Effects of immigration in frictional labor markets: theory and empirical evidence from EU countries

Fabio Mariani *
Eva Moreno-Galbis †
Ahmed Tritah ‡

Work in progress

Abstract

Immigrants are new comers in a labor market. As a consequence, they lack of social networks and other country specific and not directly productive valuable assets affecting their relative bargaining position against employers. We introduce this simple observation into a two sector matching model of the labor market and find that immigrants increase employment prospects of competing natives. This result stands in sharp contrast to the predictions reached by the standard labor-supply labor-demand framework used in the literature to analyze the labor market impact of immigrants. To test the predictions of our model, we use yearly variations between 1998 and 2004 in the share of immigrants within occupations of 12 European countries. We identify the causal impact of immigrants on natives' employment rate using an instrumental variable strategy based on historical settlement patterns across host countries and occupations by origin countries. We find a small but positive causal impact of immigrants on natives' employment rate. However, our results also suggest that these employment gains diminish as immigrants assimilate to host country labor market.

Keywords: immigration, assimilation, labor market segmentation, on-the-job search

JEL: J61; J62; J64; E24

*IZA & IRES (Université Catholique de Louvain)

†GRANEM (Université d'Angers) & GAINS (Université du Maine). Eva.Moreno-Galbis@univ-lemans.fr. Address: GAINS-TEPP, Université du Maine, Avenue Olivier Messiean, 72085 Le Mans cedex, France.

‡GAINS-TEPP. Ahmed.Tritah@univ-lemans.fr. Address: GAINS-TEPP, Université du Maine, Avenue Olivier Messiean, 72085 Le Mans cedex, France. We have benefitted from comments made by the participants at the SAM workshop (Le Mans, December, 2011). Fabien Postel-Vinay, Hlne Turon and Gregory Verdugo provided helpfull comments. Remain errors are our own.

1 Introduction

The consequences of immigration on the labor market outcomes and welfare of the host country have been extensively discussed in the economic literature, both theoretically and empirically. This interest is justified by the implications in terms of inequality, fiscal stances or political positions of immigration. These consequences have been hotly debated in European countries who benefit from a relatively more generous welfare states.

Theoretically, the issue has been framed within a standard neoclassical labor supply, labor demand framework (see Borjas (2003), Card (2001), Card (2005), Card and Shleifer (2009), Ottaviano and Peri (2012)). In such a framework, at least in the short run (i.e. before complementary factors adjust), the number of available jobs is fixed. Namely, jobs have to be shared! As a consequence, the crucial problem is to determine against which natives immigrants are competing, and then, analyze the distributional consequences of an immigration inflow (Friedberg and Hunt (1995)). Yet, this framework has somewhat been challenged by the empirical findings over the last two decades. Exploiting various experiences of immigration, in the US first and more recently in Europe, the literature has failed to find a consistent negative impact of immigrants on natives' labor market outcome[1].

In this paper we claim that the standard approach to analyze the impact of immigrants on natives misses one key feature of immigration: whatever the labor market considered, immigrants are new comers. As a consequence, they lack of social networks, host country specific labor market knowledge and others, although non directly productive, valuable assets. For instance, one such an asset is the eligibility and amount of unemployment benefits which are conditional on past employment experience in host countries. These characteristics affect immigrants' outside option and put them in a lower bargaining position as compared to natives when they negotiate their wages with employers, making them more profitable employees.

Based on these premises, the contribution of this paper is two fold. First, from a theoretical point of view, we adopt a flow approach to labor markets with search frictions. Unlike models

[1]Note that, an overwhelmingly majority of this literature has been focused on the impact over less-skilled natives, with the experience of the US following the 1965 Immigration Act that shifted the immigrants composition towards poorer countries and notably Mexicans; Card (1990); Altonji and Card (1991); Card (2001), Borjas (2003) are the most influential papers. For a literature review, see Borjas (1999). On Europe see Dustmann, Glitz, and Frattini (2008) for the UK, Glitz (2011) for Germany, Gonzalez and Ortega (2008) for Spain, and Ortega and Verdugo (2011) for France. Longhi, Nijkamp, and Poot (2006) offer a summary and perform a meta-analysis on the wage effect of immigrants.

with perfectly competitive markets this approach allows us to introduce the novel heterogeneity between immigrants and natives in terms of their outside option of employment. In our framework, firms respond to changes in labor market conditions by posting more or less vacancies so as to exploit all available profits: the number of jobs is not fixed and responds to changes in the expected profit of a filled vacancy. We consider a two sector labor market and assume that immigrants and natives are *equally productive*. However, since immigrants have lower (less valuable) outside opportunities they are paid less and are thus not *equally profitable* from the firm's point of view. We find that the conclusions of the standard neoclassical models traditionally used to analyze the impact of immigration can be reverted : immigrants may improve employment opportunities of competing natives by increasing the average expected profit of a filled vacancy.

Second, we test the predictions of our model regarding the impact of immigration on natives' employment. We exploit large variations across European countries and time in the share of immigrants within occupations. For a large part, the literature has been focused on the US experience or a single country case. This is a concern as regard the external validity of the results. We believe our approach is particularly relevant given the peculiarity of European labor markets characterized by higher frictions than in the US. Moreover, if wages are sticky, as it is presumably the case in Europe, then most of labor market adjustments should happen along the quantity margin. This has been overlooked in the literature which has mainly focused on wage impact.

Recent literature has started to investigate other potentially counterbalancing effects compensating any adverse impact of immigrants. Notably, Ottaviano and Peri (2012) consider that immigrants and natives, in spite of having similar skills, are not perfectly substitutable in production. Peri and Sparber (2011) motivate this assumption by introducing different relative skill endowments between natives and immigrants, such that an inflow of immigrants changes the comparative advantage of natives in occupations intensive in skills for which they are better endowed. Lewis (2011), looks at labor demand side adjustment, and shows, as in the recent literature on inequality and technological changes (Acemoglu (2003)), that firms adjust to unskilled labor supply shocks by adopting less skilled biased technology : an increase in the share of immigrants among lower skilled workers makes the adoption of a technology complementary with low-skilled labor more profitable, dampening their initial negative impact on wages. However, all these contributions stick to the standard neoclassical framework and all the process of

adjustment appeals to a form of "time consuming" adjustment coming from a complementary factor (capital, technology or natives' human capital). As a consequence, in the short run, since the number of jobs remains fixed and job competition rises, wages or the employment rate of natives has to decrease.

Our claim will be very different from these previous approaches : we argue that, even if immigrants are as equally productive as natives, their lack of country specific assets puts them in lower bargaining position relatively to natives when they negotiate their wages with firms. As a consequence, they are paid less on the same job, increasing average profitability of this type of jobs and stimulating the opening of more vacancies in that occupation. Because natives can apply to this occupation their employment opportunities are improved[2]. The equilibrium employment of natives in a labor market segment is thus positively affected by a shock that increases the share of immigrants in an occupation. However, we also show that this positive impact is somewhat dampened by the possibility for natives from other segments to search in the segment whose employment prospect has improved.

Surprisingly enough, with the notable exception of Ortega (2000) we are not aware of any study analyzing the labor market impact of immigrants on host countries using a search and matching model of equilibrium unemployment. Ortega (2000) is interested in the equilibrium distribution of workers in the host and origin countries and the employment consequences for natives in host countries. He shows, provided they have higher search costs, that immigrants can improve the employment prospect of natives. However, the paper considers homogeneous jobs which prevents any heterogeneous impact of immigration and does not allow the analysis of natives' endogenous response to changes in labor market conditions. While we do not model immigration choices, we consider a segmented labor market between two sectors. We allow natives to move between sectors to take advantage of any changes in employment opportunities brought by immigrants. This is all the most relevant as a great deal of literature has been interested in the so call displacement effect of immigration. While most of the literature has considered outward displacement effect we show that inward displacement is also a possibility.

To test the prediction of our model we use data from the European Labor Force surveys from 1998 to 2004 and define a labor market at a country and nine occupations level. To our knowledge, Angrist and Kugler (2003) and more recently D'Amuri and Peri (2011) are the only studies that

[2]A key assumption here is that employers cannot discriminate between natives and immigrants when posting their vacancies.

exploit variations across European countries to identify the impact of immigrants on natives. Defining a labor market at a national level, as in the seminal contribution of Borjas (2003), but in a multicountry context, has two key advantages. First mobility between countries is costly, therefore one can mitigate the spurious correlation introduced by the possibility for natives to "vote with their feet" by moving outside the labor market whose employment prospects worsen: the so call *displacement effect*. Second, without having to bother about possible displacement effects, we can use an identification strategy that has proven powerful in the spatial approach to assess the causal impact of immigrants on natives' employment rate. Indeed, the main identification issue faced in interpreting cross-occupation comparison within countries is that the supply of immigrants in an occupation and a country responds to the relative employment rate, leading to a well known simultaneity problem.

We identify the causal impact of immigrants on natives employment rate within an occupation using an instrumental variable strategy. In that case, not only do we need a variable which explains why immigrants are choosing a particular occupation, independently of any unobserved employment shocks, but also, why a particular country within that occupation is chosen. For this purpose, we extent the strategy originally developed by Altonji and Card (1991) to a multi-country-occupation setting and use historical settlement patterns in host countries and occupations by origin countries as an instrument for current inflows. Such instrument has proven to be a strong determinant of contemporaneous inflows in the single country case[3]. To date, D'Amuri and Peri (2011) are the only ones that use a similar instrument in a multicountry setting, although not in such a detail as ours as they do not instrument for occupational choices within countries.

Our main empirical findings are two. First, according to our preferred specification we show that immigrants exert a small but positive impact on male natives employment rate. This effect, robust to our instrumental variable approach, can be given a causal interpretation. A doubling of the share of immigrants in an occupation increases native employment rate in that occupation by 1.2%. Albeit small, with regard to the average magnitude of immigration inflows within some occupations recently observed in some European countries, the employment gain for natives is far from being negligible. We do not find any positive or negative impact on women, suggesting that for them disparities in outside opportunities between immigrants and native are small.

[3]See Card (2001), Card and Shleifer (2009) for the US and Gonzalez and Ortega (2008) for Spain among others.

Second, the employment gains among natives are not long lasting. Distinguishing immigrants with more and less than 10 years of tenure in host countries, we find a positive impact only for the later. In light of our model, we interpret this finding using an *assimilation hypothesis*. With years passed on host countries, immigrants and natives outside option converges. Immigrants and natives become equally profitable for firms which decreases their incentives to open more vacancies in occupations with a higher share of long term immigrants compared to occupations with higher share of new immigrants.

The rest of the paper is organized as follows. Next section presents our two sector matching model that allows us to compare changes in equilibrium natives employment rate before and after an immigration shock affecting one sector. Section 3 discusses data and gives some relevant descriptive statistics. Section 4 presents our empirical specification choices and discusses the identification strategy adopted. Empirical results are reported and discussed in section 5, and section 6 concludes.

2 The model

2.1 The matching process

We consider an occupation i. This occupation may be located either in sector A or sector B. The notion of sector may refer to a region or an activity branch, for example an economist in Paris and an economist in Strasbourg or an economist in the manufacture industry and an economist in the financial sector. In spite of considering a given occupation, the productivity of the worker differs between sectors, which affects not only the wage the firm pays but also the labor market tightness. We take as reference sector A. We assume that productivity in this sector is higher so wages earned by people employed in sector A are also higher. In spite of this wage differential, a proportion of workers decides to search in sector B, since there will be congestion problems on sector A if everyone searches there. Actually at the equilibrium, the expected utility of unemployment in sector A must equal the expected utility of unemployment in sector B.

We assume that unemployed people in sector A have a probability λ of being depreciated to sector B. We allow workers employed in sector B to do on-the-job search in sector A. Since we are considering a single occupation, these flows between sectors are perfectly reasonable. In sum,

we assume that people decide whether to search in sector A or B. This allocation takes place so as to equalize expected utilities of unemployment in both segments. Unemployed seeking for a job in sector A depreciate to sector B at the exogenous probability λ. Once employed, people in sector A remain employed in this sector which offers the best wage possibilities. In contrast, people employed in sector B keep searching for a job on sector A.

We consider a one job-one firm set up where the meeting process between firms and job seekers is represented by an homogeneous matching function. For simplicity we are going to assume that, initially the number of immigrants in both sectors equals zero. We then analyze the impact of an increase in the number of immigrants in sector A. We choose sector A as the receiving sector, simply because we want to study the impact of immigration not only in the unemployed allocation between sectors, but also the impact on the on-the-job search decisions. The possibility of natives to move towards the sector receiving the immigration wave will tend to smooth the impact of the immigration wave.

Let us denote as $t = A, B$ the two existing segments, $j = N, I$ native and immigrant workers, v^t the number of vacancies in segment t, u_j^t the number of job seekers, n_j^t the number of employed and eo the on-the-job search effort. The matching functions can be thus written as: $M^A = m^A(v^A, u_N^A + u_I^A + eo \cdot n_N^A)$ and $M^B = m^B(v^B, u_N^B)$, where we assume that initially $u_I^A = 0$. For the sake of simplicity we will assume a standard homogeneous matching function of the form $M^A = m_0(v^A)^{1/2}(u_N^A + u_I^A + eo \cdot n_N^B)^{1/2}$ and $M^B = m_0(v^B)^{1/2}(u_N^B)^{1/2}$.

Labor market opportunities are described by the market tightness variable $\theta^A = v^A/(u_N^A + u_I^A + eo \cdot n_N^B)$ and $\theta^B = v^B/u_N^B$. The probability of filling an empty vacancy equals $q(\theta^t) = M^t/v^t$. The probability of finding a job is given by $p(\theta^A) = M^A/(u_N^A + u_I^A + eo \cdot n_N^B)$ and $p(\theta^B) = M^B/u_N^B$. In sector A, a vacancy is filled by a native worker with probability $q(\theta^A)\frac{u_N^A + eo \cdot n_N^B}{u_N^A + u_I^A + eo \cdot n_N^B}$ and by an immigrant with probability $q(\theta^A)\frac{u_I^A}{u_N^A + u_I^A + eo \cdot n_N^B}$. In sector B (not receiving sector), the probability equals $q(\theta^B)$.

2.2 The agents' behavior

2.2.1 Workers

Employed workers coming from unemployed are paid w_j^t whereas workers in sector A that were previously employed in sector B earn w_N^{AB}. Jobs are destroyed with probability s. Workers employed in sector B have a probability $eo \cdot p(\theta^A)$ of finding a job in segment A but they bear a disutility cost linked to the search effort equal to $\tau(eo) = \phi_0 \cdot eo_1^\phi$, where $\phi_1 > 1$ so that

$\tau'(eo) > 0$ and $\tau''(eo) > 0$. The asset values of employment in sector A, B and in sector A but from someone coming from B, are respectively given by:

$$rE_j^A = w_j^A + s(U_j^A - E_j^A) \quad (1)$$

$$rE_N^B = w_N^B - \tau(eo) + s(U_N^B - E_N^B) + eo \cdot p(\theta^A)(E_N^{AB} - E_N^B) \quad (2)$$

$$rE_N^{AB} = w_N^{AB} + s(U_N^A - E_N^{AB}) \quad (3)$$

where U_j^t stand for the asset values of unemployment. The individual employed in sector B, searches on-the-job until all possible rents are exhausted, that is, until the marginal cost of an additional unit of search effort equals the marginal expected benefit from on-the-job search:

$$\begin{aligned} \tau'(eo) &= p(\theta^A)(E_N^{AB} - E_N^B) \\ \tau'(eo) &= p(\theta^A) \cdot \frac{w_N^{AB} - w_N^B + \tau(eo)}{r + s + eo \cdot p(\theta^A)} \end{aligned} \quad (4)$$

Because $\tau''(eo) > 0$ we deduce that an increase in $p(\theta^A)$ should push up on-the-job-search effort. The asset values of unemployment write as follows:

$$rU_j^A = b_j + p(\theta^A)(E_A^t - U_A^t) + \lambda(U_N^B - U_N^A) \quad (5)$$

$$rU_N^B = b_N + p(\theta^B)(E_N^B - U_N^B) \quad (6)$$

The value of the outside opportunities of employment (domestic production and leisure) is represented by b_j. The main difference between natives and immigrants is that the value of this outside opportunity is larger for natives. The lack of social networks and other country specific valuable assets (such as eligibility to the unemployment benefit) justify the lower value of outside opportunities for immigrants.

At the initial state (with a given level of immigration that we have normalized to zero), natives allocate between segment A and B until the moment where the expected values of unemployment are equal in both segments:

$$U_N^A = U_N^B \quad (7)$$

using (1)-(6) yields:

$$b_N + p(\theta^A)\frac{w_N^A - b_N}{r + s + p(\theta^A)} = b_N + p(\theta^B)\frac{w_N^B - b_N - \tau(eo) + eo \cdot p(\theta^A)(E_N^{AB} - E_N^B)}{r + s + p(\theta^B)} \quad (8)$$

where

$$E_N^{AB} - E_N^B = \frac{w_N^{AB} - w_N^B + \tau(eo)}{r + s + eo \cdot p(\theta^A)} \quad (9)$$

Because the value of outside opportunities of employment (b_N) is assumed to be the same for all natives, the main determinants of unemployed allocation will be the labor tightness and the

wage. If the expected utility of unemployment is improved in one segment (due for example to an increase in job opportunities in that segment) the allocation of unemployed will be modified and will become more favorable to that segment.

2.2.2 Firms

From the firm's point of view, the asset value associated with an empty vacancy is given by minus the cost associated with the announcement of this vacancy, γ, plus the surplus obtained by the firm if it manages to fill the vacancy with a native worker or with an immigrant. We have assumed that segment B does not receive the immigrant wave so that, the value of an empty vacancy is given by:

$$rV^B = -\gamma + q(\theta^B)(J^B - V^B) \tag{10}$$

where J^B represents the value of a filled vacancy in segment B. This value is defined by the instantaneous profit $h^B - w_N^B$ associated with the job (productivity minus the wage) plus the expected loss if the vacancy becomes empty, either because of an exogenous job destruction shock or because the worker finds a position in segment A:

$$rJ^B = h^B - w_N^B + s(V^B - J^B) + eo \cdot p(\theta^A)(V^B - J^B) \tag{11}$$

In segment A, the vacancy may be filled by a native worker (unemployed or coming from segment B) or by an immigrant. The firm can only observe the worker's type at the time of the match and it cannot discriminate between unemployed natives, employed natives coming from segment B and immigrants. As far as the surplus of the match is positive, the match goes on. The decision concerning the number of vacancies to open is then based on the average expected profit. We denote V^A the value of an empty vacancy and J_N^A, J_N^{AB} and J_I^A the values of a position filled, respectively, by a native worker previously unemployed, a native worker previously employed in segment B and an immigrant worker. These values are given by:

$$
\begin{aligned}
rV^A &= -\gamma + q(\theta^A)(\overline{J^A} - V^A) \qquad (12)\\
&= -\gamma + q(\theta^A)\Big(\frac{u_N^A}{u_N^A + u_I^A + eo \cdot n^B} J_N^A + \frac{eo \cdot n^B}{u_N^A + u_I^A + eo \cdot n^B} J_N^{AB} + \frac{u_I^A}{u_N^z + u_I^z + eo \cdot n^B} J_I^A - V^B\Big)
\end{aligned}
$$

where

$$
\begin{aligned}
rJ_N^A &= h^A - w_N^A + s(V^A - J_N^A) \qquad (13)\\
rJ_N^{AB} &= h^A - w_N^{AB} + s(V^A - J_N^{AB}) \qquad (14)\\
rJ_I^A &= h^A - w_I^A + s(V^A - J_I^A) \qquad (15)
\end{aligned}
$$

where h^A corresponds to the productivity of the job and w_N^A, w_N^{AB}, and w_I^A stand, respectively, for the wage of a native previously unemployed, for the wage of a native coming from segment B and for the wage of an immigrant. We denote as $\omega_1 = \frac{u_I^A}{u_N^z + u_I^z + eo \cdot n^B}$ the proportion of immigrants job-seekers in segment A, the share of native job seekers coming from segment B equals $\omega_2 = \frac{eo \cdot n^B}{u_N^A + u_I^A + eo \cdot n^B}$ and the proportion of native job seekers coming from unemployed is given by $(1 - \omega_1 - \omega_2) = \frac{u_N^A}{u_N^A + u_I^A + eo \cdot n^B}$.

Firms open vacancies until no more profit can be obtained so that, at the equilibrium, the free entry condition $V^t = 0$ applies, i.e.:

$$
\frac{\gamma}{q(\theta^A)} = \overline{J^A} \qquad \text{and} \qquad \frac{\gamma}{q(\theta^B)} = J^B \qquad (16)
$$

The cost born by the firm while the vacancy remains empty must equal the value associated with the filled vacancy. At this equilibrium, the value of a filled job in segment A equals:

$$
\overline{J^A} = \frac{h^A - \omega_1 w_I^A - \omega_2 w_N^{AB} - (1 - \omega_1 - \omega_2) w_N^A}{r + s} \qquad (17)
$$

We can denote the average wage as $\overline{w} = \omega_1 w_I^A + \omega_2 w_N^{AB} + (1 - \omega_1 - \omega_2) w_N^A$.

The value of a filled position in segment B equals:

$$
J^B = \frac{h^B - w_N^B}{r + s + eo \cdot p(\theta^A)} \qquad (18)
$$

2.3 Wages

In the presence of on-the-job search, determining wages may become a complicated issue if we allow for bargaining since workers doing on-the-job search will take as an outside option their current wage. In this case, as Shimer (2005) notes, "the set of feasible payoffs is typically non-convex because an increase in the wage rises the duration of an employment relationship"

which implies that the Nash bargaining rule cannot be applied. This paper considers thus a rigid wage case, which corresponds well to the European situation. More precisely we consider a wage determination process in the style of Hall and Milgrom (2008). Once a qualified worker meets an employer, threatening to walk away and permanently terminate the bargain is not credible. The threats are to extend bargaining (disagreement payoff) rather than terminate it (outside-option payoff). The result is to loosen the tight connection between wages and external conditions (market tightness). In the alternating offer wage-bargaining environment, as long as reaching an agreement creates value, a bargainer who receives a poor offer continues to bargain, because that choice has a strictly higher payoff than taking the outside option. Threats to exercise the outside option are simply not credible. Since this is common knowledge, changes in the value of the outside option cannot affect the bargaining outcome. Having found what appears to be a good match, the employer then makes a comprehensive job offer, including pay, benefits, and duties. The model assumes that the worker always accepts it at the equilibrium. The wage is higher than it would be if the employer had the power to make a take-it-or-leave-it offer that denied the worker any part of the surplus. The worker's right to respond to a low wage offer by counter-offering a higher wage-though never used in equilibrium-gives the worker part of the surplus.

The bargaining process proposed in this paper, implies that the unemployed worker meeting the employer receives a payoff equal to the value of her outside option (domestic productivity and leisure) if the negotiation breaks down, but also when the agreement is delayed. If the worker was previously employed (in segment B) the payoff equals the wage of her previous job. For the firm, there is no cost while bargaining continues. Firms and workers renegotiate the division of the match product h^t for $t = A, B$, so that the outcome of the symmetric alternating-offers game is :

$$w_N^t = \eta h^t + (1-\eta) b_N \tag{19}$$

$$w_I^A = \eta h^A + (1-\eta) b_I^A \tag{20}$$

$$w_N^{AB} = \eta h^A + (1-\eta) w_N^B \tag{21}$$

where $\eta = 1/2$. Note that $h^B > b_N$ (otherwise workers will prefer to remain unemployed rather than accepting a job in B), which implies that $b_N < w_N^B < h^B$. This implies that workers in segment A coming from segment B manage to obtain a higher wage in this segment ($w_N^{AB} > w_N^A$) since they have a higher outside opportunity.

2.4 Employment flows

The active population of each segment includes unemployed and employed workers. For $t = A, B$, we denote as u^t the number of unemployed people and n^t the number of employed workers. Total population in segments A and B is respectively given by $P^A = u^A + n^A$ and $P^B = u^B + n^B$. At the equilibrium, the number of individuals of each segment must remain constant which implies that outflows from each segment must equal inflows, that is:

$$u^A \lambda = eo \cdot p(\theta^A)(P^B - u^B) \tag{22}$$

Similarly, the number of employed and unemployed people within each segment must also remain constant, which implies that entries to unemployment must equal exits from unemployment. In segment A, the number of individuals quitting unemployment towards segment B equals λu_A and the number of unemployed finding a job is given by $p(\theta^A)u_A$. The number of people loosing their job equals $s(P^A - u_A)$. Because at the equilibrium entries equal exits we can easily find the equilibrium unemployment rate:

$$s(P^A - u_A) = p(\theta^A)u_A + \lambda u_A \tag{23}$$

$$\frac{u_A}{P^A} = \frac{s}{s + \lambda + p(\theta^A)} \tag{24}$$

In segment B, entries to unemployment are given by $\lambda u_A + s(P^B - u_B)$ whereas exits are given by $p(\theta^B)u_B$. At the equilibrium entries equalize exits leading to:

$$\lambda u_A + s(P^B - u_B) = p(\theta^B)u_B \tag{25}$$

$$u_B = \frac{sP^B + \lambda u_A}{s + p(\theta^A)} \tag{26}$$

Combining (26) and (22) yields the equilibrium unemployment rate in segment B:

$$\frac{u_B}{P^B} = \frac{s + eo \cdot p(\theta^A)}{r + p(\theta^B) + eo \cdot p(\theta^A)} \tag{27}$$

If $s < r + p(\theta^B)$, the unemployment rate in segment B rises when $p(\theta^A)$ increases.

2.5 Employment opportunities

Employment opportunities are measured by the labor market tightness which is determined by the free entry condition (16). Combining this equation with (17) and (18), yields:

$$\frac{\gamma}{q(\theta^A)} = \overline{J}^A = \frac{h^A - \overline{w}^A}{r + s} \qquad \text{and} \qquad \frac{\gamma}{q(\theta^B)} = J^B = \frac{h^B - w_N^B}{r + s + eo \cdot p(\theta^A)} \tag{28}$$

Since $\frac{\gamma}{q(\theta^t)} = \gamma(\theta^t)^{1/2}$ for $t = A, B$, we find:

$$\theta^A = \Big(\frac{h^A - \overline{w}^A}{\gamma(r+s)}\Big)^2 \qquad \text{and} \qquad \theta^B = \Big(\frac{h^B - w_N^B}{\gamma(r+s+eo \cdot p(\theta^A))}\Big)^2 \tag{29}$$

Immigrants benefit from a lower wage than natives since the value of their outside option is lower. The direct impact of the arrival of an immigrant wave to segment A is then to reduce the average wage paid by firms, which should yield an increase in the market tightness (if $\overline{w}^A$ decreases, θ^A increases). The larger the importance of the immigrant wave, the larger the reduction of the average wage and the larger the positive impact on employment opportunities in that segment. In the mid-term, the improvement in θ^A will yield both a reallocation of unemployed workers towards segment A and a rise in the on-the-job search effort. Both things, will push the average wage paid by firms up until the positive impact of immigration disappears. Since $w_I^A < w_N^A < w_N^{AB}$, the increase in the proportion of natives in segment A can more than compensate the initial decrease in the average wage due to the immigrant's arrival.

On the other hand, the improvement in labor market tightness in segment A fosters a reduction in the market tightness of segment B. Due to the increase in on-the-job search effort, the expected duration of a job in segment B falls. Firms must now discount their profit over a shorter horizon whereas the cost of opening a vacancy is not modified. As a result, the number of open vacancies in segment B falls.

Several conclusions can then be drawn concerning the impact of immigration on employment opportunities when considering a matching framework with two labor market segments. First of all, the labor market tightness of the receiving segment is always improved by the arrival of immigrants since the average wage paid by firms falls. Second, this positive effect of immigration in the receiving segment, is accompanied by a negative externality in an adjacent segment if workers have the possibility to do on-the-job search, since they will increase their efforts to find a job in the better paid segment that offers now larger employment possibilities. Because the expected duration of a job falls in the not-receiving segment, the number of vacancies open in this segment also falls. Finally, the positive impact of immigration in a given segment disappears in the mid-term due to the arrival of better paid natives to the receiving segment. In sum, the immigration wave fosters a reallocation of employment in the host region in favor of the immigrant receiving segment. This result contradicts traditional findings of the economic literature (see Dustmann, Fabbri, and Preston (2005) for more details), according to which the immigrant's wave will only be welfare improving for the host country if the skill composition of

immigrants differs (complements) from the skill structure of natives.

2.6 Testable implications of the model

Our model has a number of testable implications:

- The larger the immigrant wave arriving to a particular occupation in a given industry, the larger should be the reduction in the average wage paid by firms in that occupation-industry pair.
- The larger the reduction in the average wage, the larger should be the improvement in employment opportunities in that occupation-industry pair.
- Improved employment opportunities should benefit both previously unemployed natives and employed natives in other occupation-industry pairs that are attracted by the increased employment opportunities.
- Experience in a country, will tend to reduce the divergence in the value of outside opportunities between immigrants and natives. As this divergence dies out, the positive impact of immigrants will tend to disappear.

3 Data and descriptive statistics

The main dataset we use is the harmonized European Labour Force Survey (ELFS), which homogenizes and groups together country specific surveys at the European level (see EUROSTAT (2009)). Due to data availability, we restrict our analysis to the period 1998-2004. Our sample comprises the working age population (age 15-64) of Western European countries only. The data includes information on the occupation, working status (employed or inactive) and demographic characteristics of the individuals. Unluckily, the ELFS does not include any information on wages. We drop observations with missing data on country of birth, which are fundamental for our empirical analysis. In line with previous literature, we classify as immigrants all individuals born in any country (both EU or non-EU) outside the one of his current working residence. We categorize individuals into cells on the basis of different labor segments defined by occupations, which are used as proxy for skills. Occupations are broadly defined in 9 groups[4]. We can easily

[4]These are (1) senior officials and managers, (2) professionals, (3) technicians and associate professionals, (4) clerks, (5) service workers and shop and market sales workers, (6) skilled agricultural and fishery workers, (7)

understand that moving from one country to another or from one occupation to another, even within the same country, is very costly for natives in the short run. This should circumvent the criticism addressed to local labor market approaches, which point out the biases raised by the possibility for natives to leave labor markets receiving large immigration inflows (Peri and Sparber (2011)). Thus, individuals are grouped into cells defined by country-year and 1 digit occupation (9 cells by country and year). Labor market outcomes for each cell are defined as the number of natives employed within that cell. We consider that non employed natives belong to the occupation of their last employment. We exclude those that have never worked. Because last occupation of non employed natives is missing for Norway, France and Netherlands these countries are dropped from the analysis.

Considering the twelve European countries of our sample, from 1998 to 2004 the share of immigrants in natives' labor force has increased by 6 percentage points from 5.7% to 11.8% which is a large increase even compared with US. Comparatively in the US as percentage of total labor force, foreign labor force increased from 12.7% to 14.7% (Migration Policy Institute, 2006).

The European foreign labor force rise is even more impressive if one considers the heterogeneity across occupations as shown in Figure 1. While the rise pervasive across all occupations, it is the higher for the less skill occupations. However, contrary to conventional wisdom the contribution of immigrants to more skilled occupations is also on the rise. The rest of the paper will seek to exploit changes in this heterogeneity across occupations within countries to identify the causal impact of immigrants on natives employment rate.

4 Empirical specification issues and identification strategy

4.1 The homogenous immigrants specification

We work on grouped data at an *occupation-country-year* level. We define our outcome variable y_{oct} as the (log) share of employed natives in an occupation o in a country c at a time t. Let N_{oct} and P^N_{oct} denote respectively the number of employed natives and native population in the corresponding cell, then y_{oct} is $\frac{N_{oct}}{P^N_{oct}}$. Our baseline estimating equation is:

$$\ln y_{oct} = \beta_0 + \beta_1 * \ln shim_{oct} + \delta_t + \delta_c + \delta_o + \mu_{ot} + \alpha_{oc} + + u_{ijt} \tag{30}$$

craft and related trade workers, (8) plant and machine operators and assemblers, (9) elementary occupations.

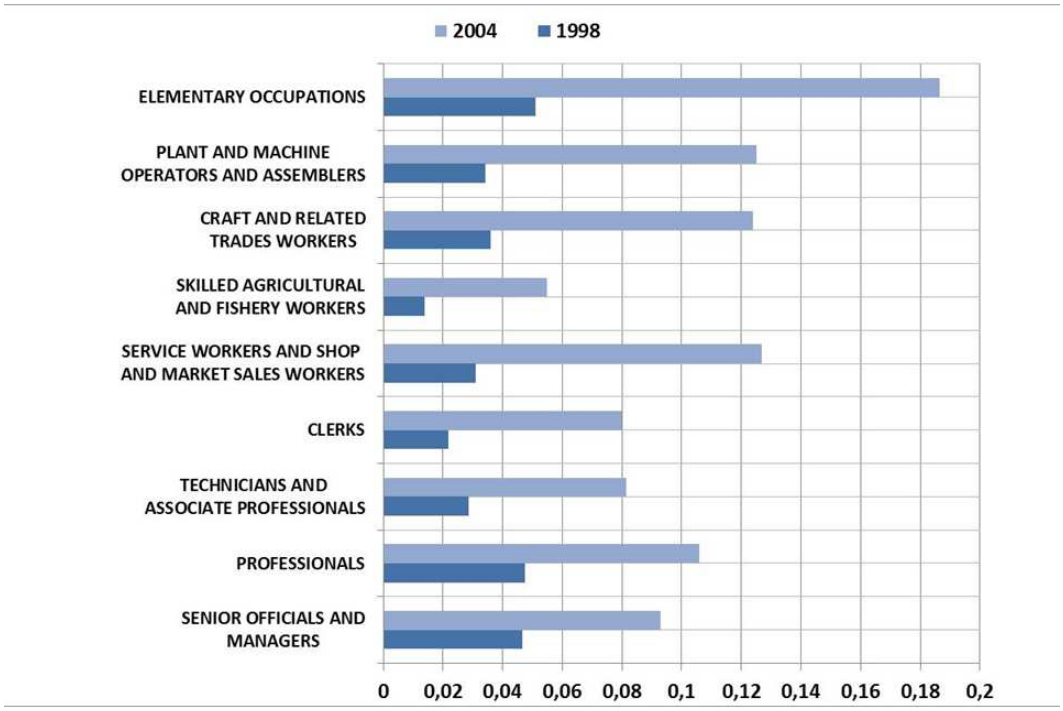

Figure 1: Heterogeneous impact of immigration across occupations.

The key explanatory variable $shim_{oct}$, is the (log) ratio of immigrants (men or women) in labor segment *oct* to the total population of the segment, δ_c is a country fixed effect and δ_t, δ_o are year fixed effects and occupation fixed effects. These effects control for unobservable country, period and occupation specific determinants of native employment. Thus we achieve identification from variation of immigrants' share in an occupation across countries and through time[5]. Lately we enrich our specification with country-occupation fixed effect (α_{oc}) and year-occupation fixed effect (μ_{ot}). In that case, our impact is identified by deviations across years from occupation specific mean within country, and deviation across countries from occupation specific mean within a period. This wide set of fixed effects distinguishes our approach from previous cross-area studies that could not control for such factors as they use a single cross-sectional data (see Card (2001)) or a single country aggregate times series data as in Borjas (2003).

Because serial correlation within cell is a concern, in all regressions we adjust standard errors for clustering of observations at the occupation-country level. We also use weighting least square,

[5]Our identifying assumption here is that the fraction of immigrants is potentially correlated with the unobserved overall level of employment in a cell, but uncorrelated with unobserved changes in employment in the same cell.

with weights equal to the native population size in each segment. In some specifications, we fixed the denominator of $shim_{oct}$ to its 1998 level such that time variations of $shim_{oct}$ within a country stem only from changes in the number of immigrants within country-occupation cells and not from variation due to native inflow or outflow across occupations. The share specification adopted constraints the effect of immigrant variation and native variation within cell to be the same. It is important to note that P^N_{oct}, the native labor force in a cell appears in the dominator on both side of equation (30) which, as shown by Peri and Sparber (2011), may potentially create a spurious positive correlation between the immigrant share within an occupation and native employment share. For this reason in some specifications we fix the denominator of the share of immigrant in an occupation to its 1998 value, and in some others we also control directly for the size of native labor force in the cell.

Despite our effort to control for unobservable determinants of natives' employment rate that are correlated with immigrants' share within an occupation, endogeneity bias still remains a concern[6]. This is the case for instance if changes in immigrants' share within a cell are correlated with changes in unobserved determinants of employment within the same cell. It is indeed plausible that immigrants sort into occupations whose demand is growing. In that case, segment specific fixed effects are not enough since segment specific employment rates are not fixed. We address this issue with two strategies. First, we control directly for estimated cell-specific productivity shocks. We motivate this by the fact that if an occupation is concentrated in an industry whose output has grown above average over the period, we expect labor demand for this occupation to have grown above average and to be potentially correlated with the inflow of immigrants within that occupation. To control for this possibility, we introduce in our estimated equation a segment specific labor demand shift driven by sectoral composition of occupations at the national level. Thus we achieve identification from deviation through occupation specific trend driven by the initial sectoral composition of occupations. To be specific, we construct for each country the following occupation and year specific labor demand shift index (in the spirit of Katz and Murphy (1992) or Katz and Blanchard (1992)):

$$\hat{\eta}_{ot} = \sum_k \gamma_{ok} Y_{kt}$$

where Y_{kt} is the real level of production of two-digit industry k at date t and $\gamma_{ok} = \frac{E_{ok}}{\sum_k E_{ok}}$ is

[6]Because we are including country-occupation fixed effect endogeneity bias should arise from over time changing labor market conditions of an occupation in a given country.

the share of occupation o employed in industry k in 1998[7]. Thus $\hat{\eta}_{ot}$ is a weighted average of industrial production in year t, where the weights are given by the share of occupation o employed in industry k; $\hat{\eta}_{ot}$ is interpreted as the predicted employment change for workers belonging to occupation o (in a given country and period of time).

Our second approach to deal with endogeneity bias uses an instrumental variable strategy. This requires a variable correlated with influx of immigrants into a given labor market segment but uncorrelated with unobserved factors driving employment growth among natives. Our instrumental variable exploits the variation of the employment distribution of contemporaneous immigrants across occupations due to the past settlement patterns of their country peers across countries and occupations (see Altonji and Card (1991) or Card (2001)). Because of informational network, immigrants have a tendency to cluster into occupations having a higher share of their country peers (see Munshi (2003)). Our instrument, inspired from Card and Lewis (2007), is constructed as follows :

$$\phi_{st} = \sum_{m} N_{ms,1990} * \frac{M_{m,t}}{N_{m,1990}},\ t = 1998, ..., 2004$$

where $M_{m,t}$ is the flow of immigrants from country m in year t in the whole OECD, $N_{m,1990}$ is the stock of immigrants from country m in the OECD in 1990, and $N_{ms,1990}$ is the number of immigrants from country m in educational group s. Data on immigrants flows has been obtained from the OECD and those on stock are from Docquier, Lohest, and Marfouk (2007). We grouped immigrants in three educational levels: primary, secondary, and tertiary. Thus, we weight the immigrants population growth by their origin-education country composition in 1990[8]. Finally the occupation specific instrument is computed from the distribution of educational levels across occupations. Our final instrument writes:

$$IV^{1}_{oct} = \sum_{s=1}^{3} \phi_{st} * \gamma_{so}$$

where γ_{so} is the share of education level s employed in occupation o in 1998. Thus we use the 1990 distribution of immigrants from a given country across occupations and OECD countries to allocate yearly new waves of immigrants from that country into OECD countries and occupations.

[7]Industrial production data is obtained from the EUKlems consortium (http://www.euklems.net/). We have also constructed an index with the average level of occupation share over the whole period 1998-2004. This index gives similar result.

[8]Ideally we would have worked with immigrants distribution across occupations instead of educational level, however this data is not available for 1990.

Figure 2 portrayed the scatter plot of the (log) share of immigrants against our (log) shift share variable. The figure illustrates the strong (unconditional) correlation between the two variables making, at a first glance, our shift share variable a good candidate to instrument the share of immigrants within cells. The first stage regression (available upon request) confirms that our instrument is a good predictor of immigrants' share within occupations.

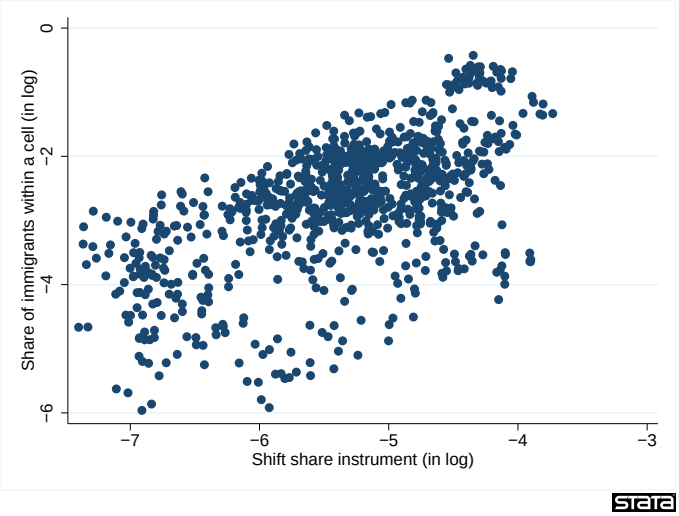

Figure 2: Immigrants predicted share based on 1990 settlement patterns across cells and immigrants yearly observed share within cells. The data are for male.

4.2 Testing the assimilation hypothesis: the heterogenous immigrants specification

The model outlined above suggests that certain conditions must hold in order for the impact of immigrants on native's employment to be positive. In particular, everything else equal, the higher the value of the outside options of immigrant with respect to natives, the lower the impact of immigrants on native employment. Equation (30) does not distinguish between recent and earlier immigrants which amounts to assume that all immigrants have the same outside options. However, an implication of our model is that employment effect should be larger in occupations receiving a higher share of immigrants with low outside options. These are expected to be lower for newly arriving immigrants than for veterans ones, either because of the formers' lack of knowledge of local labor market, have poorer social networks, or most probably are not yet fully eligible for unemployment benefits. To relax the assumption of identical outside options among

immigrants we distinguish, within an occupation, immigrants with less than 10 years of tenure (low outside option group) from those with more than 10 years (high outside option group). In a way, if immigrants outside option rises over time, their outside option should converge to that of natives and their positive impact should die out i.e. they become more substitutable with natives in what concerns their profitability for employers. Let $shim_{oct1}$ be the log ratio of immigrants (both men and women) with less than or equal to 10 years of tenure, to the population size of the cell oct and, let $shim_{oct2}$ be the ratio of immigrants with more than 10 years of residence[9]. The equation to be estimated becomes then:

$$\begin{aligned} \ln y_{oct} &= \gamma_0 + \gamma_1 * shim_{oct1} + \gamma_2 * shim_{oct2} + \\ &\quad + \delta_t + \delta_c + \delta_o + \mu_{ot} + \alpha_{oc} u_{oct} \end{aligned} \tag{31}$$

This specification assumes a piecewise linear impact of immigrants that depends on their tenure within a host country labor market. Under the assimilation hypothesis, our testable assumption is $\gamma_1 > \gamma_2$. Since we face the same identification issues as in Eq.(30), we use both the labor demand shift index and a similar instrumental variable strategy. As an additional instrument we use the distribution of immigrants within an occupation in 1990[10], crossed with occupation specific industry labor demand shift. Our justification, for this second instrumental variable is the following: labor demand shifts within occupations will attract more immigrants towards occupations where immigrants were already relatively more concentrated in the past. In a way, our instrument is the predicted employment change of immigrants within occupations due to between-sector demand shifts and the past distribution of immigrants across occupations. To illustrate, if engineers are highly concentrated in manufacturing industry and if this industry is expanding, then it will attract relatively more immigrants, everything else equal, if the later were more concentrated in this occupation in 1990. Our identification assumption is that past concentration of immigrants is unlikely to be correlated with current distribution of natives' employment in an occupation and sectoral distribution of that occupation.

[9]The choice of tenure spells in host countries is a trade-off between having a sufficient number of observations within each cell and sufficient variation to allow for identification. The ELS survey does not code tenure levels above 10 years.

[10]As previously, this distribution is derived from the educational distribution of immigrants and the distribution of educational levels across occupations.

5 Estimation results

5.1 Main results

Table (1) presents OLS estimates of the relationship between native's male employment rate and immigrants's share within an occupation. As indicated in the table, we initially present the estimations without country and year occupation specific fixed effects (column 2) and then, we successively add occupation-country and occupation-year interactions (columns 3 and 4). Thus we are successively controlling for time, occupation and year invariant country determinants of employment, and occupation-level differences varying over time and across countries. We expect endogeneity bias to diminish as more controls are included in the regression.

Interestingly, and contrary to conventional wisdom there is no tendency for immigrants to be in labor market segment with better employment prospects as shown by the rise in the coefficient associated with the immigrants share from a non statistically different from zero to 0.016, once country-occupation fixed effects are included. Namely, a doubling in the share of immigrants within an occupation is associated with an increase in the native employment rate by 1.1%. Not surprisingly, given the broad definition of occupations, controlling for year occupation fixed effects has very little effect on the estimated coefficient.

The value our independent variable changes either because more immigrants enter an occupation, or because of natives outflows, the so call *displacement effect* in the literature. Arguably, it is probably too costly for natives to change occupation across countries, instead reallocation across occupations is more likely to happen within country[11]. To avoid a spurious interpretation of our result, in column (4) we fix the denominator of our independent variable to its 1998 value. The estimated coefficient remains unchanged compared to the previous specification; furthermore, introducing the log number of natives in an occupation does not alter this result. We are therefore confident that bias due to displacement effects is negligible in our context, and does not confound our estimated impact.

A more serious concern is the unobserved time varying determinant of employment within a cell potentially correlated with the immigrants inflow within cell. To partially control for this possibility we introduce in the last column occupation specific industry labor demand shift $\hat{\eta}_{ot}$. The coefficient associated with the immigrants' share remains largely unaffected suggesting little

[11] This is also confirmed from the fact that results are sensitive to the inclusion of occupation-country fixed effect and not occupation-year fixed effects.

Table 1: The dependant variable is the log ratio of employed native over of the number of natives in the cell - Male sample -

Dependant variable: log(employment rate of natives)						
ln(IMoct/POPoct)	-0.009	0.016**	0.013***			
	(0.146)	(0.012)	(0.008)			
ln(IMoct/POP98oct)				0.015***	0.013***	0.012***
				(0.000)	(0.002)	(0.002)
ln(Naoct)					0.041*	0.039*
					(0.088)	(0.066)
log of Industry labor demand shift						0.052**
						(0.021)
Observations	683	683	683	683	683	683
Fixed effects						
country by occupation	no	yes	yes	yes	yes	yes
year by occupation	no	no	yes	yes	yes	yes

Notes: The dependant variable is the logarithm of Employment/Population for the native population in an occupation-year-country cell (Eq. 30). The main explanatory variable is the log of the share of immigrants in the cell. In parenthesis we report the heteroskedaticity p-values clustered at the occupation-country level. All regressions include a full set of time, country and occupation dummies.

correlation between changes in immigrant's labor force share within a cell and a cell specific labor demand shock driven by sectoral composition of employment.

In table (2) we run the same set of regressions for our sample of female workers.

As for the male case, female immigrants have no tendency to cluster in the labor market segment with better employment prospects, as shown by the rise in the coefficient associated with the share of immigrants from a negative to a positive and statistically non significantly different from zero value once segment specific fixed effects are introduced. In all other specifications, the coefficient for the share of immigrants remains statistically non different from zero. A tentative reading of this result in light of the model developed in the previous section suggests that, compared with male, differences in outside opportunities between immigrants and native are

Table 2: The dependant variable is the log ratio of employed native over of the number of natives in the cell - Female sample

Dependant variable: log(employment rate of natives)						
ln(IMoct/POPoct)	-0.021*	0.006	0.001			
	(0.065)	(0.472)	(0.889)			
ln(IMoct/POP98oct)				-0.001	0.001	0.001
				(0.910)	(0.858)	(0.866)
ln(Naoct)					-0.024	-0.027
					(0.347)	(0.143)
- log of Industry labor demand shift						0.124***
						(0.000)
Observations	683	683	683	683	683	683
Fixed effects						
country by occupation	no	yes	yes	yes	yes	yes
year by occupation	no	no	yes	yes	yes	yes

Notes: The dependant variable is the logarithm of Employment/Population for the native population in an occupation-year-country cell (Eq. 30). The main explanatory variable is the log of the share of immigrants in the cell. In parenthesis we report the heteroskedaticity p-values clustered at the occupation-country level. All regressions include a full set of time, country and occupation dummies.

less relevant for females.

In spite of controlling for various segment specific fixed effect and labor demand shift across occupation driven by the sectoral distribution of occupation, OLS estimates may still be contaminated by cell specific unobservable demand-driven shocks correlated with immigrants' share. Thus, we turn to IV estimates in Table 3 using the shift share instruments. Results from the first stage reveal that instruments turn out to be strong with an F-test above 50 in all specifications. Thus the initial origin country distribution of immigrants across occupation and the subsequent flows by origin are a strong predictor of immigrants changes within a cell. The 2SLS estimates suggests that our previous estimates are indeed consistent with a (small) but positive causal effect of immigration on male natives employment rate. This conclusion is robust to the introduction of industry labor demand shift. Impact of immigrants on natives female employment remains non statistically different from zero.

5.2 Variations across immigrants tenure

In the previous estimations we considered that, within occupations, immigrants have homogenous impact on natives. However, the model developed in the theoretical section points to disparities in outside opportunities as a key explanatory variable for understanding the impact of immigrants on natives' employment. With time passed on host countries, immigrants accumulate host country specific labor market experience, which for instance makes them eligible for unemployment benefit, and other useful knowledge of the local labor market. As a consequence, their outside opportunity gap with respect to natives should narrow, and they should exert a lower positive impact on natives' employment. To gauge this implication of our model we present separate estimates for the impact of the share of veterans immigrants (more than 10 years of tenure) and that of new immigrants (less than 10 years) in an occupation. Results for men are presented in table 4 for the OLS and the 2SLS, where we use as an additional instrumental variable the product of the 1990 distribution of immigrants across occupations in each country and the labor demand shift driven by the distribution of occupations across industries (Eq. 31). For both estimation methods, OLS and 2SLS, and all specifications adopted, only the share of recent immigrants exerts a small but positive impact on natives' employment rate. Results are consistent with a causal interpretation: doubling the share of new immigrants in an occupation increases the employment rate of natives by 1,7%. The fact that 2SLS estimates are higher than the OLS ones suggests that there is no tendency for immigrants to cluster in higher employment

Table 3: The dependant variable is the log ratio of employed native over of the number of natives in the cell (2SLS)

Dependant variable: log(employment rate of natives)

	Males			Females		
ln(IMoct/POP98oct)	0.021***	0.020***	0.019***	0.008	0.013	0.009
	(0.005)	(0.008)	(0.009)	(0.502)	(0.394)	(0.520)
ln(Naoct)		0.035	0.031		-0.044	-0.037
		(0.201)	(0.178)		(0.194)	(0.158)
Industry labor demand shift			0.049**			0.125***
			(0.038)			(0.000)
Observations	683	683	683	683	683	683
Fixed effects						
country by occupation	yes	yes	yes	yes	yes	yes
year by occupation	yes	yes	yes	yes	yes	yes

Notes: The dependant variable is the logarithm of Employment/Population for the native population in an occupation-year-country cell (Eq. 30). The main explanatory variable is the log of the share of immigrants in the cell. First stage statistics for the shift share instrument are above 50 in all specification and are reported in the appendix. In parenthesis we report the heteroskedaticity robust p-values clustered at the occupation-country level. All regressions include a full set of time, country and occupation dummies.

Table 4: Dynamic specification (2SLS)

Dependant variable: log(employment rate of natives)

ln(new immigrants IMoct /POP98oct)	0.010***	0.017***
	(0.001)	(0.006)
ln(veterant immigrants IMoct /POP98oct)	0.004	-0.007
	(0.293)	(0.630)
lnNatijt	0.034	0.035
	(0.118)	(0.127)
lnLDshift	0.043**	0.041**
	(0.034)	(0.036)
Observations	683	683
Fixed effects		
country by occupation	yes	yes
year by occupation	yes	yes

Notes: The dependant variable is the logarithm of Employment/Population for the native population in an occupation-year-country cell (Eq. 31). The main explanatory variables are the log of the share of immigrants in the cell with less than 10 years of tenure (new immigrants) and more than 10 years of tenure (veterans). The first stage F-stat for the shift share instrument are above 50 for recent immigrants and above 12 for the share of veterans immigrants. First stage stattistics are reported in the appendix. In parenthesis we report the heteroskedaticity robust p-values clustered at the occupation-country level. All regressions include a full set of time, country and occupation dummies.

rate segment. In the light of our model, these results suggest that new immigrants have lower outside opportunities as compared to natives. Therefore, an inflow of new immigrants within an occupation decreases the average wages paid by firms in that occupation, triggering the opening of more vacancies and leading to higher employment rate for natives.

6 Conclusion

Increasing contribution of immigrants to the labor force is among the most important labor supply shocks recently experienced by developed countries. Most of the literature has discussed the labor market consequences of this shock using a standard neoclassical labor-supply labor-demand framework. However, this approach does not allow us to introduce the important

differences in non productive assets between immigrants and natives. We have shown in this paper that, once introduced into a frictional labor market, differences in host country specific assets between immigrants and natives can revert the conclusions reached by the standard model: immigrants improve employment prospects of competing native workers. Another conclusion reached by the paper is that employment gains for natives are not long lasting since immigrants assimilate to host countries' labor market. Thus, instead of crowding-out natives, immigrants may instead crowd-in natives in occupations in which they are landing. These predictions of the model are confirmed by exploiting variations of natives' employment rate and immigration across European countries, occupations and years. Occupations turn out to be an important dimension to analyze the labor market impact of immigrants on natives.

Our results have some direct implications that are worth pursuing further. First, regarding the design of an optimal immigration policy. On one hand, recent research indicates that skilled immigrants may crowd-out natives from skilled jobs (see Borjas (2009)). On the other hand, it has been argued that unskilled immigrants may improve incentives for natives to acquire human capital by rising the skill premium (see Hunt (2011)). In contrast, our conclusions suggest that host countries with more selective immigration policy could improve the employment rate of skilled workers and at the same time rise incentives for natives to acquire human capital. A welfare analysis of such policy is a natural extension of the model proposed in this paper.

Second, on the empirical side we highlight the importance of distinguishing immigrants according to their tenure in host countries. More generally, our more realistic approach to the functioning of the labor market stresses the importance of considering any heterogeneity between immigrants and natives that would affect their relative bargaining position with respect to employers.

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