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ABSTRACT

We analyze the role of labor mobility in cushioning labor demand shocks in the Euro Area. We find that foreign born workers' mobility is strongly cyclical, while this is not the case for natives. Foreigners' higher population to employment elasticity reduces the variation of overall employment rates over the business cycle: thanks to them, the impact of a one standard deviation change in employment on employment rates decreases by 6 per cent at the country level and by 7 per cent at the regional level. Additionally, we compare Euro Area mobility to that of another currency union, the US. We find that the population to employment elasticity estimated for foreign-born persons is similar in the Euro Area and the US, while EA natives are definitely less mobile across countries than US natives are across states in response to labor demand shocks. This last result confirms that in the Euro Area there is room for improving country specific shocks absorption through higher labor mobility. It also suggests that immigration helped labor market adjustments.

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1. Introduction

Labor mobility is one of the channels through which country specific asymmetric shocks are absorbed in a currency area without generating large divergence in local unemployment rates (Fahri and Werning, 2014). Wage and price flexibility at the local level, counter-cyclical fiscal transfers (Mundell, 1961) and risk sharing through banking and capital market unions (Hoffmann, 2018) are other possible smoothing mechanisms.

In this article, we focus in particular on the Euro Area (EA), the subgroup of European Union countries that adopted the Euro as a common currency; like all European Union members, EA countries enjoy free movements of goods, services, capital and people within the EU as stated by EU treaties. All individuals legally residing in an EU country can thus move freely within the EU borders. Nevertheless, the mobility of European residents remains limited (Decressin and Fatas 1995; Obstfeld and Peri, 1998; Beyer and Smets, 2015; Arpaia et al. 2016). This can reduce the ability to absorb country specific shocks with small unemployment effects in the Euro Area relative to currency areas whose residents have a higher propensity to migrate since labour markets are better integrated (e.g., the United States).

Since the beginning of the Euro, in 1999, the share of immigrants, defined as foreign-born population, in the EA has grown from about 4.5 to almost 9 per cent of the population. In some countries, it has reached levels larger than the US, a country with a much longer immigration history. The largest part of the increase was driven by immigrants from outside Europe. The fast growth of this group has often been associated with the rise of anti-immigrant political movements (see Barone et al. (2016), Edo et al. (2017) and Halla et al. (2017), among others).

In spite of popular opposition to immigration, most academic studies show that immigrants have several features that could help EA labor markets and local economies. First, usually immigrants tend to be more mobile than natives are and they respond more actively to local labor market conditions by moving (as first pointed out by Borjas, 2001). This feature provides a potential buffer of workers with a high propensity to move that can attenuate the wage and non-employment consequences of local shocks on native workers (as found by Cadena and Kovak, 2016 for the US). Second, several studies focusing on less educated immigrants show that they take manual and unskilled jobs encouraging native workers to move to opportunities, stimulating geographical and occupational mobility and upgrading their job skills. This mechanism contributes to labor market mobility and flexibility, which in the long-run may benefit employment and wages of natives, or at least attenuate potential competition effects from immigrants.[1]

[1] D'Amuri and Peri (2014) show this mechanism for the EU before the Great Recession; Foged and Peri (2016) show this mechanism at work in Denmark; Basso, Peri and Rahman (2017) show that, due to their specialization, migrants can "push" natives in the intermediate part of the wage distribution reducing polarization of the labor market for natives.

Existing studies analyze these mechanisms in country-specific contexts, and most of the attention has been focused on long-run wage and employment effects of immigration. Using information on birthplace of workers for the euro area countries from the European Labor Force Survey 2007-2016, we analyze less explored but very important aspects of labor market adjustments in Europe in the short and medium run.

First, exploiting the different intensity of labor demand expansions and contractions, during the Great Recession/sovereign debt crisis period in different EA countries, we document how natives and foreign-born mobility varies with country-specific employment variations. To extend and interpret these results, and test their robustness, we also carry out the same analysis at the region level. We first estimate the elasticity of population changes to employment downturns and upturns. This simple coefficient illustrates how mobility of people across regions and countries offsets the unbalances across labor markets, reducing the variation of employment rates across them. We then test whether foreign-born individuals are more mobile than natives, as found in the US, and whether this elasticity differs between EU-born (residing outside of their country of birth) and extra-EU born workers. To identify more cleanly a response of population to labor demand shocks we also construct a proxy for sector-driven local shocks, in the form of a "Bartik" or shift-share index that should proxy sector-productivity-driven demand shocks. We track the response to those using them as instrumental variables for employment changes. We further analyze whether the response to negative demand shocks is different from that to positive shocks and whether this elasticity is different if these shocks are unusually large.

In the second part of the analysis, we test whether immigration played a role as a shock absorber in the area. To do this, we exploit pre-existing differences (as of year 2006) in the presence of foreign-born workers across EA regions and we test whether natives' employment and population changes are more insulated from labor demand shocks in areas with a pre-existing larger share of foreign workers who act as a "buffer". Finally, using similar data and approach, we compare main results obtained for the Euro Area with those obtained for the US during the same period.

Compared to the previous literature, we extend and complement the most recent papers of Beyer and Smets (2015), Arpaia et al. (2016) and Dao et al. (2018), which are based on the seminal works of Blanchard and Katz (1992), Decressin and Fatás (1995) and Obstfeld and Peri (1998), in two important ways. First, by looking at the most recent period, we include all the Euro Area countries and we encompass in the period of analysis the Great Recession and the sovereign debt crisis period. Second, and most importantly, we distinguish between natives and foreign-born mobility and we analyze further the role of foreign born in absorbing asymmetric shock. When possible, we disentangle the mobility of EU-born from that of non-EU-born in order to understand whether the contribution of migration in smoothing employment shocks comes from movement of people from outside the EU.

We find that, while mobility of foreign-born responds to local economic conditions, this is not the case for natives, whose migration responses are smaller and less reactive to the employment fluctuations of the local labor markets. We calculate that the higher population to employment elasticity of foreign-born persons reduces the impact of a shock equal to one standard-deviation of the variation in overall employment on employment rates by 6 per cent at the country level and by 7 per cent at the region level. Further evidence shows that in areas with lower historical presence of immigrants, natives are more exposed to labor demand shocks and tend to migrate more. This confirms that immigrants and their mobility are substitute for natives' mobility and attenuate variation of native employment rates. Finally, based on similar data, we compare results found for the Euro Area with those obtained by a similar analysis in US states. We find that the population to employment elasticity is similar for immigrants in Europe and in the US. However, the migration response to employment shocks of individuals born in US states is definitely higher than the one found for individuals born in Euro Area countries, confirming that lack of adequate labor mobility of natives in the Euro Area may limit the ability of the currency area to adjust to country specific shocks. The larger internal mobility of foreign-born workers implies that encouraging extra-EU immigrants could improve and smooth the functioning of the EU labor markets.

The rest of the paper is organized as follows: Section 2 presents the data and the descriptive statistics, while Section 3 and 4 discuss the identification strategy and main results. Section 5 focuses on extensions to the main results, while Section 6 provides robustness checks. A comparison between the Euro Area and the United States is carried out in Section 7 and Section 8 concludes.

2. Data and Summary Statistics

Our empirical analysis uses microdata from the Eurostat Labour Force Survey (EU LFS), a large harmonized household survey that collects data and information to monitor European countries' labour market dynamics. The sample we use is composed of all people aged 15-64, not enrolled in school and not living in group quarters residing in Euro Area countries during the period 2007-2016. We aggregate the microdata at the country and regional levels using the NUTS-2 definition (Nomenclature Units for Territorial Statistics). They broadly correspond to what are commonly called "regions" and sometimes we have to aggregate some of them to obtain geographically consistent definitions over time. We then create a balanced panel for each year in the interval 2007-16. The main limitations of these data are two: i) some countries started recording the main variables of interest only recently, thus limiting the span of our time series, ii) the dataset has no detailed information on wages.[2]

We will primarily look at how mobility absorbs labor market shocks and fluctuations looking at population and employment levels that we respectively define as the number of working-age

[2] Our main sample includes both early euro adopters (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain) and late adopters (Cyprus, Slovakia, Estonia, Latvia, Lithuania and Slovenia). We do not include only Malta as the data are available from 2009 onwards only. For more details on sample selection see Table A1 in the Appendix.

individuals residing in a given area (country or region) and those among them who have worked in the survey reference week according to the ILO definition. We look at developments of such variables both for the overall working-age population and for the subgroups of natives and foreigners, both defined by the place of birth reported in the survey.[3] We further distinguish foreign-born between those born inside the European Union, but outside the country of residence and those born outside of the European Union. We consider the definition that includes 28 EU members.[4]

Table 1 summarizes the annual change in the average working-age population and the change in foreign-born population shares over the 2007-2016 period, for the countries that are included in the balanced panel. Two main features are evident from the table and they are important for our analysis. First, there is a large degree of heterogeneity in the annual average growth rates of the working-age population across countries. Those rates tend to be negative for natives and positive for foreign born individuals, reflecting both ageing societies and an increase in international migrants in Europe. Second, immigration from outside the EU is quantitatively very significant. The average annual growth rate of foreign-born population averages 2.9 per cent and can be as large as 10 per cent in some countries for extra-EU born. As a consequence, during the considered period, there was a large and positive change in the share of foreign-born population of EA countries, with the exception of Latvia.

Finally, we compare the evolution between 2007 and 2016 of the foreign born population shares over total population across Euro Area countries (Figure 1) and US states (Figure 2). Across US states, the relative shares of migrants are rather constant in the ten year interval (compare maps in 2007 and 2016), implying small reallocation of foreign-born relative to natives across states. To the contrary, in the Euro Area, foreign-born shares increased in countries that performed better, from an economic point of view, during the ten year interval (such as Germany for example) and decreased in countries that fared relatively worse (Greece). This is consistent with larger mobility of foreign-born relative to natives in response to economic shocks.

3. Identification strategy

Using EU-LFS data, we first document how population changes with employment shocks in European countries and regions, which in the rest of the section we will refer to as "areas" interchangeably. Following an approach used in previous work on the US states by Cadena and Kovak (2016), we start with a simple analysis that produces informative correlations. We regress, for each of the two groups (natives and foreign-born), the log of working age (15-64) population *P*

[3] Only for Germany we use citizenship instead of place of birth, since this last information is not available in the EULFS.
[4] Refugees are excluded from our sample because asylum applicants and displaced persons who have been granted temporary protection reside in group quarters until their asylum application has been accepted. Moreover, according to Eurostat, the coverage of recent migrants is limited in the EU LFS data. For these reasons even the most recent data do not cover yet the recent refugee migration waves.

on the log of employment E for area a in year t after controlling for area (country or region) and year fixed effects.

If local employment fluctuations are driven by changes in the local demand for labor, in the short run (an assumption that we will relax later by instrumenting local employment changes with proxies of sector-specific demand shocks) the coefficient in the regression captures the population response associated to these shocks for different groups. An underlying assumption is that there are not significant complementarities/spillovers across groups that would imply that a change in demand for a group spreads its effects to another group. This approach simply relates changes in population of a group to the change in own group employment.[5] The estimated regression is the following:

$$\log(\mathrm{P}_{a,t}^{g}) = \beta^{g}\log(E_{a,t}^{g}) + \alpha_t + d_a + \varepsilon_{a,t}^{g} \quad (1)$$

Where α_t captures year fixed effects (FE), d_a captures area (country or region) FE and $\varepsilon_{r(c),t}^{g}$ is a randomly distributed error with zero mean. As we are interested in heterogeneous responses by demographic group, all variables are group specific (natives, foreign born indexed by *g)*. All the regressions, covering the ten-year period 2007-16, are weighted by the 2006 working age population in the area, while the standard errors are clustered at the area level.

In equation (1), β^{g} identifies the population to employment elasticity of group g. Namely, in association with a shock to employment of the own group equal to 1 per cent, the population of that group will change by β per cent. Hence, a value of one implies that net migration/mobility response will completely absorb the employment shock in the region, leaving the employment-to-population rate for that group unchanged. A value smaller than one, instead, implies an increase in non-employment in the area if the shock is negative and a decrease of non-employment if the shock is positive. Differences in the size of this coefficient between different population groups will thus denote heterogeneity in how their local population varies with employment shocks. The analysis summarized in equation (1) is performed for different sample periods. The main results are reported for the whole 2007-2016 interval, but we also break down the sample in two: the Great Recession (2007-2010) and the subsequent years of uneven recovery across countries (2011-2016).

The literature often considers innovations in $E_{a,t}^{g}$ identified through a VAR methodology or through technology-driven exogenous changes, as labor demand shocks (Blanchard and Katz, 1992; Cadena and Kovak, 2016). At first, we implicitly assume that region-specific employment changes, once region and time effects are controlled for, reflect demand rather than supply shocks; moreover, in equation 1 we are also assuming that labor demand shocks are group specific.[6]

[5] As a robustness check, we also run all the main regressions of the paper including a control for log employment in the other group or using overall employment as a measure of the shock and the results are essentially unchanged.

[6] As already mentioned in the previous note, as a robustness check, we also run all the main regressions of the paper including a control for log employment in the other group or using overall employment as a measure of the shock and the results are basically unchanged.

We then consider an instrumental variable identification strategy that isolates demand shocks, as driven by national sector trends and regional industrial composition. Changes in local employment could be correlated with unobserved time-varying factors captured by the error term (e.g., changes in labor supply that might themselves be driven by local population changes, time-varying amenities, etc.). Hence we instrument employment levels in an area (country or region) with a proxy of local sector-specific changes in labor demand as suggested by Bartik (1991). In particular, we multiply the region (country) level sectoral employment shares in 2006 by the employment level of the sector at the country (euro area) level in each year t, constructing the following variable, specific to each region and year:[7]

$$\text{Bartik IV} = \sum_j \frac{E_{a,j,2006}}{E_{a,2006}} * E_{A,j,t} \qquad (2)$$

where *a* indicates the area (country or region, depending on the specification), *A* the relative macroarea (Euro Area or country, respectively) and *j* indexes 13 sectors as identifiable in the EU LFS. Based on the first stage estimates of $\widehat{E^{g}_{a,t}}$, we then estimate the potential response of population changes to the Bartik-predicted changes in labor demand.

4. Main results

Table 2 reports the elasticity of total adult population to employment at the country (panel A) and the region level (panel B) in the entire sample period (Column 1), and splitting the sample into sub-periods, around the Great Recession (Column 2), and during the sovereign debt crisis and the more recent recovery (Column 3). Two clear patterns emerge. First, on average the elasticity is around 0.2, implying limited mobility[8] in response to shocks and hence a sharp decline in employment-to-population ratio (increase in non-employment population ratio) during recessions and a corresponding increase (decrease) during booms. Second, the adjustment seems to be slightly larger at the regional level (where the elasticity equals 0.3) than at the country level.[9] Mobility across countries is one of the channels through which country specific asymmetric shocks can be absorbed in a currency area, together with wage and price flexibility and fiscal transfers (Mundell, 1961; Fahri and Werning, 2014). The low mobility response at the regional level, suggests that even individual EU countries may be subject to small internal mobility and hence prone to large regional unemployment in response to local labor demand shocks. As already highlighted in the previous literature (Beyer and Smets, 2015; Arpaia et al. 2016) the limited mobility of European residents reduces the ability of absorbing asymmetric shocks in the EA,

[7] We chose as base year 2006 to optimize the trade-off between power and exogeneity of the instrument. In the context of Bartik instruments, a recent paper by Jaeger et al. (2018) suggests to use the share from a baseline year as far as possible for the period analyzed. However, we would lose power in going much back in time with respect to 2006.

[8] Cadena and Kovak (2016) for the US find for example an elasticity that is about twice as large.

[9] The elasticity is larger for demographic groups which are traditionally more prone to mobility such as young people (see Appendix Table A13 in Appendix) and high educated individuals (see Appendix Table A14).

especially vis à vis other currency areas whose residents have higher propensity to migrate and whose labour markets are better integrated (e.g., the United States).[10]

Before moving to the analysis by nativity, we establish whether the first stage of the 2SLS identification strategy introduced in the previous section is strong. Table 3 reports the first-stage relationships at the country and region level for native and foreign-born individuals for the entire sample period and for the two main sub-periods. The analysis shows that overall there is a strong and positive relationship between actual employment and the predicted (demand-driven) employment from the sector-specific Bartik, after controlling for area and year fixed effects. The Kleibergen-Paap F-statistic of excluded instruments is well above critical values as calculated in Stock and Yogo (2005) for natives in the country level regressions (Panel A) and for foreign born in the region level ones (Panel B). In the other two cases the values are lower and point to the possible presence of weak instrument bias in the estimates (25% bias compared to the OLS according to the Stock and Yogo, 2005 critical values). We have to acknowledge such limitations when looking at the second-stage estimates for these subgroups. In Table 4 we split the first stage estimates of Table 3, panel B between the subgroups of EU versus extra-EU born among immigrants, hence identifying three groups, finding similar results.

Table 5 and 6 report the estimates of equation (1) by nativity status respectively at the country level and at the region level. According to these estimates, for a given employment shock foreign-born are significantly more mobile than natives, both at the country and at the region level. This is true both in general and in different sub-periods. In particular, the estimate for the population to employment elasticity of natives is equal to 0.1 and 0.3 respectively at the country and at the region level in the OLS estimates. The coefficient is not statistically different from zero in the 2SLS estimates. For foreigners, instead, such elasticity tends to be higher and significant, ranging in most cases between 0.6 and 0.8. One exception is the 2SLS estimate for the elasticity of foreign population to employment at the national level. That coefficient is not statistically different from zero when considering the whole interval; it is however positive and significant when looking separately at the two sub periods (2007-10 and 2011-16).

In Table 7, we pursue the analysis at the regional level, also differentiating between foreigners born in the EU (columns 2, 5 and 8) and foreigners born outside of the EU (columns 3, 6 and 9). When distinguishing these two groups of immigrants we find point estimates for the population to employment elasticities that are equal to 0.7 for migrants born in the European Union and to 0.8 for those born outside of the EU; 2SLS estimates are one decimal point lower for both groups. Results are also very similar when looking at the two sub-periods 2007-10 and 2011-16. These results provide a robustness check for the main findings of this paper while also showing that migrants have a similar mobility response to employment shocks irrespective of being born inside or outside of the EU, possibly because they already moved at least once since their birth. It seems

[10] A deeper comparison on mobility in the two currency areas is carried out in Section 7.

that earlier cross-country mobility ensures a higher level of regional mobility in response to employment shocks.

A final note on the magnitude of foreign-born mobility, to provide a comparison of their level of mobility in response to shocks. The response of population to employment of foreign born individuals in Europe is similar to that of high skilled workers in response to skill-specific labour demand shock (Table A14). This result suggests that immigrants' location choices are responsive to the labour market outlook to the same extent as those of high skilled workers. A combination of low mobility costs and high sensitivity to economic returns can be the reasons for such high level of mobility of foreign-born.

5. Mobility and employment rates smoothing

The analysis conducted so far is informative of the population elasticity of natives and foreign-born to employment shocks. It does not allow, however, to quantify by how much foreign-born mobility absorbs local shocks and shields natives from their consequences on their employment rate. To answer this question we perform two separate exercises.

First, based on the previous estimates, we construct three simple counterfactual exercises in which we simulate the impact of a decrease equal to one standard deviation in the variation of employment on the employment rate in: i) the status quo with estimated elasticities, ii) when we attribute to migrants the mobility we observe for natives and iii) vice-versa. Second, inspired by the seminal work of Blanchard and Katz (1992), we calculate impulse responses to labor demand shocks on different margins of labor market adjustment although with limitations due to the fact that i) we can only leverage a limited time series and ii) we don't observe wages.

5.1 Simulations

In order to quantify the impact of the larger population to employment elasticity of foreigners on employment rates fluctuations, we carry out a simple counterfactual exercise.
Using the estimated values of β^g from equation 1, we simulate for each area the impact of a decrease equal to one standard deviation of the series of overall employment variations on the employment rate for the working age population. In a first exercise, we do so using the group specific values β^g estimated by 2SLS for the recession period (2007-10)[11] and actual shares of migrants on 15-64 population. Such estimate for the new employment rate, that we call the *status quo* estimate, is our best estimate - based on the group-specific elasticities - of the variation of the employment rate following a one standard deviation decrease in employment shock.
Then, for the same employment shock, we reconstruct two counterfactual scenarios. One, that we call Upper Bound (UB), in which we assume that the population to employment elasticity for

[11] For country (region) level simulations we consider the 2SLS estimates for β^g reported in the Panel B, columns 3 and 4 in Table 5 (6).

natives is as high as it is for foreign born. The other, that we call Lower Bound (LB), considers the case in which the opposite is true and immigrants are as responsive to employment shocks as natives.

In the status quo, a one standard deviation decrease in employment determines a -1.3 percentage point decrease of the employment rate in the group of countries analyzed here. The negative impact of employment changes on the employment rate is larger where the initial employment rate is higher and where the share of foreigners is lower. Assuming that the value of β is equal to the natives' one for all workers (Lower bound), the drop in the employment rate would have been equal to -1.5 percentage points. In other words, foreigners' presence reduces by 0.2 points (-6 per cent) the impact of a one standard deviation decrease in employment on the employment rate. In the opposite case, assuming a value of β that is equal to the foreign born level for all workers, such a drop would imply a change by only -0.8 percentage points. Country by country results are reported in Figure 3, where the *status quo* employment rate changes following a one standard deviation decrease in employment are shown in blue, the Upper Bound simulations in red and the Lower Bound ones in green. It is important to note that, as the foreign born share of the working age population increases, the decrease in the employment rate in the status quo decreases as well, thanks to foreigners' higher mobility.

We also repeat the same analysis at the region level (Figure 4), finding similar results. A one standard deviation decrease in employment in this case implies a 1.7 per cent reduction in the employment rate in the *status quo*. The impact would have been equal to 2.0 p.p. assuming migrants had the same β of natives and equal to 0.4 in the opposite case with natives being as mobile as foreigners when faced by a similar employment shock.

This simulation shows that if all workers had a level of native mobility comparable to that of foreign-born a 1.9% decline in employment (which is equal to a standard deviation of the variation of overall employment) would generate only a 0.6 per cent decline in employment rate; if all individuals had natives population to employment elasticity (not statistically different from zero in our estimates), the drop would have been equal to 1.4 percentage points. In other words, if all individuals were as mobile as foreign born, the variation in employment rate would have been 57% lower than in a no mobility scenario. This compares closely with the part of employment shock absorbed by migration in the estimates of Blanchard and Katz (1992). In that paper, (page 34) one lost job in a US state implies 0.65 individuals migrating out and the remaining 0.35 absorbed by lower employment/population ratio. With native mobility as large as foreign-born mobility, European countries would look not very different from US states in their ability to absorb shock, in the short run, with limited increase of unemployment rate. These back of the envelope calculations are confirmed in our analysis of US population to employment elasticity reported in section 7.

5.2 Further evidence

Until now we have documented the existence of a positive relationship between local employment shocks and migrants' mobility in the euro area; such a strong relationship is not found for natives, for whom there is a much weaker tendency to link locational choices to labor market conditions.

Within the context of high, even if not perfect, substitutability between native and foreign-born[12] the mobility response of foreign-born would reduce the wage and employment impact of labor demand shocks on natives. Hence, in locations with a large presence of immigrants the fluctuations of native employment rates would be smaller. As the previous simulation made clear, at one extreme, in absence of any migration response (i.e. with β=0 in equation 1), changes in employment rates in a given area would be proportional to changes in employment. On the other hand the impact of a change in employment on population would be smoothed with migration response (i.e. with β>0 in equation 1), up to the point where (for β=1) employment rates and employment shocks would become uncorrelated. If foreign-born have a much higher mobility than natives (as shown above) and if they are gross substitutes with natives, the employment impact of a negative shock to the labor demand will be attenuated by the presence of foreign-born. If foreign-born and natives were gross complements, instead, the presence of immigrants with high mobility in response to shocks could amplify their effects on natives as demand for native labor would further drop as foreign-born leave.

The smoothing (or amplifying) impact of foreign-born on natives' employment rate variations can be estimated and it will provide an indirect test of their acting as shock absorber and being gross substitutes for natives. To do so, we compare areas that, at the beginning of the period, have a higher or lower share of foreign-born. In areas with fewer of them, individuals will be on average less mobile and the population elasticity to employment is expected to be lower. Moreover, the impact of an employment shock could be gradual over time. Recent estimates by Dao et al. (2018) indicate that mobility could play little role in absorbing employment shocks in the short run, while previous research by Blanchard and Katz (1992) highlights the importance of labour mobility in the long run.

In order to capture the extent of the smoothing and its path over time we estimate the following equation,

$$log\frac{E_{a,t+h}}{P_{a,t+h}} = \rho\, log\frac{E_{a,t-1}}{P_{a,t-1}} + d_a + \alpha_t + {\gamma^h}_{HM}\, log(E_{a,t}) * HM + {\gamma^h}_{LM}\, log(E_{a,t}) * LM + \\ + {\gamma_{-1}}^h\, log(E_{a,t-1}) * HM + {\gamma_{-1}}^h\, log(E_{a,t-1}) * LM + \varepsilon_{a,t} \text{ with } h=0, 1,2 \quad (3)$$

[12] Ottaviano and Peri (2012) estimate an elasticity of substitution of 20 between immigrants and natives of similar skills, Manacorda et al (2012) an elasticity of 10. Even the exact estimate of the elasticity of substitution can be important to calculate specific wage effects, the literature agrees that immigrants and natives are gross (but not perfect) substitutes.

where the dependent variable $\frac{E_{a,t}}{P_{a,t}}$ is equal to the ratio between employment and population among 15-64 year-old natives, d_a and α_t represent area a (country or region) and year t fixed effects and $\varepsilon_{a,t}$ is the error term. The log of the main independent variable $E_{a,t}$ is interacted with two dummies HM and LM that identify areas in which the share of the foreign-born population on total population was in the first (top) and in the fourth (bottom) quartile of the distribution in 2006, hence before the period considered in the analysis. We are comparing areas in which foreign-born presence was already large, offering a larger buffer/absorption potential to employment shocks, with areas characterized by a low presence of immigrants in the population.

To estimate both contemporaneous (*h*=0) and dynamic effects (*h*>=*1*) that follow an employment innovation, as we control for past values of the shock, we use the local projections method (Jordà, 2005). This method allows estimating consistently the Impulse Responses (IRs) as the ${\gamma^h}_{HM}$and ${\gamma^h}_{LM}$ coefficients of equation (3): the intuition for such approach is that of direct forecasting. It is flexible enough to accommodate for non-linear terms, such as the dummy variables for high and low foreign-born presence, without having to worry about misspecification. Moreover, we do not need to run a system of equations, but instead we can easily estimate equation (3) directly from the data. Another benefit of local projections is that we can estimate IRs both via OLS and via 2SLS, as in the rest of the paper, to make sure that the recovered IRs are truly interpretable as the causal responses of the employment-to-population rate to an employment shock. Finally, as in the rest of the paper, inference is provided by clustering the standard errors at the area level.

Local projections come with few caveats to bear in mind. First, because of data limitations, we can only leverage a short time series: a main consequence of this is that we are not confident in estimating impulse responses beyond two years from the shock to avoid significant biases. A source of potential bias due to the shortness of the time series is the "Nickell bias" present in dynamic panel data settings because of the correction for the unobserved area-specific effect when lagged outcomes are on the right hand side of the equation. To test the robustness of our results to Nickell bias, we also re-estimate equation 3 without the lagged dependent variables. The results are robust to this specification, suggesting that our baseline estimates do not suffer from major biases.

The IRs should be interpreted as follows: values of γ_{HM} and γ_{LM}close to zero imply that migration responses offset the largest part of employment shocks. On the other hand, values of $\gamma_{HM}, \gamma_{LM} = 1$ would imply that the local employment shock is translated one for one into a change of the employment rate.

Country level results are reported in Tables A3 and A4 in the Appendix for the OLS and the 2SLS estimates respectively. We show in Figure 5 the estimated impulse response coefficients. When we look at OLS estimates in more details (Figure 5a) we find point estimates for γ (in the first period) that are around 0.6 for countries with high migrant shares (significant at the 1 per cent level) and 0.8 for countries with low migrants shares. These coefficients are both precisely estimated and statistically different from zero; such a pattern supports the idea that natives residing in countries with a higher presence of migrants are partly protected from employment shocks translating into changes in employment rates. We then look separately at employment (Figure 5c) and population (Figure 5d) (the numerator and denominator of the employment rate) within the same specification. We find that in areas with a lower presence of migrants, natives' employment reacts more strongly to common employment shocks (the value for γ is equal to 1 for low migration countries and to 0.7 for high migration countries). At the same time, also the population elasticity is larger (0.3 against 0.1). These results point to the fact that, in areas with a lower presence of migrants, an aggregate employment shock is translated into a larger impact on employment rates of natives. In spite of natives' somewhat larger population to employment elasticity in those areas, their employment rate is still affected more strongly than in areas with fewer immigrants. We also consider the impact of such employment shocks on participation (Figure 5b), finding essentially no effect of employment shocks on the share of active individuals on total population in both groups of areas.

Finally, using the impulse response we can look beyond the contemporaneous effects (one and two years after the shock). The two sets of countries differ because natives' population to employment elasticity in areas with a lower share of migrants remains statistically different from zero in *t+2*, with a value of 0.3 determining a faster absorption of the employment shock than in areas with a high share of migrants. This last result, however, which would suggest that common employment shocks tend to trigger long lasting changes in the native population in areas where there is a higher incidence of migrants, is not confirmed when looking at 2SLS estimates (Table A3). The two sets of estimates together suggest that migrants act as buffer for labour demand shocks. This is particularly clear in the short run.

Moving to the region-specific OLS analysis (Figure 6), the results are slightly mixed: the contemporaneous impact of employment shocks on the employment rate for natives is similar in both sets of regions (Figure 6a). The coefficient estimates for γ are respectively equal to 0.36 for HM regions and to 0.27 for LM ones, but the difference between the two is not statistically significant. Similar to country level estimates we find a smaller effect on native population and employment changes in high migration regions, suggesting that - in these regions - most of the absorption of employment shocks relies on migrants' population. In addition, in this case, when looking at one and two-year horizons, the impact of employment shocks disappears after two years, although there is again suggestive evidence of marginally more persistent effects in low immigrant areas. These patterns, and especially the smoothing effects played by migrants as found for Cadena and Kovak (2016) for the US, are confirmed - and somewhat reinforced - when looking at the 2SLS estimates based on the Bartik IV. In Appendix Table A6 we observe larger and more persistent effects of a labour demand shock on employment/population ratios in euro area regions with fewer migrants: in these areas, not only the effects of a sector-driven shock on employment and employment-to-population rates are larger, but they persist up to two years (although not precisely estimated).

Additional tables in the Appendix (A7 to A10), in which we do not control for past values of the outcomes and of the shocks, report similar estimates to the baseline results. This robustness check indicates that potential Nickell bias present in the dynamic panel of equation (3) plays a minor role. Another source of bias is the one identified by Teulings and Zubanov (2014) that may lead to an underestimation of the persistence and it is likely to affect our estimates. For these reasons, we prefer to consider these results as mainly suggestive.

Overall, the evidence based on OLS and 2SLS regressions for euro area countries and regions points toward an equilibrating role of migrants. Their presence and their larger cross-country and cross-region mobility smoothens the impact of labor demand shocks on natives' employment rates and facilitates its absorption without large fluctuations of non-employment rates. There is also some evidence showing that, in areas in which there are fewer foreign-born to absorb the local shocks, natives are more likely to move when a shock on employment occurs. Natives compensate in part for immigrant mobility, but due to the larger size of employment effect from the shock and due to their lower elasticity of population to employment, the experienced variation in employment to population ratio is larger.

6. Extension and Robustness checks

In this section we will check the robustness of main results: i) to different cyclical conditions of the labor market, ii) to demographic factors that could alter the number of working age individuals iii) between early and late European Union joiners.

6.1. Different cyclical conditions

Although the main analyses presented so far already distinguish between the Great Recession period and the most recent years, it is worth investigating whether – more generally – the migration response to negative labour demand shocks differs from that to positive shocks. Columns 1 and 2 of Tables 8 and 9 present the results of the main equation (1), in which the shock is interacted with a dummy equal to 1 if the employment change was negative. In the results presented so far, we found that – compared to natives – foreigners' show larger population to employment elasticity both at the country and at the region level. We will now test whether such estimated average elasticity can have different values during upturns and downturns.

At the country level (Table 8, Columns 1 and 2) the results show that the value of the elasticity does not change significantly during downturns, with point estimates for the additional interaction that are very close to zero and never statistically significant.

Also at the more disaggregated level (Table 9, Columns 1 and 2), the coefficient estimates for the interactions show that, during downturns, the population to employment elasticity decreases, but only by 0.04 to 0.795 (significant an estimate at the 1 per cent level), for foreign born individuals.

It remains unchanged at 0.265 for natives. 2SLS results, not reported here for brevity, confirm these findings. We can thus conclude that the values of the population to employment elasticities do not change significantly during labor market upturns and downturns. Immigrants respond much more actively than natives do to positive and to negative area employment shocks and their mobility is not hindered by recessions.

As an additional exercise, we also interact the main independent variable of equation 1 with two dummies that are equal to one respectively if the employment change for the area (country or region) falls within the first or the fourth quartile of the distribution of the employment changes taking place in the whole euro area in a given year. This is a check to see whether the elasticity to large employment shocks is different to that to smaller ones. Also in this case, point estimates for the interactions are very close to zero and do not point to substantial differences in the average elasticities both at the country and at the regional level (Table 8 and 9, Columns 3 and 4) when large shocks occur. These results provide no evidence of significant changes in the population to employment elasticity during large upturns and downturns.

Finally, we may be worried that the construction sector plays a major role in driving the results. The concern is that a high mobile migrant workforce could exacerbate boom and bust cycles in that sector with destabilizing consequences on the rest of the economy. Such concern is reasonable since the construction sector shows a strong cyclical behavior: the coefficient of variation of the construction employment-to-working age population is 16.8 per cent versus a cross-industry average 12.7 per cent. Moreover, immigrants have a high propensity to work in the construction sector, whose tasks are mainly manual-intensive: their migration decisions could have been strongly related to the construction boom and bust that occurred in the last decade in many European countries (see the particularly notable case of Spain, illustrated in Gonzalez and Ortega, 2013). Table A2 in the appendix shows that this is not the case: excluding construction workers from the sample, we do not observe a different population to employment elasticity for foreign-born population with respect to the baseline results.

6.2. Demographic factors

Until now, like the literature so far, we have assumed that changes in the number of working age individuals in a certain area are only due to individuals entering or exiting the area. Nevertheless, there could be demographic factors affecting those changes and potentially confounding the findings. In particular, if in a given year the size of the cohort of individuals entering working age is different from the one of those exiting it, there could be a change in the 15-64 population in that area. This change is unrelated to mobility choices but could potentially be correlated to employment level variations through changes in labour supply if young and old individuals have different participation rates. In order to rule out the possibility of this element driving our results we reconstruct a series of counterfactual population levels in which we “neutralize” the potential variations due to cohorts of different sizes entering/exiting the 15-64 age group.

In the ELFS data, individuals' age is available in 5-year intervals. Hence we assume that cohort sizes by year of birth are constant within such age brackets and subtract (add) in each year t from (to) the actual population value the number of individuals in the 10-14 (60-64) age class in year t-1 that are expected to enter (exit) working age in year t. These additional estimates of equation 1, that are not reported in the main text for brevity, are very similar to the main ones reported in Tables 5 and 6 both when using actual employment variations and when instrumenting it with the Bartik IV described in section 3.

6.3. Early vs late European Union members

The analysis presented so far has been conducted pooling together all the EA countries, whether early or late joiners. In an extension, we interact a dummy for early EA joiners (i.e., Austria, Belgium, Finland, France, Germany, Italy, Luxembourg, the Netherlands, Portugal and Spain) with the local employment shock. The results, available upon request, do not show that in these countries the mobility of all three groups (natives, EU born and extra-EU born) have a substantially different reaction to employment variations compared to the others.

7. The Euro Area and the US

Our paper focuses on the responses of natives and immigrants to labor demand shocks in the Euro Area and it shows that the population to employment elasticity is very small for natives, but not for foreign born individuals. A substantial degree of labor mobility among all workers to absorb country-specific shocks that cannot be dealt with monetary policy would is a desirable feature of a well-functioning currency area. The experience of the United States, a large currency area with several different local economies (states or commuting zones), responding to different local shocks, can be used as a benchmark to evaluate euro-area mobility patterns.[13]

7.1 Estimates based on US states and commuting zones

Table 10 replicates the main analysis performed in Tables 5-7 on US ACS data from 2007 to 2016 (as available from IPUMS; Ruggles et al, 2017). To make the two analyses as comparable as possible, we define the sample of individuals in a very similar way as the one based on the EU LFS.[14] We run two sets of OLS regressions, separately on US states, which we compare to euro area countries, and commuting zones (CZs), which we compare to European regions. It must be

[13] The previous literature has shown some conflicting results on the response of migration during upturns and downturns. Saks and Wozniack (2011) find that US internal migration is strongly procyclical as the benefits of moving rise during upturns; a recent paper by Dao et al. (2018) finds instead counter-cyclical migration responses in the US using population and inter-state migration data.

[14] The sample is composed of all people aged 15-64, not living in group quarters, and not currently enrolled in school, residing in US states in the period 2007-2016.

noticed that although European NUTS2 regions and US CZs define areas that share common economic conditions, i.e., local labor markets, they are not fully comparable, being the former of much larger size.[15] One possible concern is that CZs are more likely to capture not only long-term migration, but also short-term movements, thus inflating US internal mobility relative to the Euro Area. Nevertheless, in all estimates we control for area fixed effects, which account for time invariant characteristics, such as the size of the areas.

Splitting the sample into in-state-born, out-of-state-born and foreign-born individuals, we find three interesting patterns in the data. First, the elasticity of foreign-born population to employment shocks in the US is similar to the one found for the euro area. This result confirms the idea that people who already moved long-distance tend to be more mobile also in response to local shocks. This group tends to be more responsive to economic incentives, helping equilibrating the local market after a shock. This is possibly due to a weaker attachment to the location they reside because of lower homeownership rates (Modestino and Dennet, 2013; Foote, 2016) or weaker family links (Mincer, 1978; Huttunen et al., 2018). It may also be due to the larger dependence of immigrants on wage income, relative to natives (Peri, 2018), which implies a larger responsiveness to its fluctuations.

The second result worth noting is the lack of differential mobility observed among US natives born in and out of state: this differs substantially with the results of mobility of EU citizens whether born in the same country where they reside, or born out of the country (we establish here an equivalence between US states and EU countries). The analysis suggests that European citizens face frictions to mobility across countries that US citizens do not face across states. Such frictions can be very well related to national rules for professions, language barriers and banking and capital markets regulations, different social security regulations that still exist across EA countries.

In the Appendix, we further report an analysis that mimics the strategy of Cadena and Kovak (2016) and adapts the local projection estimates to the US data. We divide states and regions into high and low migration intensity based on the share of foreign-born population.[16] The IRs confirm that in the US, as in Europe, foreign born migrants tend to shield natives from the negative effects of labor demand shocks in line with what found by Cadena and Kovak (2016) who look only at low skilled migrants from Mexico. Table A11 in the Appendix shows that the variation of the native employment-to-population rate for natives, in response to a change in overall employment is stronger in states with relatively fewer foreign-born individuals (column 1). The effects proceeds

[15] There are two substantial differences between US commuting zones and European NUTS 2 regions: (i) the latter are based on jurisdictional units and not based on commuting patterns; (ii) the average population of a US CZ is about 200,000 (15-64-year old not enrolled in school) – there are 741 CZs using the 1990 definition – while the average population of a NUTS 2 region is 3,300,000 – there are 65 regions in our sample.

[16] We cannot fully replicate the local projection analysis of section 5.2 on US data as in the US an out-of-state-born American is still a citizen, differently from the Euro Area. If we were to divide US states and commuting zones based on the share of out-of-state born population we would have to consider also American citizens and, thus, we would not be able to compare the results with those of section 5.2. Still, the analyses reported in Appendix table A11 and A12 are informative on the role of foreign born in smoothing labor market shocks.

from a stronger response of native employment, which is twice as large in low foreign-born relative to high foreign-born areas. (Columns 3 and 4). The LPs based on such a short time series may be biased towards zero at longer horizons: indeed, the effects one and two years after the shock are noisily estimated. Yet, they point to a more persistent change in natives' employment and population in low migration areas, confirming the pattern we have found for the Euro Area.

The IRs estimated on CZs data point to similar, but more robust results (Appendix Table A12). The changes in US natives employment and population elasticities is about .1 percentage points larger in low than in high migration areas and it persists for at least one year. This determines also a larger responsiveness of the employment-to-population ratio in these regions. As we discuss in the next section, the differences between US and euro area regions migration response is milder than that between US states and EA countries: this is especially so when looking at CZs and EA regions with a low share of foreign-born individuals.

7.2 Discussion

Overall, comparing the results of the analysis for the Euro Area and the US, we can derive two main conclusions. First, the estimated elasticities are much more similar between euro area regions and US CZs, rather than between euro area countries and US states. This result indicates that natives in the euro area react to a negative labor demand shock by moving out of the hit region similarly to what US natives do across CZs, although the elasticity is lower (as already found by Beyer and Smets, 2015). Looking at movements between states, the differences between the Euro Area and the United States become bigger, with employment-to-population rate elasticities to a labor demand shock that on average are five times larger in the former than in the latter.

Such a low degree of internal mobility across EA countries is worrisome as it hints to a lack, or a limited, mobility channel to absorb country-specific asymmetric shocks in Europe. Second, the role of foreign-born migrants is prominent in absorbing the shocks both in US and in Europe. The difference in magnitude of the elasticities between high and low migration areas is comparable in the two currency unions.

Finally, the results based on the local projections need to be interpreted with caution. The LPs method, although extremely flexible and robust to miss-specification, may suffer of attenuation bias in presence of such a short time series. This is evident if we compare our results with the VAR-based estimates of Blanchard and Katz (1992) and Arpaia et al. (2016) which find a more persistent impact of relative labor demand shocks on employment rates. However, our estimates are not fully comparable to theirs for two reasons: first, we analyze nativity group-area specific employment variations; second, we use a direct measure of population change rather than the one implied by the VAR specification, which confounds migration from abroad, net migration from other states, ageing and mortality. As noted by Dao et al. (2018), direct measures of population changes, as the one we use, tend to yield more conservative estimates. Differently from Dao et al. (2018), however, we estimate larger on-impact responses, but less persistent effects. This result could be due to the large negative shocks that characterize our sample period and that led to immediate and large employment losses across Europe.

8. Conclusions

Focusing on the Euro Area, in this paper we analyze the role of mobility in cushioning labor demand shocks. We find that, while foreign-born individuals' mobility is strongly cyclical, this is not the case for natives, whose migration flows are less dependent on the labor market outlook. These results survive a number of robustness checks, and are confirmed both in OLS and 2SLS estimates based on a Bartik IV, and when looking at the region and at the country level.
Migrants' higher population to employment elasticities reduce the variation of overall employment population rates over the business cycle significantly. Thanks to their higher mobility, the impact of a one standard deviation change in employment on employment rates decreases by 6 per cent at the country level and by 7 per cent at the regional level. Further evidence shows that, in areas with a lower immigrants presence, natives are less insulated from employment variations and tend to migrate more and their employment also changes more, confirming that immigrants mobility is able to shields natives' employment variation substantially.

Finally, based on similar data, we compare results found for the Euro Area with the US for within and between states migration. We find that the population to employment elasticity is similar for migrants in both areas. The migration response to employment shocks of individuals born in US states in instead definitely higher than the one found for individuals born in Euro Area countries. This result confirms the concerns already expressed in Blanchard and Katz (1992) and Obstfeld and Peri (1998) about the lack of adequate labor mobility in the Euro Area as a possible brake on the ability of the currency area to adjust to country specific shocks. At the same, the long-term tendency towards an increase in migration in Europe, coupled with the fact that foreigners are found to be much more mobile compared to natives could possibly reduce the "mobility gap" between the two currency areas in the future.

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Tables

Table 1. Change in population and foreign-born share by country and nationality, 2007-2016

Country	Annual average population per cent change			Change in foreign population share	
	National Born	EU born	Extra-EU born	EU Born	Extra-EU Born
AT	-0,1	4,1	2,0	2,4	1,6
BE	-0,8	4,1	6,3	2,2	4,5
CY	-0,3	7,0	1,5	5,1	0,8
DE	-0,7	7,8	4,3	2,7	2,0
EE	0,2	2,5	-3,6	0,1	-3,9
ES	-0,6	1,2	-0,2	0,6	0,2
FI	-0,7	6,1	10,1	1,0	2,1
FR	-0,5	-0,2	2,2	0,0	2,1
GR	-1,0	-0,1	0,7	0,0	0,8
IE	-0,9	0,0	6,7	0,4	3,3
IT	-0,7	7,6	6,0	2,1	4,0
LT	-1,4	5,3	0,5	0,2	0,5
LU	-0,9	2,2	7,2	4,7	3,9
LV	-1,4	-1,5	-4,5	-0,1	-2,8
NL	-0,3	1,3	-0,5	0,4	-0,3
PT	-1,2	4,1	0,2	0,9	0,7
SI	-0,6	-1,6	4,2	-0,4	2,8
SK	-0,1	2,9	10,5	0,0	0,1

Note: Own calculations from the Eurostat Labour Force Survey. 2007-2016.

Table 2. Elasticity of Population to Employment, 2007-2016

Country and region-level regressions

	(1) All years	(2) 2007-10	(3) 2011-16
Panel A: Country level			
log(Employment)	0.198**	0.089	0.245+
	(0.047)	(0.076)	(0.134)
Panel B: Region level			
log(Employment)	0.297**	0.157**	0.443**
	(0.041)	(0.042)	(0.086)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. Panel A: N=180 (column 1), 72 (column 2) and 108 (column 3); the units of observation are euro area countries. Panel B: N=650 (column 1), 260 (column 2) and 390 (column 3); the units of observation are euro area regions (NUTS2 further aggregated in order to obtain consistent regions across the sample period). The dependent variable is the log of working age population; the independent variable is the log of employment. All regressions include time and area (country or region) fixed effects. The standard errors are clustered at the area level and all the regressions are weighted by the 2006 area working age population. Significance levels: + 0.10 * 0.05 ** 0.01.

Table 3. First-Stage Regressions, Employment on Bartik

Natives and foreign-born, country and region-level regressions

	(1) Natives 2007-2016	(2) Foreign-born 2007-2016
Panel A: Country level		
log(Bartik IV)	0.900**	2.566*
	(0.199)	(1.085)
F-statistics	20.3	5.6
Panel B: Region level		
log(Bartik IV)	0.199*	1.267**
	(0.085)	(0.141)
F-statistics	5.4	81.3

Note: Data from the Eurostat Labour Force Survey. 2007-2016. Panel A: N=180; the units of observations are Euro Area countries. Panel B: N=650; the units of observation are euro area regions. The outcome variable is the log of employment; the independent variable is the log of shift-share instrument constructed at the country level as described in the text (NUTS2 further aggregated in order to obtain consistent regions across the sample period). All regressions include time and area fixed effects and are weighted by the 2006 area working age population. The standard errors are clustered at the country level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table 4. First-stages regressions

Natives, EU-born and extra EU-born, region-level regressions

	(1) Natives 2007-2016	(2) EU-born 2007-2016	(3) Extra EU-born 2007-2016	(4) Natives 2007-2010	(5) EU-born 2007-2010	(6) Extra EU-born 2007-2010	(7) Natives 2011-2016	(8) EU-born 2011-2016	(9) Extra EU-born 2011-2016
log(Bartik IV)	0.199*	1.238**	1.154**	0.318**	1.396**	2.005**	0.067	2.422*	0.718*
	(0.085)	(0.312)	(0.158)	(0.082)	(0.488)	(0.444)	(0.052)	(1.124)	(0.305)
F-statistics	5.4	15.7	53.5	15.1	8.2	20.4	1.7	4.6	5.6

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=650 (columns 1- 3), 260 (columns 4-6) and 390 (columns 7-9); the units of observation are euro area regions (NUTS2 further aggregated in order to obtain consistent regions across the sample period). The outcome variable is the log of employment; the independent variable is the log of shift-share instrument constructed at the country level as described in the text: columns 1, 4 and 7 report the results for natives only. while columns 2, 5 and 8 report the results for EU-born only and columns 3, 6 and 9 for extra EU-born only. All regressions include time and region fixed effects and are weighted by the 2006 regional working age population. The standard errors are clustered at the region level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table 5. Population elasticity to employment by nativity status, country-level regressions

	(1) Natives 2007-2016	(2) Foreign-born 2007-2016	(3) Natives 2007-2010	(4) Foreign-born 2007-2010	(5) Natives 2011-2016	(6) Foreign-born 2011-2016
Panel A: OLS						
log(empl)	0.117*	0.727**	0.112	0.606**	0.116	0.884**
	(0.054)	(0.116)	(0.098)	(0.117)	(0.104)	(0.051)
Panel B: 2SLS						
log(empl)	0.089	0.300	-0.135	0.451**	0.312+	0.788**
	(0.057)	(0.244)	(0.152)	(0.170)	(0.173)	(0.073)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=180 (columns 1 and 2), 72 (columns 3 and 4) and 108 (columns 5 and 6). The units of observation are euro area countries. The outcome variable is the log of working age population; the independent variable is the country-level log of employment: columns 1, 3 and 5 report the results for natives only. while columns 2, 4 and 6 report the results for foreign-born only. All regressions include time and country fixed effects and are weighted by the 2006 country working age population. The standard errors are clustered at the country level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table 6. Population elasticity to employment by nativity status, region-level regressions

	(1) Natives 2007-2016	(2) Foreign-born 2007-2016	(3) Natives 2007-2010	(4) Foreign-born 2007-2010	(5) Natives 2011-2016	(6) Foreign-born 2011-2016
Panel A: OLS						
log(empl)	0.271**	0.782**	0.257**	0.801**	0.428**	0.813**
	(0.048)	(0.061)	(0.065)	(0.082)	(0.093)	(0.057)
Panel B: 2SLS						
log(empl)	-0.141	0.688**	-0.074	0.782**	-0.263	0.835**
	(0.158)	(0.140)	(0.115)	(0.118)	(0.348)	(0.143)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=650 (columns 1 and 2), 260 (columns 3 and 4) and 390 (columns 5 and 6). The units of observation are euro area regions (NUTS2 further aggregated in order to obtain consistent regions across the sample period). The outcome variable is the log of working age population; the independent variable is the regional log of employment: columns 1, 3 and 5 report the results for natives only. while columns 2, 4 and 6 report the results for foreign-born only. All regressions include time and region fixed effects and are weighted by the 2006 regional working age population. The standard errors are clustered at the region level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table 7. Population elasticity to employment by nativity status (three categories), region-level regressions

	(1) Natives 2007-2016	(2) EU-born 2007-2016	(3) Extra EU-born 2007-2016	(4) Natives 2007-2010	(5) EU-born 2007-2010	(6) Extra EU-born 2007-2010	(7) Natives 2011-2016	(8) EU-born 2011-2016	(9) Extra EU-born 2011-2016
Panel A: OLS									
log(empl)	0.271**	0.722**	0.786**	0.257**	0.763**	0.812**	0.428**	0.647**	0.787**
	(0.048)	(0.074)	(0.059)	(0.065)	(0.049)	(0.094)	(0.093)	(0.098)	(0.065)
Panel B: 2SLS									
log(empl)	-0.141	0.622**	0.699**	-0.074	0.876**	0.728**	-0.263	0.643**	0.966**
	(0.158)	(0.115)	(0.165)	(0.115)	(0.179)	(0.152)	(0.348)	(0.133)	(0.306)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=650 (columns 1- 3), 260 (columns 4-6) and 390 (columns 7-9). The units of observation are euro area regions (NUTS2 further aggregated in order to obtain consistent regions across the sample period). The outcome variable is the log of working age population; the independent variable is the log of employment: columns 1, 4 and 7 report the results for natives only. while columns 2, 5 and 8 report the results for EU-born only and columns 3, 6 and 9 for extra EU-born only. All regressions include time and region fixed effects and are weighted by the 2006 regional working age population. The standard errors are clustered at the region level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table 8. Heterogeneity analysis: Population elasticities to employment by nativity status, country-level regressions

	(1) Natives 2007-2016	(2) Foreign-born 2007-2016	(3) Natives 2007-2016	(4) Foreign-born 2007-2016
log(empl)	0.118*	0.746**	0.119*	0.778**
	(0.051)	(0.116)	(0.055)	(0.105)
log(empl)*	0.000*	0.003		
1(Δempl<0)	(0.000)	(0.002)		
log(empl)*			0.000	-0.001
1(Δempl>p75)			(0.000)	(0.002)
log(empl)*			0.000	-0.005+
1(Δempl<p25)			(0.001)	(0.003)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=180. The units of observation are euro area countries. The outcome variable is the log of working age population; the independent variable is the country-level log of employment: columns 1 and 3 report the results for natives only, while columns 2 and 4 report the results for foreign-born only. All regressions include time and country fixed effects and are weighted by the 2006 country working age population. The standard errors are clustered at the country level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table 9. Heterogeneity analysis: Population elasticity to employment by nativity status, region-level regressions

	(1) Natives 2007-2016	(2) Foreign-born 2007-2016	(3) Natives 2007-2016	(4) Foreign-born 2007-2016
log(empl)	0.265**	0.799**	0.261**	0.805**
	(0.049)	(0.063)	(0.047)	(0.064)
log(empl)*	-0.000+	0.004**		
1(Δempl<0)	(0.000)	(0.001)		
log(empl)*			-0.000	0.002
1(Δempl>p75)			(0.000)	(0.001)
log(empl)*			0.003**	-0.003*
1(Δempl<p25)			(0.001)	(0.001)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=650 (columns 1 and 2). The units of observation are euro area regions (NUTS2 further aggregated in order to obtain consistent regions across the sample period). The outcome variable is the log of working age population; the independent variable is the log of employment: columns 1 and 3 report the results for natives only, while columns 2 and 4 report the results for foreign-born only. All regressions include time and region fixed effects and are weighted by the 2006 regional working age population. The standard errors are clustered at the region level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table 10. Population elasticity to employment by nativity status, OLS regressions

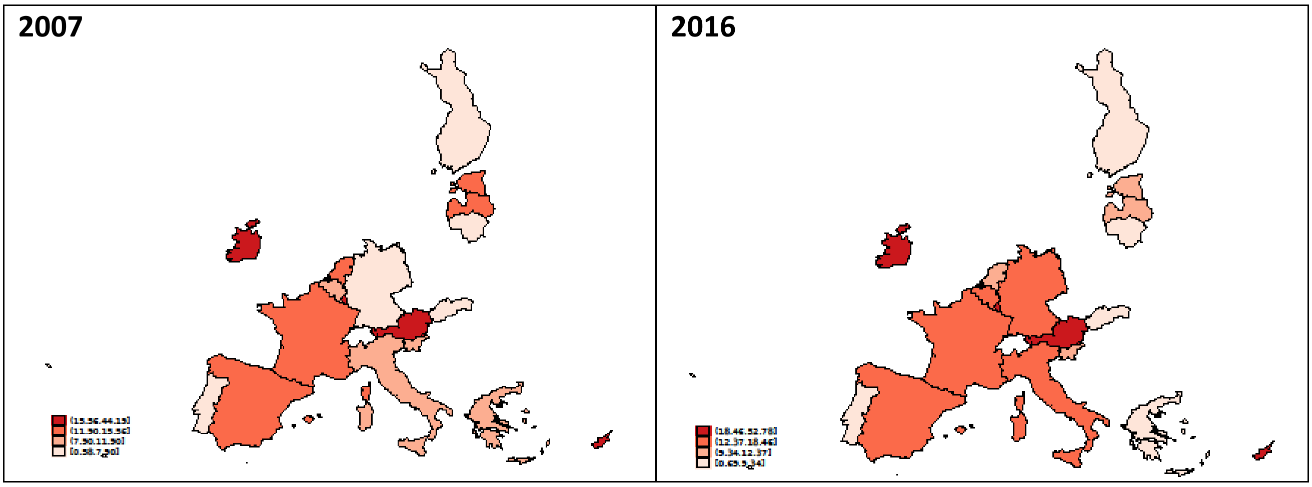
US States and Commuting zones

	(1) State natives 2007-2016	(2) US natives 2007-2016	(3) Foreign born 2007-2016	(4) State natives 2007-2010	(5) US natives 2007-2010	(6) Foreign born 2007-2010	(7) State natives 2011-2016	(8) US natives 2011-2016	(9) Foreign born 2011-2016
Panel A: State									
log(empl)	0.909**	0.897**	0.874**	0.784**	0.669**	0.822**	0.775**	0.870**	0.816**
	(0.021)	(0.040)	(0.020)	(0.101)	(0.046)	(0.038)	(0.033)	(0.074)	(0.047)
Panel B: CZs	0.833**	0.782**	0.775**	0.728**	0.701**	0.761**	0.722**	0.749**	0.751**
log(empl)	(0.021)	(0.018)	(0.012)	(0.035)	(0.016)	(0.022)	(0.020)	(0.016)	(0.014)

Note: Data from the Census ACS. 2007-2016. Panel A: N=510 (columns 1 to 3). 204 (columns 4 to 6) and 306 (columns 7 to 9); the units of observation are US states. Panel B: N=7410 (columns 1 and 2). 2964 (columns 3 and 4) and 4446 (columns 5 and 6); the units of observation are Commuting Zones. The outcome variable is the log of working age population; the independent variable is the area-level log of employment: columns 1, 3 and 5 report the results for natives only. while columns 2, 4 and 6 report the results for foreign-born only. All regressions include time and area fixed effects and are weighted by the 2006 area working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01.

Figure 1

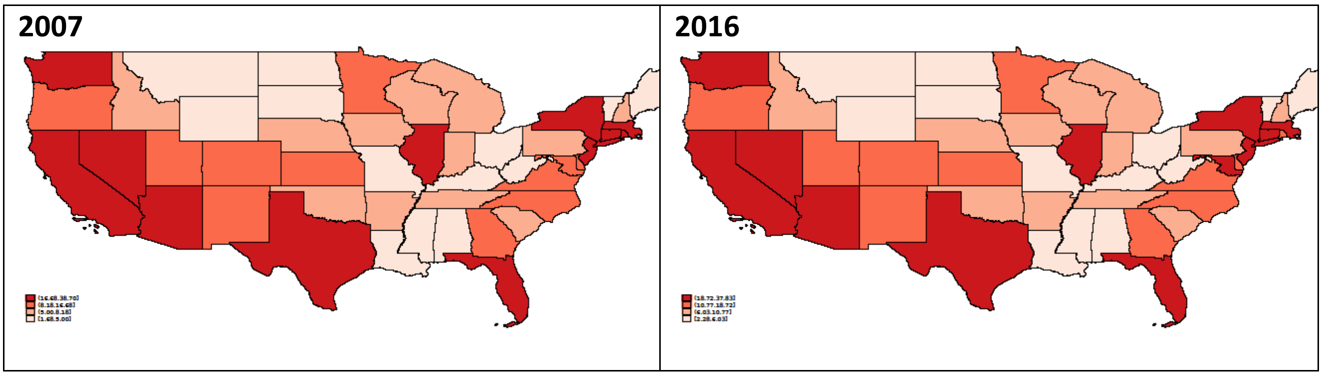
Foreign born shares in EA countries



Note: The figure shows the shares of foreign born individuals over total population in 2007 and in 2016. In darker countries the share is higher. Our calculations on EU-LFS data.

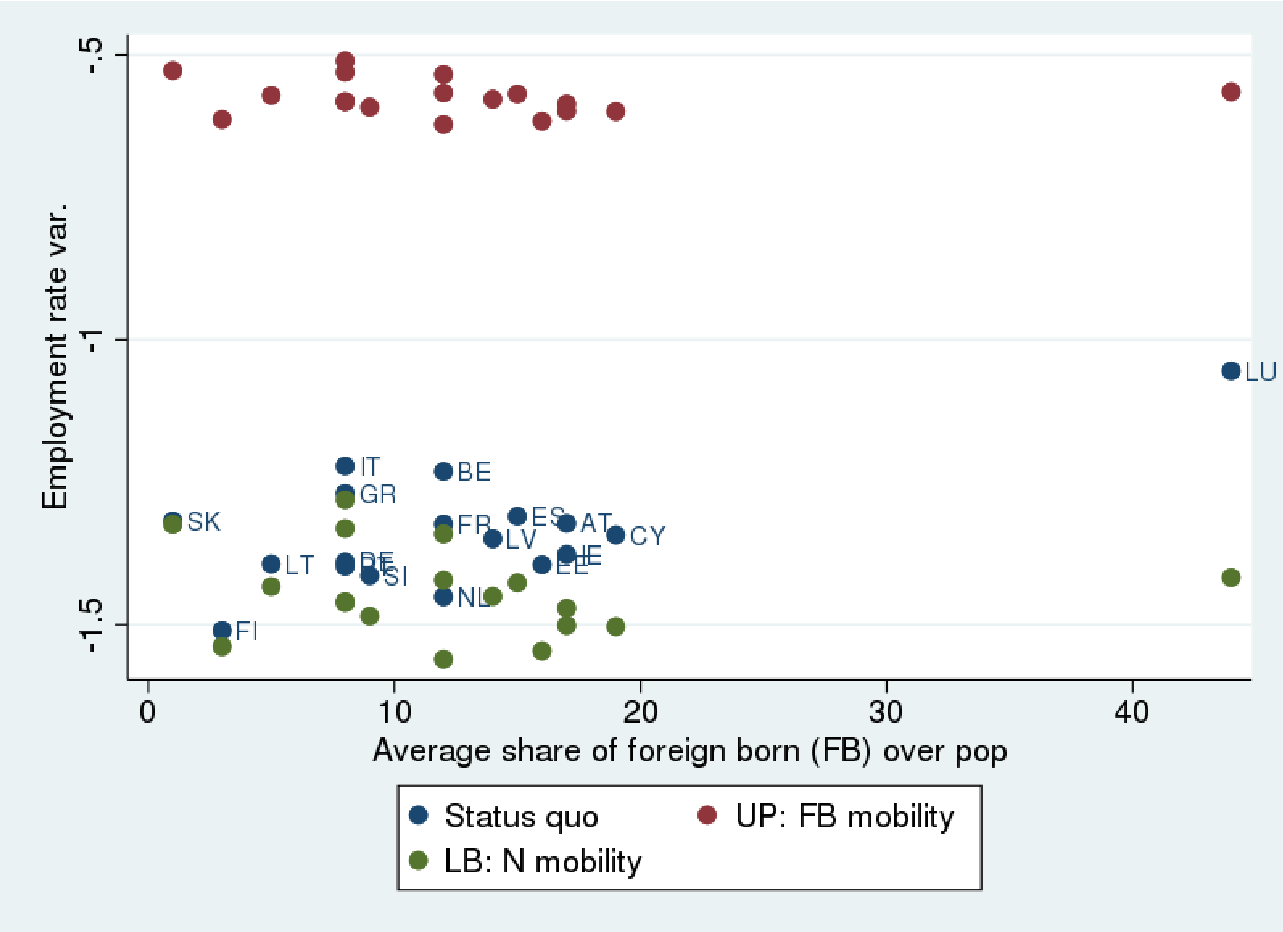
Figure 2

Foreign born shares in US states



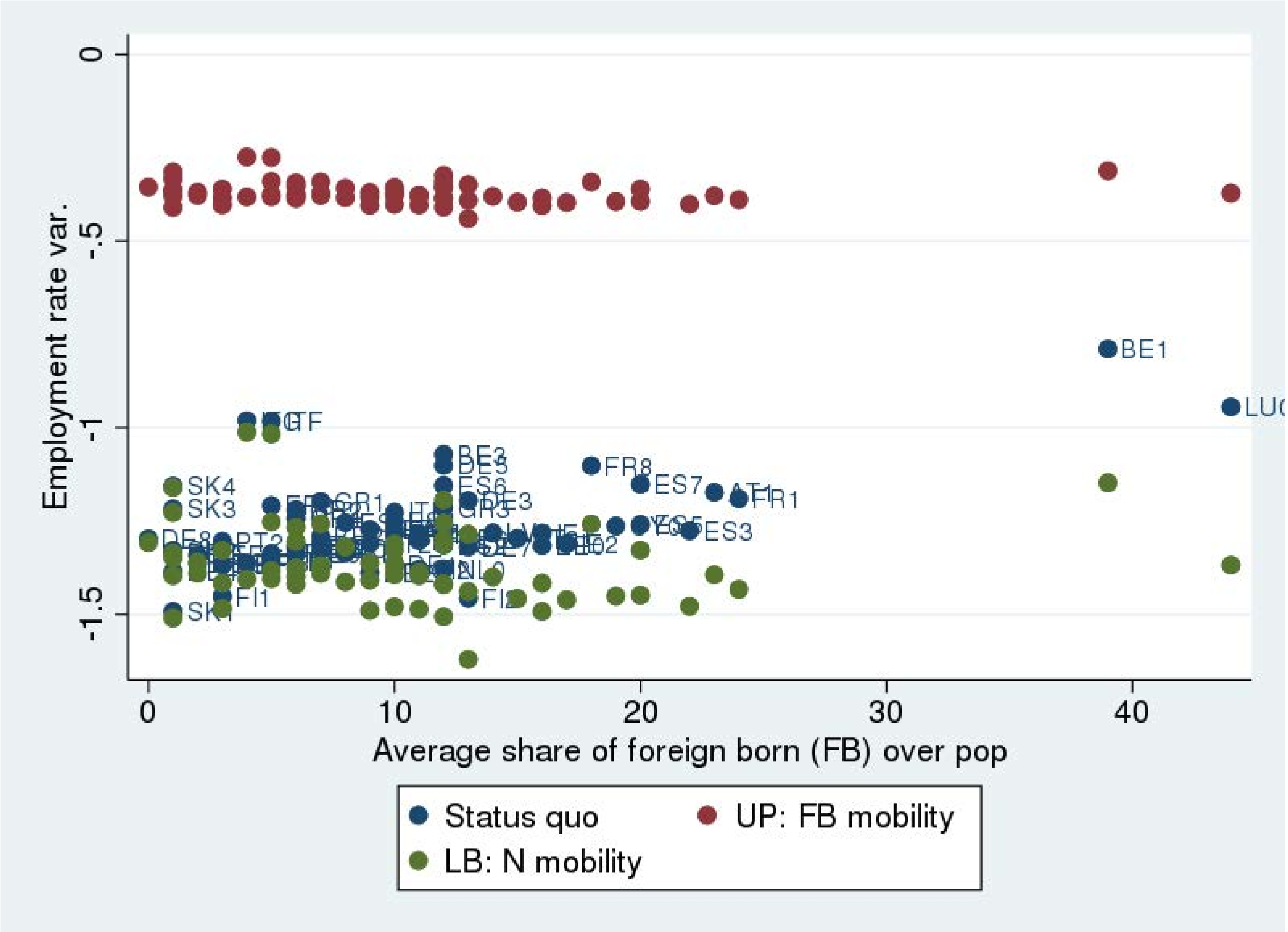
Note: The figure shows the shares of foreign born individuals over total population in 2007 and in 2016. In darker countries the share is higher. Our calculations on ACS data.

Figure 3. The impact on the employment rate of a one standard deviation decrease in employment, three different scenarios. Country level projections



Note: The figure shows the impact of a decrease of one standard deviation of the variation of overall employment on employment rates in EA countries after three different scenarios. The first scenario (status quo, in blue) simulates the impact on the employment rate based on the group-specific elasticities estimated in the paper. In the Upper Bound scenario (red), we assume that the population to employment elasticity for natives is as high as the one estimated for the foreigners. In a last scenario, that we call Lower Bound (LB, green) the opposite is true.

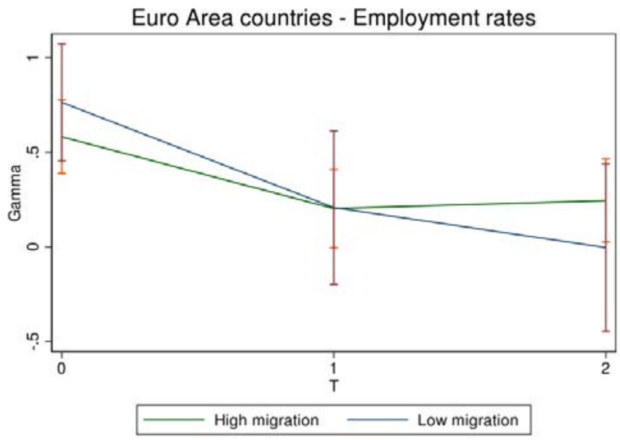
Figure 4. The impact on the employment rate of a one standard deviation decrease in employment, three different scenarios. Region level projections



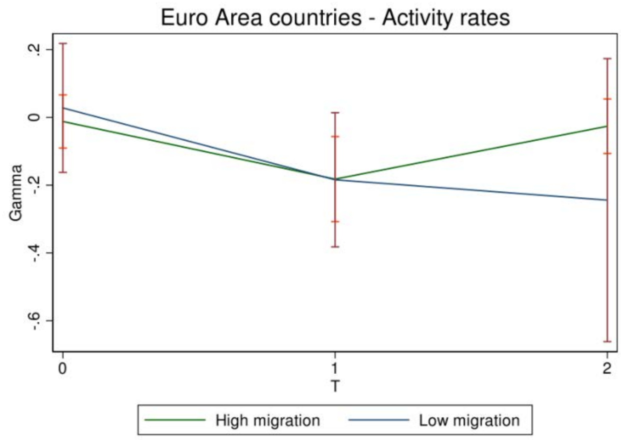
Note: The figure shows the impact of a decrease of one standard deviation of the variation of overall employment on employment rates in EA regions in three different scenarios. The first scenario (status quo, in blue) simulates the impact on the employment rate based on the group-specific elasticities estimated in the paper. In the Upper Bound scenario (red), we assume that the population to employment elasticity for natives is as high as the one estimated for the foreigners. In a last scenario, that we call Lower Bound (LB, green) the opposite is true.

Figure 5. Smoothing effects on natives labour markets, country-level OLS estimates

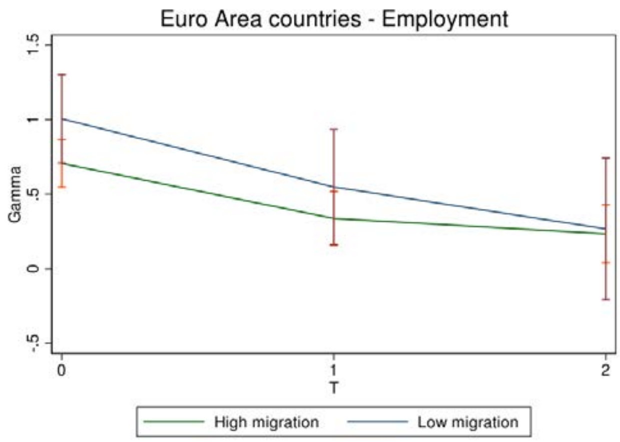
a. log(empl/pop)



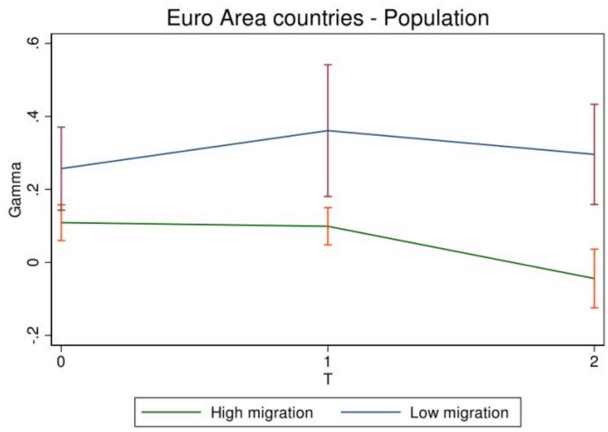
b. log(labor force/pop)



c. log(empl)



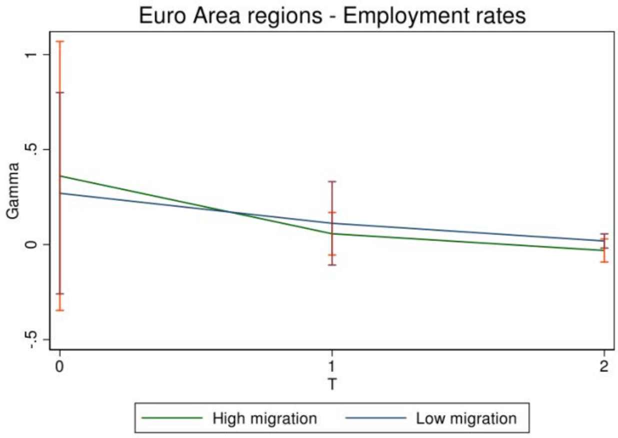
d. log(pop)



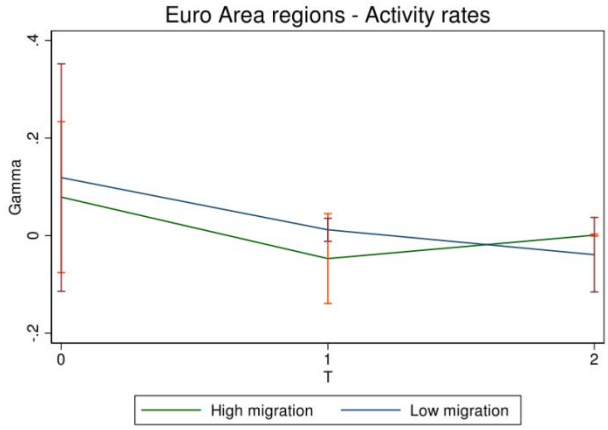
Note: The figure shows the impact of a one per cent change in local employment on employment rates, activity rates, employment and population levels in EA countries as reported in Appendix table A3 (OLS estimates, baseline local projection specification). The green line reports the estimates for high migration countries as defined in the text, while the blue one for low migration countries. 95 per cent pointwise confidence intervals are report as capped vertical bars.

Figure 6. Smoothing effects on natives labour markets, region-level OLS estimates

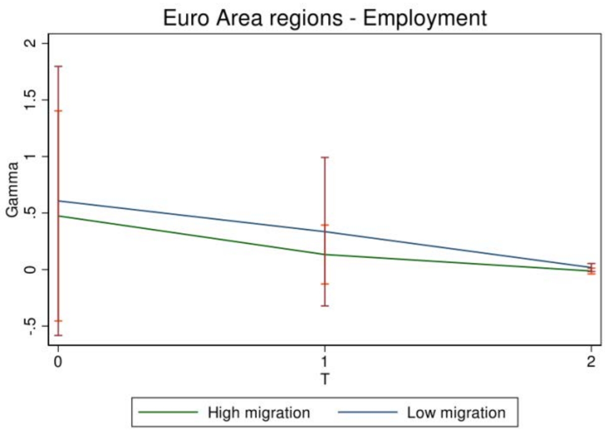
a. log(empl/pop)



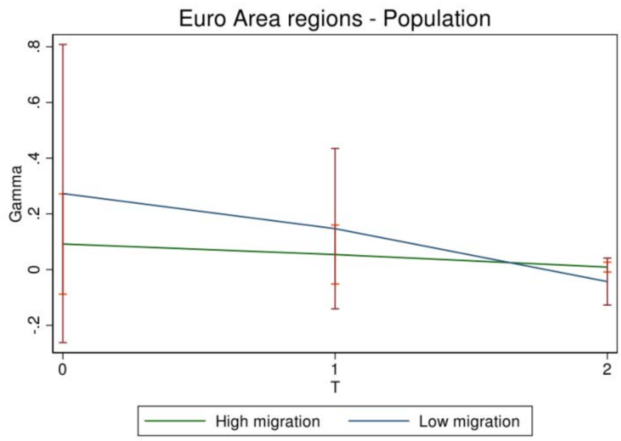
b. log(labor force/pop)



c. log(empl)



d. log(pop)



Note: The figure shows the impact of a one per cent change in local employment on employment rates, activity rates, employment and population levels in EA regions as reported in Appendix table A5 (OLS estimates, baseline local projection specification). The green line reports the estimates for high migration regions as defined in the text, while the blue one for low migration regions. 95 per cent pointwise confidence intervals are report as capped vertical bars.

Appendix.

Table A1. Availability of the migration variables in the Eurostat Labor Force Survey

Country	Euro joined in	First year	Last year	Regional migration availability	Country of birth availability	Regression samples
AT	1999	1999	2016	1999-2016	1999-2016	All
BE	1999	1999	2016	1999-2016	1999-2016	All
CY	2008	1999	2016	-	1999-2016	Main only
DE	1999	1999	2016	2002-2016	1999-2016*	All
EE	2011	1999	2016	2007-2016	1999-2016	All
ES	1999	1999	2016	1999-2016	1999-2016	All
FI	1999	1999	2016	1999-2016	1999-2016	All
FR	1999	1999	2016	1999-2016	1999-2016	All
GR	2001	1999	2016	1999-2016	1999-2016	All
IE	1999	1999	2016	-	1999-2016	Main only
IT	1999	1999	2016	1999-2016	2005-2016	All
LT	2015	1999	2016	-	1999-2016	Main only
LU	1999	1999	2016	2000-2016	1999-2016	All
LV	2014	1999	2016	-	2004-2016	Main only
NL	1999	1999	2016	-	1999-2016	Main only
PT	1999	1999	2016	1999-2016	1999-2016	All
SI	2007	1999	2016	2001-2016	2002-2016	All
SK	2009	1999	2016	1999-2007 & 2013-2016	2003-2016	Main only

Note: Own calculations from the Eurostat Labor Force Survey. * For Germany we use data on nationality instead of country of birth as this latter is not available.

Table A2. Population elasticity to employment excluding the construction sector, foreign born

	(1) 2007-2016 (country)	(2) 2007-2010 (country)	(3) 2011-2016 (country)	(4) 2007-2016 (region)	(5) 2007-2010 (region)	(6) 2011-2016 (region)
Panel A: OLS						
log(empl)	0.804**	0.645**	0.930**	0.824**	0.822**	0.816**
	(0.142)	(0.139)	(0.067)	(0.063)	(0.079)	(0.059)
Panel B: 2SLS						
log(empl)	-0.073	0.385+	0.798**	0.716**	0.899**	0.857**
	(0.626)	(0.221)	(0.096)	(0.185)	(0.138)	(0.165)
Panel C: first-stage						
log(Bartik IV)	1.573	3.035**	2.033**	1.037**	1.741**	1.115**
	(1.010)	(1.040)	(0.573)	(0.120)	(0.508)	(0.288)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=180 (column 1), 72 (columns 2), 108 (column 3), 650 (column 4), 260 (column 50) and 390 (column 6). The units of observation are euro area countries (columns 1 to 3) and regions (columns 4 to 6). The outcome variable is the log of working age population; the independent variable is the area-level log of employment (panel A) and the area-level log of employment instrumented with the Bartik IV (panel B); panel C reports the first-stage estimates of the panel B. All regressions include time and country fixed effects, are weighted by the 2006 country working age population and exclude people working in the construction sector. The standard errors are clustered at the country level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table A3. Smoothing effects on natives labour markets, OLS country-level (main specification)

	(1) log(empl/pop)	(2) log(labor force/pop)	(3) log(empl)	(4) log(pop)
Panel A: Contemporaneous effect				
log(empl): high migration	0.582**	-0.012	0.706**	0.109**
	(0.099)	(0.040)	(0.081)	(0.025)
log(empl): low migration	0.764**	0.028	1.005**	0.257**
	(0.158)	(0.097)	(0.151)	(0.058)
Panel B: 1-year effect				
log(empl): high migration	0.203+	-0.182*	0.337**	0.099**
	(0.106)	(0.064)	(0.092)	(0.026)
log(empl): low migration	0.208	-0.184+	0.548*	0.361**
	(0.207)	(0.101)	(0.197)	(0.092)
Panel C: 2-year effect				
log(empl): high migration	0.245*	-0.026	0.234*	-0.044
	(0.112)	(0.041)	(0.099)	(0.041)
log(empl): low migration	-0.003	-0.244	0.267	0.296**
	(0.226)	(0.213)	(0.242)	(0.070)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=180. The units of observation are euro area countries. The outcome variables are indicated on the top of each column and calculated for natives only. All regressions include time and area fixed effects and are weighted by the 2006 country working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table A4. Smoothing effects on native labour markets, 2SLS country-level (main specification)

	(1) log(empl/pop)	(2) log(labor force/pop)	(3) log(empl)	(4) log(pop)
Panel A: Contemporaneous effect				
log(empl): high migration	0.409*	-0.026	0.537**	0.110*
	(0.187)	(0.054)	(0.187)	(0.050)
log(empl): low migration	0.575	0.175	0.709	0.209*
	(0.410)	(0.118)	(0.432)	(0.084)
Panel B: 1-year effect				
log(empl): high migration	0.183	-0.176*	0.280	0.065
	(0.228)	(0.072)	(0.225)	(0.083)
log(empl): low migration	0.288	-0.197*	0.462	0.273+
	(0.534)	(0.085)	(0.525)	(0.158)
Panel C: 2-year effect				
log(empl): high migration	0.379	-0.004	0.302	-0.118+
	(0.252)	(0.044)	(0.239)	(0.062)
log(empl): low migration	0.134	-0.596*	0.429	0.364**
	(0.540)	(0.294)	(0.578)	(0.120)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=180. The units of observation are euro area countries. The outcome variable are indicated on the top of each column calculated for natives only; the independent variable is the log of employment rate, labor force participation rate, employment and population at country level in high and low migration countries. All regressions include time and area fixed effects and are weighted by the 2006 country working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table A5. Smoothing effects on native labour markets, OLS region-level (main specification)

	(1) log(empl/pop)	(2) log(labor force/pop)	(3) log(empl)	(4) log(pop)
Panel A: Contemporaneous effect				
log(empl): high migration	0.361**	0.079*	0.474**	0.092*
	(0.064)	(0.033)	(0.075)	(0.039)
log(empl): low migration	0.270**	0.119*	0.607**	0.273**
	(0.082)	(0.055)	(0.079)	(0.063)
Panel B: 1-year effect				
log(empl): high migration	0.057	-0.047	0.133	0.054
	(0.074)	(0.030)	(0.088)	(0.063)
log(empl): low migration	0.112	0.012	0.335**	0.147
	(0.082)	(0.042)	(0.073)	(0.112)
Panel C: 2-year effect				
log(empl): high migration	-0.031	0.001	-0.013	0.009
	(0.112)	(0.038)	(0.100)	(0.061)
log(empl): low migration	0.019	-0.039	0.018	-0.043
	(0.098)	(0.066)	(0.193)	(0.191)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=650 . The units of observation are euro area regions (NUTS2 further aggregated in order to obtain consistent regions across the sample period). The outcome variable are indicated on the top of each column calculated for natives only; the independent variable is the log of employment rate, labor force participation rate, employment and population at region level in high and low migration regions. All regressions include time and area fixed effects and are weighted by the 2006 regional working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table A6. Smoothing effects on natives labour markets, 2SLS region-level (main specification)

	(1) log(empl/pop)	(2) log(labor force/pop)	(3) log(empl)	(4) log(pop)
Panel A: Contemporaneous effect				
log(empl): high migration	0.424**	0.073*	0.591**	0.149**
	(0.069)	(0.033)	(0.073)	(0.043)
log(empl): low migration	0.787**	0.038	1.129**	0.203**
	(0.208)	(0.114)	(0.244)	(0.078)
Panel B: 1-year effect				
log(empl): high migration	0.090	-0.030	0.219*	0.118+
	(0.069)	(0.044)	(0.085)	(0.068)
log(empl): low migration	0.374	-0.091	0.767*	0.293*
	(0.340)	(0.126)	(0.314)	(0.120)
Panel C: 2-year effect				
log(empl): high migration	-0.068	-0.020	-0.054	0.023
	(0.115)	(0.036)	(0.107)	(0.072)
log(empl): low migration	0.044	-0.127	0.166	0.076
	(0.289)	(0.096)	(0.177)	(0.133)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=650 . The units of observation are euro area regions (NUTS2 further aggregated in order to obtain consistent regions across the sample period). The outcome variables are indicated on the top of each column calculated for natives only. All regressions include time and area fixed effects and are weighted by the 2006 regional working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table A7. Smoothing effects on natives labour markets, OLS country-level (no lags included)

	(1) log(empl/pop)	(2) log(labor force/pop)	(3) log(empl)	(4) log(pop)
Panel A: 1-year effect				
log(empl): high migration	0.512** (0.104)	-0.047+ (0.024)	0.575** (0.099)	0.062* (0.027)
log(empl): low migration	0.424 (0.261)	-0.079 (0.114)	0.842** (0.249)	0.418** (0.029)
Panel B: 2-year effect				
log(empl): high migration	0.276** (0.091)	-0.020 (0.024)	0.324** (0.091)	0.048 (0.029)
log(empl): low migration	0.144 (0.243)	-0.092 (0.132)	0.515+ (0.247)	0.370** (0.038)
Panel C: 3-year effect				
log(empl):. high migration	0.123 (0.084)	0.024 (0.029)	0.129 (0.083)	0.006 (0.039)
log(empl): low migration	-0.024 (0.241)	-0.049 (0.127)	0.238 (0.264)	0.262** (0.070)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=180. The units of observation are euro area countries. The outcome variables are indicated on the top of each column calculated for natives only. All regressions include time and area fixed effects and are weighted by the 2006 country working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table A8. Smoothing effects on natives labour markets, 2SLS country-level (no lags included)

	(1) log(empl/pop)	(2) log(labor force/pop)	(3) log(empl)	(4) log(pop)
<u>Panel A: 1-year effect</u>				
log(empl): high migration	0.493**	-0.035	0.509**	0.016
	(0.157)	(0.033)	(0.162)	(0.037)
log(empl): low migration	0.610	-0.148	0.937*	0.327**
	(0.488)	(0.112)	(0.476)	(0.082)
<u>Panel B: 1-year effect</u>				
log(empl): high migration	0.267*	-0.011	0.265+	-0.002
	(0.126)	(0.037)	(0.137)	(0.045)
log(empl): low migration	0.351	-0.232	0.668	0.317**
	(0.410)	(0.178)	(0.434)	(0.095)
<u>Panel C: 2-year effect</u>				
log(empl): high migration	0.139	0.037	0.106	-0.032
	(0.095)	(0.042)	(0.107)	(0.059)
log(empl): low migration	0.179	-0.231	0.464	0.284*
	(0.341)	(0.232)	(0.409)	(0.144)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=180. The units of observation are euro area countries. The outcome variables are indicated on the top of each column calculated for natives only. All regressions include time and area fixed effects and are weighted by the 2006 country working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table A9. Smoothing effects on natives labour markets, OLS region-level (no lags included)

	(1) log(empl/pop)	(2) log(labor force/pop)	(3) log(empl)	(4) log(pop)
Panel A: 1-year effect				
log(empl): high migration	0.359**	0.016	0.417**	0.058
	(0.056)	(0.023)	(0.060)	(0.052)
log(empl): low migration	0.545**	0.082	0.605**	0.059
	(0.132)	(0.059)	(0.113)	(0.107)
Panel B: 1-year effect				
log(empl): high migration	0.131+	0.009	0.162**	0.032
	(0.069)	(0.020)	(0.059)	(0.049)
log(empl): low migration	0.379*	0.004	0.354*	-0.025
	(0.144)	(0.057)	(0.151)	(0.134)
Panel C: 2-year effect				
log(empl): high migration	-0.034	0.018	-0.047	-0.013
	(0.076)	(0.018)	(0.069)	(0.042)
log(empl): low migration	0.222	-0.054	0.120	-0.101
	(0.176)	(0.074)	(0.199)	(0.153)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=650 . The units of observation are euro area regions (NUTS2 further aggregated in order to obtain consistent regions across the sample period). The outcome variables are indicated on the top of each column calculated for natives only. All regressions include time and area fixed effects and are weighted by the 2006 regional working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table A10. Smoothing effects on natives labour markets, 2SLS region-level (no lags included)

	(1) log(empl/pop)	(2) log(labor force/pop)	(3) log(empl)	(4) log(pop)
Panel A: 1-year effect				
log(empl): high migration	0.363**	0.013	0.404**	0.041
	(0.058)	(0.025)	(0.064)	(0.053)
log(empl): low migration	0.899**	-0.069	0.719**	-0.180
	(0.208)	(0.101)	(0.083)	(0.164)
Panel B: 2-year effect				
log(empl): high migration	0.125+	0.018	0.140*	0.014
	(0.066)	(0.022)	(0.060)	(0.051)
log(empl): low migration	0.542*	-0.089	0.382**	-0.160
	(0.237)	(0.085)	(0.120)	(0.166)
Panel C: 3-year effect				
log(empl): high migration	-0.042	0.024	-0.081	-0.039
	(0.075)	(0.020)	(0.067)	(0.050)
log(empl): low migration	0.299	-0.106	0.049	-0.250
	(0.298)	(0.073)	(0.154)	(0.191)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. N=650 . The units of observation are euro area regions (NUTS2 further aggregated in order to obtain consistent regions across the sample period). The outcome variables are indicated on the top of each column calculated for natives only. All regressions include time and area fixed effects and are weighted by the 2006 regional working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table A11. Smoothing effects on natives labor markets, OLS state-level. United States

	(1) log(empl/pop)	(2) log(labor force/pop)	(3) log(empl)	(4) log(pop)
Panel A: Contemporaneous effect				
log(empl): high migration	0.032 (0.099)	0.004 (0.075)	0.213 (0.158)	0.249 (0.156)
log(empl): low migration	0.142* (0.056)	-0.012 (0.048)	0.447** (0.100)	0.298* (0.111)
Panel B: 1-year effect				
log(empl): high migration	0.115 (0.074)	0.087 (0.099)	0.248 (0.193)	0.145 (0.214)
log(empl): low migration	0.005 (0.037)	-0.044 (0.038)	0.182+ (0.091)	0.197+ (0.101)
Panel C: 2-year effect				
log(empl): high migration	-0.145 (0.114)	-0.052 (0.091)	0.106 (0.125)	0.199 (0.151)
log(empl): low migration	-0.013 (0.038)	0.023 (0.028)	-0.031 (0.100)	0.045 (0.093)

Note: Data from the Census ACS. 2007-2016. N=510. The units of observation are US states. The outcome variable are indicated on the top of each column calculated for natives only; the independent variable is the log of employment rate, labor force participation rate, employment and population at state level in high and low migration states. All regressions include time and area fixed effects and are weighted by the 2006 state working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01..

Table A12. Smoothing effects on natives labor markets, OLS region-level. United States

	(1) log(empl/pop)	(2) log(labor force/pop)	(3) log(empl)	(4) log(pop)
Panel A: Contemporaneous effect				
log(empl): high migration	0.086*	0.068*	0.340**	0.257*
	(0.043)	(0.031)	(0.123)	(0.124)
log(empl): low migration	0.104**	0.019	0.479**	0.352**
	(0.029)	(0.022)	(0.067)	(0.064)
Panel B: 1-year effect				
log(empl): high migration	0.018	0.061	0.222*	0.198*
	(0.046)	(0.045)	(0.094)	(0.096)
log(empl): low migration	0.049	0.039+	0.328**	0.271**
	(0.031)	(0.023)	(0.065)	(0.057)
Panel C: 2-year effect				
log(empl): high migration	-0.038	0.034	0.111	0.130
	(0.051)	(0.043)	(0.093)	(0.101)
log(empl): low migration	-0.033	0.020	0.078	0.111+
	(0.025)	(0.021)	(0.070)	(0.061)

Note: Data from the Census ACS. 2007-2016. N=7410. The units of observation are Commuting Zones. The outcome variables are indicated on the top of each column calculated for natives only. All regressions include time and area fixed effects and are weighted by the 2006 CZ working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table A13. Population elasticity to employment by age group, OLS regressions

	(1) 15-39 y.o. 2007-2016	(2) 40-64 y.o. 2007-2016	(3) 15-39 y.o. 2007-2010	(4) 40-64 y.o. 2007-2010	(5) 15-39 y.o. 2011-2016	(6) 40-64 y.o. 2011-2016
Panel A: countries						
log(empl)	0.494**	0.307+	0.197*	0.082	0.647**	0.490**
	(0.077)	(0.146)	(0.079)	(0.131)	(0.136)	(0.120)
Panel B: regions						
log(empl)	0.538**	0.423**	0.379**	0.326**	0.681**	0.581**
	(0.037)	(0.056)	(0.064)	(0.063)	(0.059)	(0.051)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. The units of observation are euro area countries (panel A) and regions (panel B; NUTS2 further aggregated in order to obtain consistent regions across the sample period). The outcome variable is the log of working age population by age group as indicated in the column titles; the independent variable is the regional log of employment. All regressions include time and are fixed effects and are weighted by the 2006 regional working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01.

Table A14. Population elasticity to employment by education group, OLS regressions

	(1) Low educ 2007-2016	(2) High educ 2007-2016	(3) Low educ 2007-2010	(4) High educ 2007-2010	(5) Low educ 2011-2016	(6) High educ 2011-2016
Panel A: countries						
log(empl)	0.355**	0.872**	0.118	0.643**	0.556**	0.966**
	(0.063)	(0.116)	(0.090)	(0.133)	(0.131)	(0.046)
Panel B: regions						
	0.413**	0.880**	0.247**	0.844**	0.593**	0.940**
	(0.037)	(0.044)	(0.059)	(0.045)	(0.047)	(0.027)

Note: Data from the Eurostat Labour Force Survey. 2007-2016. The units of observation are euro area countries (panel A) and regions (panel B; NUTS2 further aggregated in order to obtain consistent regions across the sample period). The outcome variable is the log of working age population by education group: high education corresponds to an ISCED level equal 5 or more, low education to an ISCED level below 5; the independent variable is the regional log of employment. All regressions include time and are fixed effects and are weighted by the 2006 regional working age population. The standard errors are clustered at the area level. Significance levels: + 0.10 * 0.05 ** 0.01.