable. H1: left variable does Granger-cause right variable for at least one canton/region. Number of lags selected by minimizing BIC. Unemployment rate is seasonally adjusted. Border worker rate is detrended.

41 Table 4 displays the fixed effects panel estimations explaining the unemployment rate (columns (1) and (2)) and the border worker rate (columns (3) and (4)). In both cases, we estimate various specifications using all cantons/regions or only border cantons/regions. We emphasize once again that employment growth is included only in the estimations at the regional level, because a quarterly measure is lacking at the cantonal level.

42 Our findings indicate that, if anything, the border worker rate affects the unemployment rate negatively (in a statistical sense). In cantonal estimations, coefficients are very close to zero not significant, while they are slightly negative and significant in regional estimations. When the border worker rate increases by 1 percentage point, unemployment tends to decrease by between 0 and 0.5 percentage point. For border cantons/regions, the effects are only slightly stronger. Overall, our findings thus indicate that the impacts from border worker rate to unemployment rate are rather small. This is in line with the panel causality tests reported in Table 3, which show that causality in this direction is weak or even non-existent.

43 Concerning the opposite relationship, from unemployment to border workers, we obtain that unemployment rate is associated with negative changes (in a statistical sense) in the border worker rate. The estimation on all regions shows that when unemployment increases by 1 percentage point, the border worker rate decreases by 2.2 percentage points. The reaction of the border worker rate appears stronger in the border regions. In estimations at the cantonal level, the effects are however small and not significant.

44 We also note that coefficients related to employment growth have the expected negative effect on unemployment and positive effect on border workers, but the effects are never significantly estimated. Appendix Table 11 reports similar regressions where observations are weighted by the active population, thus giving more importance to larger labor markets. The results of these estimations are similar to those presented in Table 4, but the coefficients obtained on cantonal and regional levels are closer to each other and lie between those obtained in unweighted regressions.

Table 4: Panel estimations explaining unemployment rate and border worker rate

	Unemployment rate		**Border worker rate**	
	(1)	(2)	(3)	(4)
Cantons				
Unemployment rate	-	-	-0,007	-0,124
			(0,581)	(0,756)
Border worker rate	-0,000	-0,004	-	-
	(0,022)	(0,023)		
Constant	3,853***	4,716***	4,352*	8,004**
	(0,210)	(0,357)	(2,181)	(3,395)
Time FE	Yes	Yes	Yes	Yes
# Obs.	2262	1305	2262	1305
# Regions	26	15	26	15

Regions	All	Border	All	Border
R^2 within	0,771	0,801	0,271	0,422
Regions				
Unemployment rate	-	-	-2,245*	-2,686**
			(1,015)	(0,915)
Border worker rate	-0,047***	-0,056***	-	-
	(0,012)	(0,009)		
Employment growth rate	-0,006	-0,007	0,020	0,010
	(0,008)	(0,011)	(0,025)	(0,041)
Constant	4,837***	5,193***	16,172**	19,842***
	(0,393)	(0,451)	(4,574)	(4,584)
Time FE	Yes	Yes	Yes	Yes
# Obs.	609	522	609	522
# Regions	7	6	7	6
Regions	All	Border	All	Border
R^2 within	0,876	0,882	0,420	0,490

*/**/***: significant at 10/5/1%. Unemployment rate is seasonally adjusted. Robust standard errors clustered at the region level in parentheses.

Conclusions

45 Although economic theory does not preclude border workers to exert a negative impact on wages and unemployment by the simple increase in supply of foreign workers, our results largely confirm what has been found in the literature. We find no evidence of substitution taking place from local to border workers at an aggregate level. In fact, if any, our estimations point to a repelling effect of local unemployment toward border workers. One caveat should however be made with regard to the variable used for unemployment. Registered unemployment only accounts for the unemployed in the period of registration, and those who leave the employment services because they are not entitled to benefits anymore, could still in part at least be unemployed.

46 Our results are based on time-series and panel data econometrics. As such, it seeks to unravel causality from variations over time and (to a lesser extent) across cantons. To our knowledge, the present paper constitutes the first analysis of the effects of border workers on the Swiss labour market on such a long period: It makes use of the longest

observation window available to date, using quarterly series from 1996 to 2017. Several other papers have been investigating specific policy changes, therefore focusing on a few years before and after the change to unravel causality. Our paper is complementary to this literature, in the sense that we investigate long-run relationships, in a "normal state of affairs".

47 Based on our findings, one could formulate the following policy recommendations. Considering that causality from border workers to unemployment appears to be weak, the populist solution aiming at drastically reducing or even excluding border workers from the Swiss labour market to tackle local unemployment issues should not have the expected result in the long term at a macro level. On the other hand, because we find a strong negative causality from unemployment to border workers, we can expect a decrease in the local unemployment to be accompanied by a rise in the number of border workers, who would be attracted by a healthy labour market. Said otherwise, if policies implemented in Switzerland are successful in addressing unemployment issues, these will also benefit border workers. Swiss policy makers should therefore tolerate rises in the number of border workers and even contemplate such increases as positive spillover effects of their policies.

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APPENDIXES

Table 5: Data sources and descriptions

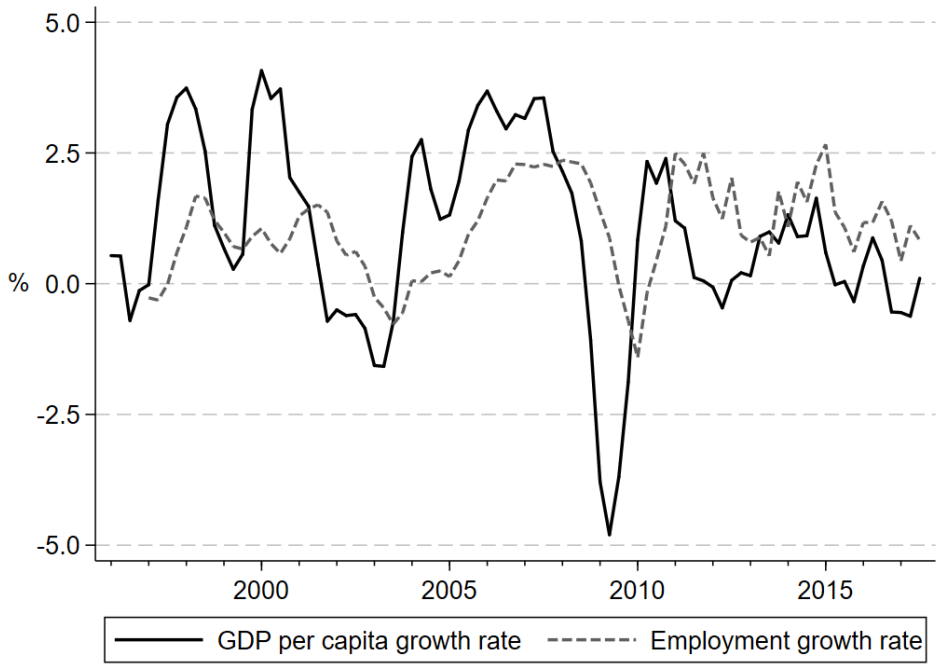
Variable	Source	Units	Description
Number of unemployed	SECO	10 000	Number of persons officially registered as unemployed in Switzerland
Number of job seekers	SECO	10 000	Number of persons officially registered as job seekers in Switzerland (includes the unemployed)
Unemployment rate	SECO	%	Official unemployment rate in Switzerland, computed as the number of unemployed divided by official active population
Number of border workers	SFSO (CCS)	10 000	Number of cross-border commuters measured in the Cross-border Commuters Statistics (CCS), i.e., foreign individuals holding a permit G and working in Switzerland
Border worker rate	SFSO	%	Number of border workers divided by the official number of active persons in Switzerland (same denominator used for calculating the unemployment rate)
GDP	SECO	2010 CHF	Switzerland's quarterly GDP in real terms:
Population	SFSO	1	Switzerland's population, measured on the 1st of January every year and linearly interpolated for quarters 2, 3, and 4.
GDP per capita growth rate	SECO + SFSO	%	Growth rate of GDP per capita (annualised): $\Delta\%gdp_t = 100\times(\ln(gdp_t) - \ln(gdp_{t-4}))$, where $gdp_t = GDP_t / Population_t$ is GDP per capita in quarter t = 1996:Q1, ..., 2017:Q3
Employment	SFSO (ES)	10 000	Number of persons in employment as defined in the Employment Statistics (ES), i.e., those who carry out an economic activity for at least one hour per week.
Employment growth rate	SFSO (ES)	%	Growth rate of employment (annualised): $\Delta\%emp_t = 100\times(\ln(emp_t) - \ln(emp_{t-4}))$, where is employment in quarter t = 1996:Q1, ..., 2017:Q3
Exchange rate (EUR|CHF)	SNB	#CHF = 1€ (10 cents of CHF)	Observed exchange rate (from SNB) for the period 1999-2017. Re-constructed for the period 1996-1998 (see footnote 5)

Table 6: Augmented Dickey-Fuller unit root tests

	Levels		First-differences	
	Lags	Test statistic	Lags	Test statistic
ln(Number of unemployed)	1	-3,926***	0	-9,349***
Unemployment rate	1	-3,722***	0	-10,055***
ln(Number of border workers)	3	-0,355	2	-9,953***
Border worker rate	0	1,364	0	-15,619***
GDP per capita growth rate	1	-4,550***	3	-8,337***
Employment growth rate	0	-2,719*	0	-16,699***
Exchange rate (EUR|CHF)	0	-0,087	0	-13,579***

*/**/***: significant at 10/5/1%. Number of lags selected by minimizing BIC. Unemployment series are seasonally adjusted.

Figure 4: GDP per capita and employment growth



Source : SECO: https://www.seco.admin.ch/seco/en/home/wirtschaftslage---wirtschaftspolitik/Wirtschaftslage/bip-quartalsschaetzungen-/daten.html (GDP), SFSO-ES: https://www.bfs.admin.ch/bfs/fr/home/statistiques/travail-remuneration/enquetes/spao.html (Employment)

Table 7: ARDL estimations explaining numbers of unemployed and border workers

	ln(Number of unemployed)		**ln(Number of border workers)**	
ln(Number of unemployed)	-	-	-0,016***	-0,013***
			(0,004)	(0,004)
L.ln(Number of unemployed)	1,445***	1,728***	-	-
	(0,100)	(0,081)		
L2.ln(Number of unemployed)	-0,583***	-0,799***	-	-
	(0,179)	(0,074)		
L3.ln(Number of unemployed)	0,232	-	-	-
	(0,187)			
L4.ln(Number of unemployed)	0,204	-	-	-
	(0,177)			
L5.ln(Number of unemployed)	-0,365***	-	-	-
	(0,098)			
ln(Number of border workers)	0,007	0,106	-	-
	(0,116)	(0,162)		
L.ln(Number of border workers)	-	-	0,938***	0,919***
			(0,024)	(0,024)
GDP per capita growth rate	-0,018***	-	0,001**	-
	(0,004)		(0,000)	
L.GDP per capita growth rate	0,009	-	-	-
	(0,007)			
L2.GDP per capita growth rate	-0,002	-	-	-
	(0,007)			
L3.GDP per capita growth rate	0,016**	-	-	-
	(0,006)			

L4.GDP per capita growth rate	-0,023***	-	-	-
	(0,006)			
L5.GDP per capita growth rate	0,021***	-	-	-
	(0,004)			
Employment growth rate	-	-0,001	-	0,002
		(0,006)		(0,001)
Exchange rate (EUR|CHF)	-0,002	0,001	0,001	0,001
	(0,003)	(0,004)	(0,001)	(0,001)
2nd quarter	0,019**	0,026**	0,006***	0,006***
	(0,008)	(0,010)	(0,002)	(0,002)
3rd quarter	0,010	0,015	-0,001	-0,001
	(0,008)	(0,010)	(0,002)	(0,002)
4th quarter	0,015*	0,017*	-0,005**	-0,005**
	(0,008)	(0,010)	(0,002)	(0,002)
Time trend	0,004	-0,081	0,090***	0,106***
	(0,131)	(0,178)	(0,025)	(0,025)
Constant	0,721	-0,443	0,891***	1,077***
	(1,354)	(1,864)	(0,269)	(0,268)
# Obs.	82	82	86	86
Adj. R^2	0,991	0,985	0,999	0,999
BIC	-323,116	-301,691	-567,157	-564,054

*/**/***: significant at 10/5/1%. Number of lags selected by minimizing BIC. Number of unemployed is seasonally adjusted. L. (LN.) denotes the 1st (Nth) lag of the variable.

Table 8: ARDL estimations explaining unemployment and border worker rates

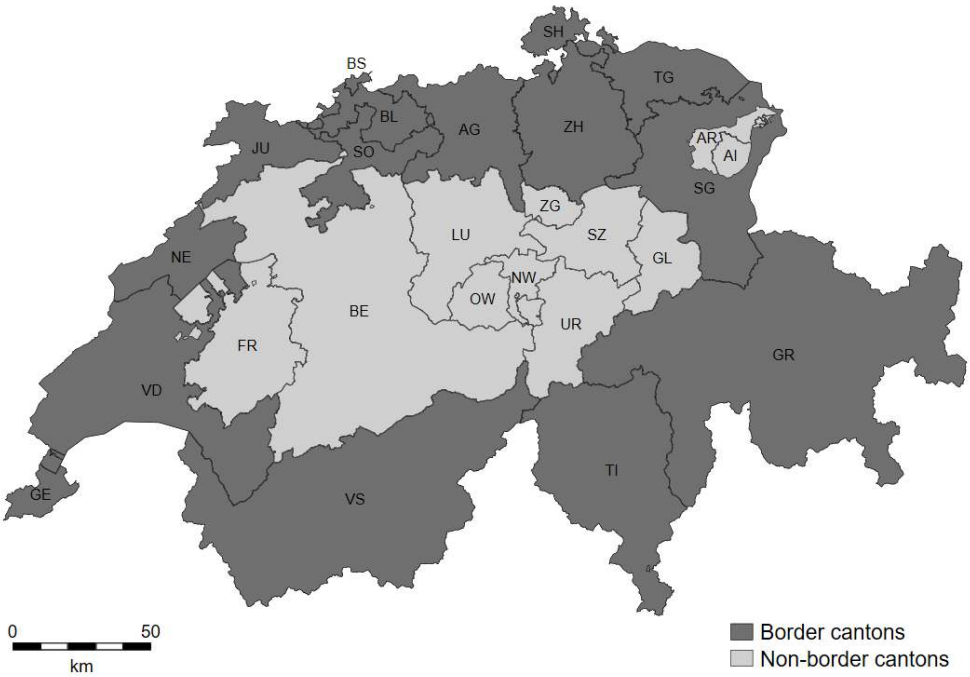
	Unemployment rate		**Border worker rate**	
Unemployment rate	-	-	0,254***	0,250***

			(0,066)	(0,055)
L.Unemployment rate	1,244***	1,578***	-0,374***	-0,342***
	(0,095)	(0,083)	(0,114)	(0,103)
L2.Unemployment rate	-0,242	-0,666***	0,133**	0,123**
	(0,158)	(0,074)	(0,065)	(0,058)
L3.Unemployment rate	-0,086	-	-	-
	(0,163)			
L4.Unemployment rate	0,227	-	-	-
	(0,156)			
L5.Unemployment rate	-0,228***	-	-	-
	(0,083)			
Border worker rate	0,652***	0,760***	-	-
	(0,140)	(0,182)		
L.Border worker rate	-0,659***	-0,704***	0,893***	0,860***
	(0,133)	(0,168)	(0,036)	(0,034)
GDP per capita growth rate	-0,048***	-	0,007	-
	(0,008)		(0,011)	
L.GDP per capita growth rate	-	-	-0,013	-
			(0,016)	
L2.GDP per capita growth rate	-	-	0,026**	-
			(0,010)	
Employment growth rate	-	-0,040*	-	0,050***
		(0,021)		(0,011)
Exchange rate (EUR|CHF)	0,014	0,008	-0,006	-0,011
	(0,010)	(0,013)	(0,007)	(0,007)
2nd quarter	0,004	0,021	0,066***	0,066***
	(0,031)	(0,037)	(0,020)	(0,019)

3rd quarter	0,027	0,025	0,035*	0,037*
	(0,029)	(0,034)	(0,020)	(0,019)
4th quarter	0,025	0,032	0,010	0,011
	(0,029)	(0,034)	(0,020)	(0,019)
Time trend	0,048	-0,127	0,520***	0,535***
	(0,272)	(0,315)	(0,161)	(0,145)
Constant	0,077	-0,059	0,274*	0,407**
	(0,228)	(0,294)	(0,163)	(0,158)
# Obs.	82	82	85	85
Adj. R^2	0,986	0,979	0,997	0,997
BIC	-121,265	-99,020	-182,139	-198,140

*/**/***: significant at 10/5/1%. Number of lags selected by minimizing BIC. Number of unemployed is seasonally adjusted. L. (LN.) denotes the 1st (Nth) lag of the variable.

Figure 5: Map of Switzerland and its cantons



Note: Cantons' full names are provided in Appendix Table 9.

Source : Federal Office of Topography - swissBOUNDARIES3D: https://shop.swisstopo.admin.ch/fr/products/landscape/boundaries3D

Table 9: List of cantons and regions

#	Canton	Full name	Border	Region (NUTS-2)
1	ZH	Zürich	Yes	Zürich
2	BE	Bern	No	Espace Mittelland
3	LU	Luzern	No	Central Switzerland
4	UR	Uri	No	Central Switzerland
5	SZ	Schwytz	No	Central Switzerland
6	OW	Obwald	No	Central Switzerland
7	NW	Nidwald	No	Central Switzerland
8	GL	Glarus	No	Eastern Switzerland
9	ZG	Zug	No	Central Switzerland
10	FR	Fribourg	No	Espace Mittelland
11	SO	Solothurn	Yes	Espace Mittelland
12	BS	Basel-Landschaft	Yes	Northwestern Switzerland
13	BL	Basel-Stadt	Yes	Northwestern Switzerland
14	SH	Schaffhausen	Yes	Eastern Switzerland
15	AR	Appenzell Ausserrhoden	No	Eastern Switzerland
16	AI	Appenzell Innerrhoden	No	Eastern Switzerland
17	SG	St. Gallen	Yes	Eastern Switzerland
18	GR	Graubünden	Yes	Eastern Switzerland
19	AG	Aargau	Yes	Northwestern Switzerland
20	TG	Thurgau	Yes	Eastern Switzerland
21	TI	Ticino	Yes	Ticino
22	VD	Vaud	Yes	Lake Geneva Region
23	VS	Valais	Yes	Lake Geneva Region
24	NE	Neuchâtel	Yes	Espace Mittelland
25	GE	Genève	Yes	Lake Geneva Region

26	JU	Jura	Yes	Espace Mittelland

Table 10: Levin-Lin-Chu panel unit root tests

	Trend	Lags	Test statistic
Cantons			
Unemployment rate	No	1,115	-4,932***
Border worker rate	No	0,846	4,748
Border worker rate	Yes	2,308	-6,584***
Border worker rate (detrended)	No	2,308	-5,689***
Regions			
Unemployment rate	No	2,857	-1,476*
Border worker rate	No	0,000	3,780
Border worker rate	Yes	0,000	-4,139***
Border worker rate (detrended)	No	0,000	-3,488***
Employment growth rate	No	3,571	-8,583***

*/**/***: significant at 10/5/1%. H0: Panels contain unit roots. H1: Panels are stationary. Number of lags selected by minimizing BIC. Unemployment series are seasonally adjusted. Column Trend indicates whether a time trend is included in the test or not. All tests contain fixed effects and cross-sectional averages are removed from the data to help control for cross-sectional correlation.

Table 11: Panel estimations explaining unemployment rate and border worker rate, Weighted regressions

	Unemployment rate		**Border worker rate**	
	(1)	(2)	(3)	(4)
Cantons				
Unemployment rate	-	-	-0,237	-0,416
			(0,625)	(0,708)
Border worker rate	-0,006	-0,011	-	-

	(0,016)	(0,017)		
Constant	4,341***	4,705***	4,836*	7,157**
	(0,230)	(0,324)	(2,612)	(3,169)
Time FE	Yes	Yes	Yes	Yes
# Obs.	2262	1305	2262	1305
# Regions	26	15	26	15
Regions	All	Border	All	Border
R^2 within	0,841	0,836	0,246	0,319
Regions				
Unemployment rate	-	-	-1,242	-1,587
			(0,964)	(1,016)
Border worker rate	-0,036*	-0,044**	-	-
	(0,018)	(0,016)		
Employment growth rate	-0,000	-0,001	0,026	0,023
	(0,008)	(0,011)	(0,019)	(0,030)
Constant	4,443***	4,622***	9,279*	11,382*
	(0,253)	(0,284)	(4,061)	(4,452)
Time FE	Yes	Yes	Yes	Yes
# Obs.	609	522	609	522
# Regions	7	6	7	6
Regions	All	Border	All	Border
R^2 within	0,912	0,917	0,383	0,425

*/**/***: significant at 10/5/1%. Unemployment rate is seasonally adjusted. Robust standard errors clustered at the region level in parentheses. All regressions are weighted by the official active population, averaged by canton/region over the observation period.

NOTES

1. Thereafter, we use the lighter expression “border worker” as a synonym for “cross-border worker”.

2. It is worth mentioning that border workers have no unemployment rights in Switzerland; only local workers are entitled to unemployment benefits.
3. This movement was mainly backed by the national MP James Schwarzenbach, member of the xenophobic political party "National Action". From 1968 onwards, he and his party launched a series of popular initiatives aiming at reducing foreign population, using arguments such as undermining Swiss cultural identity and economic overheating. The Swiss voted on these "Schwarzenbach's initiatives" first in 1970 and then again in 1974. Both were rejected.
4. In the canton of Ticino, the local government has proposed a "bottom-up safeguard clause" which considers the specificities of cross-border dynamics and provides for a more targeted scope than the national level. For more details, see Ambühl et al. [2016].
5. The Euro currency exists since 1999 (even though coins and notes started to circulate in 2002 only). For the period 1996-1998, we re-construct the EUR|CHF exchange rate using the exchange rates of the main currencies composing the Euro (DEM, FRF, ITL, ESP, NLG, BEF, ATS, and PTE) against the CHF and the exchange rates that were fixed for these 8 currencies against the Euro since 1999. This first step gives us 8 different but very similar series, with the largest difference between the highest and lowest value being 15 cents in January 1996 and the spread narrowing continuously until January 1999. The average standard deviation between these 8 series over the period from January 1996 to December 1998 is 0.013 while the average exchange rate obtained is 1.62. We then take the unweighted average of these 8 series. Using a weighted average would hardly make any empirical difference considering the minor differences between the series.
6. To make the series for cantons and regions of different size comparable, we display unemployment and border worker *rates*, instead of the absolute numbers of unemployed and border workers. Both rates are obtained by dividing respectively the numbers of unemployed and border workers by the active population in the canton/region.
7. Because GDP is not available at a finer geographical level in Switzerland, we will also estimate specifications in which we substitute GDP by the employment level. As shown in Appendix Figure 4, the growth rates of these two series are closely related, with employment reacting to GDP changes with 2 or 3 quarters of delay. Because our specifications potentially include a number of lags of each variable, we argue that one variable can be substituted for the other. Employment being available quarterly at the regional level, we will therefore be able to compare the results we obtain using time-series at the aggregate level with panel estimations (see Section 5).
8. The entire procedure for estimating and testing ARDL models is provided in the user-written Stata command "ardl" [Kripfganz & Schneider, 2016].
9. Including the unemployment rate differential between Switzerland and its neighbouring countries does not alter the results.
10. Counterintuitively though, the coefficients for unemployment rate are positive in the estimations of Table 2.
11. A list of the Swiss cantons and regions is provided in Appendix Table 9.

ABSTRACTS

Switzerland's labour market traditionally accommodates many cross-border workers: their number is currently above 300 000, corresponding to almost 7 % of the workforce. Social acceptance of such workers has however deteriorated over the last years, and questions arise over their potential adverse impacts on the local labour market. Using quarterly data over

1996-2017, we investigate the claim that border workers create unemployment among the local labour force, conducting both time-series analyses at the country-level and longitudinal analyses at the canton-level. Our findings indicate that causality runs mainly from unemployment to border workers, the latter being repelled when unemployment increases. The opposite effect, from border workers to unemployment appears to be weaker or even non-existent.

Le marché suisse du travail accueille traditionnellement de nombreux frontaliers : ils sont actuellement plus de 300 000, soit près de 7 % de la population active. L'acceptation sociale de ces travailleurs s'est toutefois détériorée au cours des dernières années. En utilisant des données trimestrielles sur la période 1996-2017, nous étudions l'affirmation selon laquelle les travailleurs frontaliers créent du chômage parmi la population locale, effectuant à la fois des analyses de séries chronologiques au niveau national et des analyses longitudinales au niveau cantonal. Nos résultats indiquent que la causalité va principalement du chômage vers les travailleurs frontaliers, ces derniers étant repoussés lorsque le chômage augmente. L'effet inverse, des travailleurs frontaliers vers le chômage, semble être plus faible, voire inexistant.

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