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ABSTRACT

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In this paper we use a dataset that follows a representative sample of native Europeans, resident of 11 countries, over the period 1995-2001, in order to identify the effect of inflows of immigrants on their career, employment, location and wage. We use the 1991 distribution of immigrants by nationality across European labor markets to construct an imputed inflow of the foreign-born population that is exogenous to local demand shocks. We also control for a series of fixed effects that absorb individual, country-year and sector-year effects. We find that native Europeans are more likely to upgrade their occupation to one associated with higher skills and better pay, when a larger number of immigrants enter their labor market. They are also more likely to start a self-employment activity. As a consequence of this upward mobility their income increases or stays the same in response to immigration. We find no evidence of an increased likelihood to leave employment or to leave their region of residence. These effects take place within 2 years and some persist over 4 years. Hence it appears that immigrants push native European workers on a faster career track rather than reducing their employment opportunities.

JEL Classification: J61, O15

Keywords: immigrants, job upgrading, mobility, self-employment, Europe

NON-TECHNICAL SUMMARY

This paper evaluates the effect of immigrants on the career of natives. We follow native individuals who have been exposed to competition of immigrants in European countries. In countries and occupations with larger immigrant competitions we find that natives are pushed to faster occupational upgrades towards jobs using more sophisticated skills, requiring higher education and paying higher wages. Natives are also more likely to undertake enterpreneurial activities in response to larger immigrant competition. This implies that immigrants "push-up" natives in the labor market and the overall effect on wages and income of natives is small and usually positive. The implications of these findings are that immigrants do not hurt native labor market opportunities but rather create incentives for their improvement. By filling manual and less-skilled occupations immigrants encourage native careers. More open immigration policies, combined with flexible labor markets, could result in better opportunity for the career of natives.

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1 Introduction

There is debate on the effect that immigrants have on the labor market opportunities of natives (Borjas 2003, Borjas et al 2008, Card 2001, 2009, Ottaviano and Peri 2012). As immigrants supply disproportionately some type of skills and concentrate their work in some occupations, their effect on natives depends on how much these jobs compete with those performed by natives, or instead how complementary they are to native's jobs. The effect also depends on the response of natives to immigration, as they may change their occupation to take advantage of their specific skills, vis-a-vis immigrants (Peri and Sparber 2009, D'Amuri and Peri, forthcoming). The literature has so far mainly analyzed the aggregate effects of immigration, using the regional or national wages and employment of natives (or group of natives) as outcomes. Namely researchers have constructed average wages or employment rates for region/skill groups and they have estimated the impact of immigration on average wage and employment in the group. Our reading of the literature is that most of these studies find small wage and employment effects of immigration on natives both in Europe (Dustman et al forthcoming, D'Amuri et al 2010, Glitz 2012) and in the US (Ottaviano and Peri 2012, Card 2009). There are however some significant exceptions (Borjas 2003, 2006). On average the effect of immigrants are estimated to be close to zero or mildly positive, indicating an aggregate "complementarity" with natives. Even for less educated natives the competition effect of immigrants seems small and their wages and employment levels hardly change in response to immigrants. However, labor markets, are in continuous flux. People enter and exit them, young people join and old people leave them and these flows may be affected by immigration. This alters over time the composition of individuals in the market (cell) so that the wage effects of immigration identified at the local level, can be due to changes in wages of individuals or to changes in the composition of individuals in the analyzed cell. Even in absence of net native employment changes in the cell, the differential skill intensity of the inflows and outflows of natives can change the cell composition. The aggregate analysis can mask the actual effect of immigration on single individuals.

An alternative, intuitive and much less explored question is: how much does immigration affect the employment, occupation and wage of a specific native person if one follows him/her over time after a significant inflow of immigrants took place into the labor market where he/she worked. What happens to native workers over the following years, when immigrants take jobs in the same labor market as theirs? Is the evolution of their career affected by this? In this paper, we consider and follow individual workers and we test how an inflow of immigrants affects their labor market outcomes over time. By comparing similar workers, some of whom were exposed to large inflows of immigrant competition and others who were not, and by following them in their career we analyze how the competition and complementarity with immigrants affected them. We also introduce a genuine "dynamic" component to the analysis of the effects of immigration, by considering the response of an individual labor market outcomes after two, three and four years from the inflow of immigrants in his/her

labor market. We also make the analysis more focused on the consequences of immigration for individual native workers who were already working when immigrants entered the labor market. How does this inflow affect their career over their working life in the short and medium run?

This new way of analyzing the effects of immigrants has several interesting implications. First, we can control for heterogeneity at the individual level reducing the scope for omitted variable bias. Second, this method moves the research closer to the idea of evaluating the gain/losses for specific native workers, *in the short and medium run*, when exposed to immigrant competition. Third it moves the literature on labor market effects of immigration closer to the analysis of individual effects of aggregate shocks. There is a body of literature in evaluating the *medium and long-run effects* of recessions and of mass-layoffs on individual long-run outcomes (e.g. Von Wachter et al., 2007, Neal 1995, Stevens 1997, Oreopulos et al., 2012*)* and some contributions focused on the effects of globalization and of technological change on individual labor market outcomes (e.g. Bartel and Sicherman 1998, Zoghi and Pabilonia 2007, Dunne et al., 2004). However, to the best of our knowledge, this is the first paper analyzing the effects of immigration dynamics on individual labor market outcomes following people over time[1].

The data requirements to implement this type of analysis are larger than those implied by the cell regressions. We need longitudinal panel data set for a representative sample of individuals in a country. The data must include information on their demographic and labor market variables and on their location. At the same time we need an accurate aggregate dataset to construct the local immigration flows for the country in order to measure the influence of immigrant workers in the labor market where the person is active. Finally we need to analyze a country (or an economy) during a period in which it received a significant and heterogeneous inflow of immigrants (across regions and jobs). The European Community Household Panel (ECHP) is a dataset that satisfies these characteristics and covers one of the largest economy in the world: the European Union. The ECHP is a European survey that was designed to provide a representative and cross-nationally consistent picture of households and individuals on a range of topics, including income, health, education, housing, demographics and employment characteristics. The survey, designed as a longitudinal panel, was conducted between 1994 and 2001, in eight successive waves in 12 European countries, with a standardized methodology. The ECHP was designed to be representative for native households. It does not include a representative sample of the migrant population as it excludes households formed purely of new immigrants. Hence, in order to compute the share of immigrant population by country, year and occupation group, we complement the ECHP with the harmonized European Labour Force Survey (ELFS). This second database is larger and representative of the whole population in EU countries, but it is a repeated cross section.

By considering individual outcomes and aggregate shocks (change over time in immigrants in country/occupation

[1] A very recent paper by Kerr and Kerr (2013) looks at STEM workers (science, technology, engineering and math) transitions from firms that experience a large increase in foreign skilled workers in the US.

cells) the reverse causality issues are reduced. However, the inflow of immigrants in country/occupation cells may be correlated with economic and labor market shocks in those cells, causing omitted variable bias. In order to estimate the casual impact of immigrants on individual outcomes we use an instrumental variable approach. We follow the method (first used by Altonji and Card 1991, followed by Card 2001, Peri and Sparber 2009, Lewis 2011 and now standard in this literature) of imputing new immigrants based on where previous immigrants from the same countries already were. We construct the imputed inflow of immigrants based on the 1991 immigrant distribution across countries and occupations and on the aggregate flows by country of origin between 1991 and 2001. We then use these imputed flows as instrument for actual flow of immigrants.

The paper has three main findings. First we find that an inflow of immigrants in the country-occupation cell generates a higher probability that a worker upgrades his/her occupation in the next two to four years. Namely we first group occupations in four tiers, that are ranked in terms of wage, education and social status, from lower to higher: "Elementary", "Clerical and Craft", "Technical and Associate" and "Professional and Manager". Then we find that an increase in the share of immigrants by one percentage point of the workers in the occupation-cell increases by 0.4-1.0 % the probability for a native worker to move to a higher ranked tier within the following four years. Second, we find that in response to immigration there is no change in the probability that a worker exits employment in the following two to four years and we find no evidence that he/she moves to other regions within the same country. Third, we also find some evidence that immigration increases the probability that native workers add self-employment income to their earnings, probably as some are encouraged to become entrepreneurs to take advantage of their complementarity with immigrants. Results also suggest positive but not significant changes of average wage earnings among natives and an increase in their average self-employment earnings. All these effects indicate a dynamic response of natives, mainly along the occupational dimension, which can be thought to protect natives from the potential competition effect of immigrants, which could be detrimental if he/she stays in the original job.

Overall it looks like immigrants speed up the transition of natives to higher ranked occupations, they also encourage them to be entrepreneurs, do not push them out of the labor market and do not hurt their income. All of these effects are small and all of them help natives. The rest of the paper is organized as follows. Section 2 frames the contribution of this paper within the existing literature. In Section 3 we present the empirical framework of analysis. Section 4 presents the dataset and the main variables and section 5 describes our main results. Section 6 extends the analysis and performs robustness checks and section 7 concludes the paper.

2 Literature Review

There is a very large literature analyzing the effect of immigration on labor market outcome of natives. Some studies distinguish between short-run and long-run effects. Studies such as Borjas 2003, Card 2009, Ottaviano

and Peri 2012, Dustman et al. (forthcoming) approach the issue by defining a production function and interactions between the supply of immigrant labor and native labor. In that framework, the variation to the marginal productivity of native labor caused by immigration is captured by changes in aggregate wages. In presence of rigidities or upward sloped labor supply, it would also cause changes in aggregate employment. Most of the studies use annual (short-run) or decade (long-run) variation in immigrant population (or employment) to identify the effects on average native wages or aggregate employment. The data used in those studies are, therefore, "pseudo-panels". They are constructed using repeated cross sections of individuals (obtained from Census or Labor force survey) organized in "cells" such as regions, skill or region/skill groups and then followed over time. Even papers specifically analyzing the dynamic effect of immigration on natives identify the effects following "cells" over time constructed by aggregating individual that may change in repeated cross sections. For example, Cohen-Goldner and Paserman (2011) distinguish between the short-run and medium-run effects of immigrants on wages and employment, taking into account possible labor market adjustments induced by immigration. In the paper, however, individuals are not followed over time after the shock. Peri and Sparber (2009) and D'Amuri and Peri (forthcoming) focus on the "dynamic response" of natives, by analyzing whether natives move to more complex jobs as a consequence of immigration. Again, these papers do not follow individuals over time but they use skill cells as unit of observation.

The immigration literature has not, to the best of our knowledge, used individual panel data to measure the effects on natives. These data would allow one to follow individuals during and after immigrants move into their region/occupation in order to observe what is the impact in the short and medium run on their labor-market outcomes. Peri and Sparber (2011) analyze the substitutability of highly educated natives and foreigners by tracking natives' occupations in two points in time. They then assess how an inflow of immigrant workers with graduate degree affects the occupation of highly educated natives. In their paper, however, only yearly changes in occupation are recorded and no medium run effects are considered. The use of individual panel data to track the medium and long-run transition has been confined to the analysis of other type of shocks. For instance Von Wachter et al., 2007, Neal 1995 and Stevens 1997 (among others) analyzed the impact of mass layoffs on employment and wages of individuals who were subject to those shocks, by following them. Oreopulos et al. (2012) analyzed the medium and long-run effect of a recession at the beginning of one's career. Bartel and Sicherman (1998) studied the effect of technological change on employee training. Zoghi and Pabilonia (2007) analyzed the effect of the introduction of computers on individual wages. Dunne et al. (2004), using establishment-level data, assessed the effect of computer investment on the dispersion of wages and productivity. All these papers consider aggregate shocks and track their effects on individual panel data. While this is common in the labor literature, it is rarely done when analyzing the long-run impact of immigration.

The present paper brings individual panel data and a strategy similar to the one used to identify effects

of recession, layoffs and technological change, to the study of the impact of immigration on native workers' labor market outcomes. This is particularly important if natives respond to immigration by changing their specialization (as suggested in Peri and Sparber 2009) or by investing in firms' specific skills (as suggested by the wage dynamics in Cohen-Goldman and Pasermann, 2011) or by undertaking other changes. These responses, in fact, may take some time and may have effects even when the individuals move out of the original labor market (or upgrade from the original skills) where the competition with immigrants first affected them.

3 Empirical Framework and Implementation

In this section we discuss the empirical specification that we estimate and we discuss our identification strategy and the construction of the instruments.

3.1 Basic Specification

Our basic specification relates the presence of immigrants, measured as share of workers in an occupation-country cell to several subsequent outcomes for individuals in the same cell. Denoting with $y_{i,j,c,t,t+r}$ a specific outcome for individual i in occupation j and country c taking place between t and $t+r$, and with $f_{j,c,t}$ the number of foreign born workers in occupation j and country c and year t relative to total workers in that cell we estimate the following specification:

$$y_{i,j,c,t,t+r} = \phi_i + \gamma_t + \delta X_{i,t} + \beta f_{j,c,t} + \varepsilon_{it} \tag{1}$$

In specification (1) the outcome y will be, alternatively, a dummy for upgrading one's occupation, or for leaving employment or for changing the region of residence, or the change in monetary income occurred in the considered period. The term ϕ_i captures a set of individual fixed effects fully controlling for the individual heterogeneity in the sample, γ_t is a set of time effects, $X_{i,t}$ includes time-varying individual controls, namely dummies for education, marital status, principal activity performed in occupation, industry and tenure dummies. The coefficient of interest is β, which captures the correlation between immigration in the occupation-country cell and individual i's outcome in the following r years. Given the sample period we can estimate outcomes for $r = 2$, $r = 3$ or $r = 4$ years.

We also estimate a more demanding specification, where additional fixed effects are included as follows:

$$y_{i,j,c,t,t+r} = \phi_i + \gamma_t + \phi_{c,t} + \phi_{j,t} + \delta X_{i,t} + \beta f_{j,c,t} + \varepsilon_{it} \tag{2}$$

In specification (2) $\phi_{j,t}$ is a set of occupation by year fixed effects, which captures shocks such as changes

in technology and in relative demand, that are occupation specific. $\phi_{c,t}$ is a set of country by year fixed effects, which control for shocks related to political, financial or institutional changes and likely to be country specific.

The first outcome that we consider is occupational upgrading. Our data has a definition of occupations that can be easily organized (as we illustrate in the next section) into four "tiers" with a clear ranking. These tiers, in fact, are associated with different levels of wage, education, use of cognitive and complex skills. Ranking those tiers with respect to any of those variables would provide the same ordering. Namely, from the lowest to the highest tier we grouped occupations into "Elementary", "Clerical and Craft", "Technical and Associates" and "Managers and Professionals". Occupational upgrading is coded with a dummy equal to 1 if an individual changes occupation moving from a lower to an higher tier between t and $t + r$ and is equal to 0 otherwise. The second outcome that we consider is the exit of individual i from employment. This is a dummy equal to 1 if the individual exits from employment (either joining the group of unemployed or quitting the labor force) between t and $t + r$ and 0 if his/her occupational status remains unchanged. The third outcome captures (with a dummy) the moving of the individual out of the region of initial residence. The fourth outcome is the change in logarithmic earnings for individual i between t and $t + r$ distinguishing between wage and salary earnings and self-employment earnings. We also include as additional outcomes the starting of a self-employment activity (measured as the adding of self-employment income to his/her total income) as a binary outcome. Before describing the data and the results let us present our identification strategy and its advantages and limitations.

3.2 Identification and Instrumental variable

The goal of the empirical analysis is identifying and estimating consistently the parameter β in equation (1) so that it can be interpreted as the causal effect of immigration on individual outcomes. The first challenge to this is the presence of omitted variable bias. Specific labor markets, defined as occupation-country cells, might be experiencing expansion or contraction of their labor demand in a certain year for a host of reasons such as technological change, changes in a country economic outlook and other. Those shocks could affect the inflow of immigrants as well as individual outcomes for native workers generating a spurious correlation. Fixed effects that may capture those shocks should address this concern. Changes in technology, such as adoption of computers, the progress of information technology, the change in the relative demand across sectors are controlled for the inclusion of the occupation by year fixed effects ($\phi_{j,t}$). Country-specific shocks driven by political, financial or institutional evolutions are controlled for by the inclusion of the country by year fixed effects ($\phi_{c,t}$). In the most demanding specifications we will include both sets of effects. Individual heterogeneity is controlled with the inclusion of individual fixed effects (ϕ_i).

As there could still be some lingering occupation-country specific shocks inducing spurious correlation we adopt an instrumental variable strategy to deal with this issue. We use the fact that, using national Censuses

in 1991, we can observe the distribution of immigrants from nine different areas of origin[2] across European countries and occupational groups. In particular we compute sh^N_{jc1991} as the share of immigrants of area of origin N in country c and occupation j as measured in year 1991. From the censuses 1991 we can also calculate the total number of foreign-born from area of origin N in Europe, F^N_{1991}.We then use the OECD data on net migrant flows by area of origin (ΔF^N_t) in Europe to obtain the total number of foreign born from each area in each year. In particular the number of foreign-born of area of origin N in Europe in year t is constructed as $\widehat{F}^N_t = F^N_{1991} + \sum_{s=1992...t} \Delta F^N_s$. We then allocate the total population of each area of origin to country and occupations according to their shares sh^N_{cj1991}. The "imputed" number of immigrants of area of origin N in occupation j and country c will therefore be: $\widehat{F}^N_{j,c,t} = \widehat{F}^N_t * sh^N_{j,c,1991}$. The total imputed number of foreign-born in that country-occupation cell is obtained by summing across areas of origin so that $\widehat{F}_{j,c,t} = \sum_N \widehat{F}^N_{j,c,t}$. We then divide this imputed immigrant population in occupation j and country c by the total employment in that cell to obtain $\widehat{f}_{j,c,t} = \left(\widehat{F}_{j,c,t}/Empl_{j,c,t}\right)$ which we use as instrument for $f_{j,c,t}$, the share of foreign-born in occupation j, country c and period t.

The assumption behind this instrument is that the distribution of immigrants of specific nationality across countries and occupations in 1991 is the result of historical settlements and historical events. Such very uneven distribution, combined with networks, implies that new immigrants are more likely to move to the same regions and occupations in which previous immigrants of the same nationality operate. This is because information on jobs opportunities travels better in ethnic networks, and immigrants value the possibility of being near other nationals. Hence in periods of large aggregate immigrants inflows, independently from any individual labor market conditions, cells with larger past settlements of immigrants receive a larger inflow. The region and occupation specific changes in demand after 1991, do not affect at all the instrument that only captures the distribution of migrants as of 1991. Hence, the instrument can be thought as proxying for a supply-driven change in immigrants. It should, therefore, be correlated with the share of foreign-born but not with the region-sector specific demand shocks. This strategy to isolate supply-driven changes in immigrants follows the method of Altonji and Card (1991), Card (2001) and, more recently, Peri and Sparber (2009).

4 Data and summary statistics

The main dataset used is the European Community Household Panel (ECHP), a survey based on a standardized questionnaire that involves annual interviewing of a representative panel of households and individuals in each of 11 EU countries. The total duration of the ECHP was 8 years, running from 1994 to 2001. In the first wave a sample of around 60,500 nationally representative households - including approximately 130,000 adults

[2] The areas of origin that we construct are; Central and South America, Eastern Europe, Middle East Central Asia, North Africa, North America, Oceania-Pacific, Other Africa, South and Eastern Asia, Western Europe.

aged 16 years and over - were interviewed in the 12 Member States. Austria, Finland and Sweden joined the project in 1995, 1996 and 1997, respectively. Two major areas covered in considerable detail in the ECHP are the economic activity and personal income of the individuals interviewed. Information on other topics such as health, education, housing, demographics and employment characteristic was also provided.

The truly unique feature of ECHP is its panel structure. Within each country, the original sample of households and persons is followed over time at annual intervals. Persons who move or otherwise form or join new households are followed at their new location, provided they move within the same country. In this manner, the sample reflects demographic changes in the population and continues to remain representative of the population over time, except for losses due to sample attrition. Households formed purely of new immigrants into the population are not included (European Commission, 1996). Hence the survey is only representative of natives. Although attrition is a typical problem with panel surveys and ECHP is no exception, its sample dynamics compares well with other similar panels (Peracchi, 2002).

In order to measure foreign-born as share of the population we use the harmonized European Labour Force Survey (ELFS), which groups together country specific surveys at the European level (see Eurostat, 2009). We use only data ranging from 1995 to 2001 since before 1995 data on place of birth are absent in most countries. ELFS is used to construct yearly measures of foreign born shares by occupation and country. It is an aggregation of repeated cross-sections, built with standard sampling techniques to make them representative of the national labor force, allowing us to capture inflows and outflows of migrants by country and years. The sample size of ELFS is 5 to 10 times larger than the ECHP depending on the year and country considered allowing for a more reliable estimate of migrant shares by occupation.Using ELFS we are left with 11 out of EU15 countries (namely Austria, Belgium, Denmark, Finland, France, Greece, Ireland, the Netherlands, Spain, Portugal, and the UK) as for the others there is no information allowing us to distinguish between native and foreign born individuals.[3]

In both data sets we selected only observations relative to working age individuals (15-65). Their occupations are coded according to the 1988 International Standard Classification of Occupations (ISCO) produced by the International labour Office (ILO 1990). The ISCO classification is the result of detailed investigation of national coding of occupations in the European countries and organizes them into a standard and common grouping of occupations (Elias and McKnight, 2001). We group the ISCO-88 occupations into four tiers. The first tier ("Elementary") includes occupations that use skills associated with a basic general education, usually acquired by the completion of compulsory education. Examples of occupations in the first tier include postal workers, hotel porters, cleaners, and catering assistants. The second tier ("Clerical and Craft") covers

[3]It should be noticed that ECHP, besides being unable to provide a representative sample of the foreign population in the EU, lacks information on respondents' country of birth as for 4 out of 15 countries, namely Germany, the Netherlands, Greece and Luxembourg.

a large group of occupations, all of which require basic knowledge as for the first tier, but also a period of worker-related training or work experience. Occupations classified at this level include machine operation, driving, caring occupations, retailing, and clerical and secretarial occupations. The third tier ("Technical and Associate") applies to occupations that normally require a body of knowledge associated with a period of post-secondary education but not necessarily up to a college degree level. A number of technical occupations fall into this category, as do a variety of trades occupations and proprietors of small businesses. In the latter case, educational qualifications at sub-degree level or a lengthy period of vocational training may not be a necessary prerequisite for competent performance of tasks, but a significant period of work experience is typical. The fourth tier ("Managers and Professionals") relates to what are often termed professional occupations and managerial positions in corporate enterprises or national/local government such as legislators, senior officials and managers. Occupations at this level typically require a tertiary degree or equivalent period of relevant work experience. Table 1 provides the correspondence between the 4 occupation tiers and the ISCO occupations at 1-digit. Recall that the "first" tier is associated with the lowest skills and the "fourth" with the highest.

Table 2 shows the distribution of native workers across the four tiers. As we notice from columns 1-2, overall about 10% of individual-year observations fall in the first occupation tier, 56% in the second tier, 13% in the third and over 21% in fourth (top) tier occupations. This table also shows frequencies (columns 3-4) of tiers in terms of individuals rather than individual-years, showing that 16% of individuals ever worked in the first tier, 66% in the second, 19% in the third and 26% in the fourth, for a grand total of 104,344 individual-tier observations. Considering that we have 81,843 individuals in our sample, this table suggests that mobility across occupational tiers is substantial as one quarter of the European population in the period considered has held occupations in at least 2 different tiers.

The grouping of the occupations into four different hierarchical tiers is quite natural. The aggregate data reveal that moving from tier 1 to 4, we find an increasing percentage of native workers with tertiary education. The levels of wage and salary earnings also increase and so does income from self-employment. In addition a higher score in complex skills as well as a lower score in manual skills is associated with higher tiers. (see Table A1 in the Appendix to see these descriptive statistics[4]).

We base our estimation on the sample of native workers in ECHP, which comprise over 313,000 individual-year observations in our selected sample. In fact, about 23% of individuals experienced an occupation upgrade, as defined in Subsection 3.1, at some point over the period considered. Labor market mobility occurs also along other dimensions. About 7% of the workers-year observations include individuals moving out of employment,

[4]The intensity of skills of the different tiers are computed using D'Amuri and Peri (forthcoming) calculation based on the O*NET data, from the US Department of Labor. Complex scores are computed as the average of scores in communication, complex and mental skills. Non-complex, manual scores are the average of scores in manual and routine skills. The higher scores in complex tasks for tier 4 occupations imply that workers in this group are the most likely to use intensively complex skills compared to the rest of the workers.

and 16% of the workers exit employment at least once[5] in the sample. Regional mobility, defined as a change in region of residence (within a country) takes place for about 3% of the population in our sample (for details see Table A2 in the appendix). It is well known that Europeans are not very mobile geographically (relatively to Americans). However the difficulty of following a household that moves over time may produce an underestimate of the mobility rates.

We define as foreign born those workers who were born in a country different from the one where they are currently resident. Although in some countries further information regarding the country of origin is provided, it is not consistently defined across the countries and years considered. Figure 1 shows the share of foreign born workers in the total population by country (left panel) and by the ISCO occupation categories (right panel). The first shows that EU countries widely differed in their share of foreign workers. Averaging the whole period, in France about 10% of the working population was foreign-born, and in Belgium that percentage was over 9, while in Finland it was less than 2% of the population. Breaking down the foreign born population of workers by ISCO codes, one notices that foreign-born workers are a relatively large share (roughly 8%) of workers in elementary occupation occupations but they also constitute a large share (about 6-7%) of those employed in occupations requiring high qualifications (such as professional, legislators, senior officials and managers).

5 Main Empirical Results

In this section we present the results of our empirical analysis. In all the tables we estimate two types of specifications. First we consider a specification on individual data, as described in equations (1) and (2). In each subsection below we will present the results when using a different outcome variable, $y_{i,j,c,t,t+r}$ beginning with one that captures occupational upgrading of natives, then considering their moving in or out of jobs and out of the region of residence and finally analyzing a measure of wage income change. This type of estimation includes individual fixed effects but it is subject to one important caveat. As we use individual level data, we cluster the standard error at the individual level. However the main explanatory variable $f_{j,c,t}$ varies at the occupation-country-year level. Hence the potential correlation among individual outcomes within occupation-country-year is not accounted for in such specification. This may induce an underestimate of the standard errors of the first and second stage and an overestimate of the F-statistic of the first stage. To obviate this problem, we employ an alternative estimation strategy based on a cell-type analysis, where we collapse the individual observations by country-year-occupation cells. In particular we estimate the following type of specification:

$$y_{j,c,t,t+r} = \phi_j + \phi_c + \gamma_t + \phi_{c,t} + \phi_{j,t} + \delta X_{j,c,t} + \beta f_{j,c,t} + u_{j,c,t} \tag{3}$$

[5] The ECHP survey records out of employment those workers employed for less than 15 hours, individuals doing housework, looking after children or other person and other economically inactive persons.

In 3 the outcome variable $y_{j,c,t,t+r}$ varies only across occupation-country-year and it is the average outcome (probability of upgrading, or being employed, wage or probability of moving to another region) across individuals in the cell. The other controls are occupation (ϕ_j) country (ϕ_c) and year (γ_t) fixed effects as well as the time varying individual controls, collapsed by occupation-country-year cell ($X_{j,c,t}$). We still include country by year ($\phi_{c,t}$) and occupation by year ($\phi_{j,t}$) effects and $u_{j,c,t}$ is now a cell-specific, zero average random error. This specification aggregates the dependent variable at the same level as the main explanatory variable of interest and hence implies that standard error should be consistent and inference is correct.

5.1 Immigrants and Native job upgrading

In Table 3 we show the estimated values of the coefficient β, when the dependent variable is a 0-1 dummy capturing the occupational upgrade of natives. In particular, we define $y_{i,j,c,t,t+r}$ equal to one if, during the period between t and $t+r$, individual i (who was in occupation j and country c in year t) moved to an occupation in a higher "tier". The variable is equal to 0 if individual j did not change or moved to a lower tier. The outcome, therefore, is a "change in status" dummy within the considered period. In the first row we consider the outcome within 2 years, while in the second row we measure the outcome within 3 years and in the third row we measure it within 4 years. Different columns show results for increasingly demanding specifications beginning with OLS in column 1. We then show the 2SLS with individual and year effects in column 2. Column 3 includes country by year effects to specification (2) and column 4 adds occupation by year effects. In columns 5 and 6 we average, at the country-occupation-year level, both the dependent and the independent variables and we estimate a specification as in equation (3). We keep in the regression the fixed effects for occupation, country and the interactions for country-year (column 5) and occupation-year effects (column 6).

The 2SLS results are robust and consistent across specifications. They show that the effect of immigration on native occupation upgrading is positive, significant and increasing over time for all specifications. The 2SLS estimates exhibit larger coefficients than the OLS (that are usually non-significant), implying that measurement error, and possibly negative regional shocks associated to immigration flows, may conceal part of the impact of immigration on native occupational upgrading when using OLS as estimation method. The 2SLS estimated effect on occupational upgrading is large and significant even for the most demanding specification. Using the coefficients in column 4, an increase of immigrants by one percentage point of workers in the cell, increases the probability of native workers to upgrade their jobs (to one in a higher tier) by 0.6% within 2 years and by almost 1.0% within four years. Given the sample average probabilities, an increase in the share of immigrants by 10 percentage points of the cell employment raises the likelihood of a native occupational upgrading from 13 to 19% within 2 years interval. The same increase in the share of foreigners increases the probability of native upgrading from 16 to 26% within four years. Table A4 in the appendix shows that moving between two

occupational tiers within 2, 3 and 4 years interval is a relatively unusual event, involving 13%, 15% and 16% of individual-year observations, respectively. Hence the impact of immigrants is substantial.

It is also reassuring that the imputed immigrant share by cell turns out to be a strong instrument for the endogenous variable. While the standard errors from the 2SLS estimates are almost double those of the OLS estimates the estimated coefficients are all significant. The results of the cohort analysis, in columns 5 and 6 confirm the previous findings, as a percentage point increase in the share of immigrants increases the probability of upgrading between 1% and 1.5% in 2 to 4 years. We also obtain more reasonable F-statistics for the first stage regression still revealing strong instruments. It should be noted that the sample in the 2SLS estimations does not include all the 11 countries available. This is because the 1991 census data, used to compute the instrument, were available only for six of the 11 countries, namely France, UK, Greece, Spain, Portugal and Austria.[6]

These results imply that immigration promotes a response of natives in terms of occupational specialization and career. By filling several jobs at the "low" end of the occupational spectrum many immigrants generate opportunities (and increase demand) for jobs in higher occupational tiers, that can be filled by natives. Native workers appear to take advantage of these opportunities. These dynamics are known, for aggregate economies, from previous studies such as Peri and Sparber (2009). Our dataset, by considering individual data shows that in countries in which the inflow of immigrants has been larger, individual natives have been pushed to climb more rapidly the ladder of occupational opportunities. Natives are more likely to advance and less likely to regress in their progression from simpler and less paid jobs to more complex and better paid jobs. This analysis shows that the higher concentration of natives in higher-ranked occupations, in response to immigration is not only the result of compositional changes (choice of new workers or selective retirement) but of existing native individuals moving more rapidly to higher ranked occupations.

5.2 Effects on employment and mobility

While the mobility towards higher occupational tiers is certainly a positive outcome for natives, it may imply, in the short and medium run, higher risk of searching for a new job. A modified version of the "crowding-out" hypothesis (that argues that immigrants decrease the job opportunities for natives) would imply that immigrant push natives to move to other occupations with possible transitional periods of unemployment. While immigrant may create complementary opportunities for natives, beneficial in the long-run, the fact that natives have to change job to take advantage of those opportunities may leave them unemployed, or out of the labor force for a while. Moreover, while on average workers upgrade their jobs some workers may be left without one for long time, because immigrants crowd their opportunities in lower occupational tiers or because other natives compete

[6] OLS estimates relative to the IV sample, available on request, indicate that the selection of the countries does not alter the results. The OLS coefficients in the two samples are of comparable magnitude.

with them, pushed from lower tiers.

To test these possibilities we consider as outcome y a dummy equal to 1 if individual i goes from employed to non-employed between year t and $t+r$. The dummy is equal to 0 if individual i does not change the employment status. In this analysis we omit observations recording any move from non-employment to employment, hence focusing only on the gross flow out of employment. As already discussed in the Section 4, non-employed persons are both unemployed, as well as workers employed for less than 15 hours, individuals doing housework, looking after children or other person and other economically inactive persons. We exclude from the sample individuals in education or training, retired or in community or military service. Table 4 shows the estimates of the coefficient β in such regressions and maintains the same structure as the previous tables, showing across rows different time-lags for the outcome and across columns different specifications. The results are consistent across all the 2SLS specifications and imply no effect of immigration on the probability of transiting out of employment for individual i. The point estimates in the three most demanding specifications (3 and 4) range between -0.02 and 0.01, and they are never significant at any level. Even focusing on the shorter 2-year interval, we do not detect any increased tendency of natives to exit employment. This implies that immigration has a very small and non-statistically significant impact on the probability that a native worker exits employment and it is true both in the short and in the medium-run. This finding reinforces the idea that the inflow of immigrants creates complementary job opportunities for natives. The estimates from the cohort specifications (5 and 6) yield larger point estimates in absolute value when compared to the individual level estimation. In some specifications one detects a statistically significant and negative effect of immigration on the probability of becoming non-employed. This result again would be consistent with the hypothesis that immigrants create new working opportunities in the labor market and, by taking jobs complementary to those of natives, induce stronger job-creation by firms and potentially more employment. There is not support to the idea of crowding out in our specifications.

Table 5 explores the effect of immigration on the regional mobility of native workers. This hypothesis is sometimes referred to as the "skating-rink" hypothesis[7]: if immigrants "take" jobs in a region natives would leave in response and move to others. The dependent variable $y_{i,j,c,t,t+r}$ is equal to 1 when the native individual i moves out of the region where he/she lived in year t, within the following r years and 0 otherwise. When we aggregate over cells, that value becomes the share of native workers who moved. The estimated coefficients from the 2SLS specifications on individual data of column 2-4, as well as those for cell-level outcomes in columns 5 and 6 are non-significant and small. There is no evidence that at any time horizon between 2 and 4 years immigration increases geographical mobility of natives across regions. The results of Table 4 and 5, together with those of Tables 3 seem to imply a clear pattern of response of native workers to immigration. While

[7] See Card and DiNardo (2000) for a discussion of the skating rink hypothesis.

immigrants generate a response of natives in the labor market that response does not seem to be crowding-out, in which native are moved out of employment, nor a "geographical skating-rink" effect, in which natives move out of the region. In fact we do not find any evidence that either effect takes place. They do, however, tend to push "up" natives in the occupation ladder, hence the appropriate description would be a "bump-up" of native workers. The fact that the local economy absorbs them and tends to accommodate them in higher ranked occupations, should also signal that immigrants, while competing for similar jobs generate a complementary demand for other jobs that attracts natives.

5.3 Effects on income and self-employment

Our panel data contain also information on the yearly wage income of an individual and on the yearly income from self-employment. Using these variables we explore two further potential effects of immigration. We first analyze the impact of immigrants on yearly wage income of individual natives, following natives over 2, 3 and 4 years. On the one hand, we may expect a positive effect of immigration on wages, due to the occupational upgrade identified before. On the other, occupation upgrading needs not imply significantly higher wages for an individual. In fact, it may take longer than 4 years to accrue measurable income effects. Moreover, immigrant competition may decrease the occupational wages at low level of the ranking so that climbing up simply offsets the potential decreases. It would be puzzling, however, to find significant negative wage impact given the observed occupational upgrading.

Table 6 shows that the estimated effect of the foreign born share on average wages and salaries of natives is positive but not significant, both in the individual panel specifications (columns 3-4), and in the country-occupation-year cell specifications (5-6). The point estimates are not small (an increase of immigrants by one percentage point of employment would increase native wages by 0.2 to 0.6%) however the standard errors are large. Significant wage effects from occupational upgrade may need more time to accrue, and the immigrant competition for some occupations may offset part of the positive effect of occupational upgrading.

Second, we focus on self-employment income. Self-employment income is a large proportion of work incomes in many countries and, although seldom explored, foreign-born workers could have an effect on the employment status of natives. Again, we have no specific expectation on the empirical results. On the one hand, natives might consider self-employment activities where they have an advantage over foreigners possibly due to better communication skills or better access to credit (see Fairlie, 2012). Moreover the presence of immigrants may increase the opportunity of natives to start a business, hiring immigrants in manual tasks at moderate cost. On the other, the competition of immigrants as entrepreneurs can crowd-out native entrepreneurs. While there are some studies analyzing immigrants as self-employed (e.g. Fairlie 2010) there is very little analysis of whether

more immigration encourages natives to become entrepreneurs[8].

In the first part of Table 7 we analyze the effect of immigration on the change in (log-)self-employment income and in the second part of the table we test whether it affects the likelihood of receiving self-employment income, a 0-1 indicator that would correspond to the starting of an entrepreneurial (self-employment) activity. This latter outcome is equal to 1 if an individual is paid any self-employment income between period t and period $t + r$ while previous to year t he had received none and is equal zero otherwise. These two outcome provide a sense of the effect of immigration on native entrepreneurial activity overall (self-employment income) and on the extensive margin (probability of self-employment), i.e. in pushing more individuals to engage in self-employment activities. The results suggest that the likelihood of native workers to receive self-employment income increases. The results are somewhat sensitive to the specification chosen. In particular the cell-level analysis (columns 5 and 6) shows stronger effects on self-employment income after 3 to 4 years (possibly taking some time to accrue) and stable effects on the probability of starting self-employment activities (equal to an effect of 0.20 at 2 or 4 years horizon). The individual estimates, while usually positive, are sometimes non-significant especially at the 3 and 4 years horizon. Overall there is some evidence that immigrants increase the probability that natives engage in self-employment activities and earn higher self-employment income.

6 Extension and Checks

6.1 Different definitions of Occupations

One key element of our finding is the increased occupational mobility of natives in response to immigration. In order to verify that the specific occupational "tier" structure imposed is not responsible for the findings of larger occupational mobility, in this section we compute occupational change without any tiers. In particular we analyze whether immigration affects the mobility of natives between any of the nine ISCO occupational groups. In this way, we test if the impact of immigration is robust to a possible misspecification in the hierarchy that we defined in the previous analysis. Clearly, in the sample there are more occupation changes than occupation upgrades. Some occupation changes are not coded as upgrades as they occur between occupations of the same tier. While the sample average probability of job upgrading within 2 years is 13%, the same probability for job change increases to 25%. Table 8 presents the empirical findings for mobility. The point estimate is positive and statistically significant in the 2SLS, estimates of individual data. The coefficient ranges from 1 to 1.4 in the different specifications, implying a significant increase in mobility in response to higher immigration. The point estimates in the cell-level regressions specification, however, are positive but statistically non-significant. The larger mobility across occupations due to several other reasons (technological change, sectorial shifts)

[8] An exception is Fairlie and Meyer (2003), that finds a crowding out effect of immigrant entrepreneurs on native ones.

may introduce significant noise in this regression, hence the limited significance of the coefficients. Overall, immigrants seem to increase the mobility of natives across occupations, which, together with specialization according to comparative advantages, is the key mechanism for the gain from immigration to materialize. The results of the previous and of the present section indicate that immigration makes the labor market more dynamic. Comparing the coefficients of Table 3 and 8 we can say that part of the induced mobility in response to immigration is horizontal mobility, but nearly half of these occupational changes imply a vertical mobility (across tiers).

6.2 Heterogeneity by initial skill, age, gender

There is large heterogeneity in the labor market outcomes of workers which is associated to their age, gender and skills. These differences can make one group more vulnerable than others to the inflows of migrants. In Table 9 we take into account this heterogeneity and we split the sample of workers according to three criteria: in Section A we distinguish workers in terms of Tiers, and in particular we check if workers employed during year t in occupations belonging to Tier 1 and 2 are less or more likely to upgrade within two years than workers in Tier 3, in response to immigrants. On one hand natives in Tier 1 and 2 may be more subject to competition of immigrants in Manual jobs. On the other, natives in Tier 3 may have stronger upward mobility in general, linked to their higher skills, so stronger incentives to upgrade may result in higher probability of upgrading. In section B we assess whether the ability to respond to immigration via an occupational upgrade is mainly an opportunity for young workers, defined as individuals younger than 40 years of age. Finally, in section C we distinguish between male and female workers. A larger share of immigrant is male in Europe, so one could expect a larger pressure on that gender to upgrade occupation. Moreover, immigration in the '90s was dominated by young and male workers. Given that many jobs are gender- specific, this male immigration may have created greater competition for male rather than female natives.

The empirical findings show some interesting tendencies. First, section A of Table 9 shows that workers both in low and intermediate tiers are pushed towards faster occupational upgrading by immigrants. The coefficient of interest is positive and statistically significant in all of the 2SLS estimates reported in the first and in the second row of Section A. However, workers employed in Tier 3 at time t are more likely to upgrade within two years than worker in lower Tiers. This finding is consistent in all specifications.[9] The types of occupations grouped in Tier 3 are mainly science professionals and associate professionals and they are likely to upgrade and become corporate managers, managers, legislators or senior officials. These results are consistent with the hypothesis that large inflows of immigrants increase the demand of managerial occupations needed to coordinate and supervise workers in more operational and manual roles typically filled by immigrants.

[9] As a robustness check, we estimate a regression where we distinguish Tier 1 from Tier 2 and 3. A larger gain from immigration accruing to higher Tiers remains.

In section B we split workers by age. The point estimates are positive and statistically significant in most specifications. Only when we group workers in cells, in columns 5 and 6 we find a stronger tendency to upgrading for young as opposed to old workers, in line with the idea that younger workers are those better positioned to take advantage of the new career opportunities. Finally in section C we divide workers according to their gender. The point estimates for male are always positive and statistically significant, whereas the coefficients for female turn statistically insignificant in some specifications. This finding indicates that male workers may be those feeling more the competition from immigrants and therefore climbing the occupational ladder in response. Alternatively the result may indicate that males have easier upward mobility in their career than women, who have to bear the burden of raising the family and even when opportunity arise males are more likely to take advantage of them. As women can be more "marginal" to the labor market (because of their lower attachment to it) we test whether the inflow of foreigners increases their probability of moving out of employment. A regression similar to those specified in Table 4, but only limited to women is estimated. The empirical findings, not reported for brevity, do not show a significant effect of immigration on employment of women, as the coefficient of interest is never statistically significant. The lack of upgrading in female occupations therefore does not indicate that women represent the most vulnerable part of the labor supply with respect to immigration, but that they might not receive any competitive pressure from immigration and no (positive) reaction occurs.

6.3 Differences between Countries

The reallocation of workers towards higher skill occupations can be influenced not only by individual characteristics but also by characteristics of the local labor market. Rigid labor market institutions characterized by strong unions, large costs of labor mobility and of hiring and laying off workers can make transition across occupations more infrequent and sluggish. Also employment protection defined by the widespread use of collective contracts among workers, implies larger costs for workers to move out of the boundaries of narrowly defined occupations and hence lower mobility. Conversely, flexible labor markets make the creation of new occupations easier and therefore optimize the adjustments and the productive reallocation of natives, which the inflow of immigrants may produce. This idea is tested systematically in D'Amuri and Peri (forthcoming) who analyze the effect of immigrants on aggregate occupational mobility of European workers, dividing countries into those with more and less protected labor markets.

We test the impact of labor market institutions on individual occupational mobility of natives in response to immigration in a way similar to D'Amuri and Peri (forthcoming). We classify the countries of our sample according to an index of Employment Protection Law (EPL). The OECD (1999) computes various indexes, along different dimensions. We restrict to norms concerning temporary employment, which capture limitations on the use of temporary employment. We define a high EPL dummy variable equal to one if the country has

a value of EPL for temporary employment greater than the sample average and zero otherwise. We define a low EPL dummy if the country is below the sample mean. We then interact the key control variable, $f_{j,c,t}$, with the high and low dummies. Results are reported in Table 10. While the estimated effect of immigration on native occupational upgrading is positive for both group of countries, and the coefficient is between 0.6 and 1.2, countries with low employment protection exhibit larger and more significant effects. Especially when we consider the specifications at the cell-level we see that the coefficient for low EPL countries is 40-60% larger than for those with high EPL[10].

7 Conclusions

In this paper we have analyzed the impact of immigration on several native outcomes. The novelty of the approach is that we use data that allow us to follow native individuals over 2, 3 and 4 years after they have been exposed to labor market competition from immigrants measured as their share in the occupation-country cell. Our main focus is to analyze whether the exposure to immigrant competition accelerates or slows the career of native workers, measured as their ability to climb up the occupational ladder from jobs requiring basic manual skills to jobs having a managerial and supervisory role. Using the presence of immigrants from different nationalities in 1991 in European countries and occupations and their inflow during the period 1995-2001 we compare natives exposed to large or small waves of immigrant competition and use this variation to identify the effects on their career.

We find that immigrant competition accelerates the upward potential of natives, increasing their probability of moving to higher occupational tiers. Immigrants fill in several jobs at the "low" end of the occupational spectrum, thus generating opportunities for jobs in higher occupational tiers for natives. This faster mobility does not take place at the cost of higher probability of non-employment, nor at the cost of higher geographical mobility. The adjustment process in fact does not imply that some natives are crowded out, but instead that new working opportunities are created. Foreigners, by taking jobs complementary to those of natives, induce stronger job-creation by firms and potentially more employment. Interestingly, native categories, such as female workers, who are less in competition with foreign workers, don't lose but nor benefit from immigration. The upward mobility seems to occur largely among male workers, whereas female workers are less likely to upgrade their jobs. Native individuals are also more likely to become self-employed in response to immigrant competition and in general immigration increases occupational mobility of natives.

The novelty of our findings is that we are following a representative panel of European workers, controlling

[10] In a related check we interact the $f_{j,c,t}$ with dummies that distinguish countries between above and below the European average GDP per capita. The coefficient of the interaction term is positive and statistically significant only for high income countries. Richer countries with more flexible labor market institutions may be in the best position for the positive "complementarity" effects of immigrants to unfold themselves.

for their characteristics. Differently from the previous literature we are not identifying an average effect for a labor market resulting from a combination of effects on the existing workers and change in their composition. We are isolating the impact on native individuals, exposed to competition from immigrants. Hence our findings imply that immigration stimulates the upward mobility of existing European natives pushing them to faster career upgrades. The impact of an immigration shock on native careers is a new dimension of the analysis of labor market effects of immigrants and may have very important long-run implications for the gains from immigration.

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Table 1: The skill content of occupations

Occupation tiers	ISCO Occupation-1 digit
First: "Elementary occupations"	9. Elementary occupations
Second: "Clerical and Craft occupations"	4. Clerks; 5. Service workers and shop and market sales workers; 6. Skilled agricultural and fishery workers; 7. Craft and related trades workers; 8. Plant and machine operators and assemblers
Third: "Technical and Associate professionals"	3. Technicians and associate professionals
Fourth: "Professional and Manager"	1. Legislators, senior officials and managers; 2. Professionals

Table 2: Distribution of native workers in the four occupation tiers (%). Average 1995-2001

Occupation tiers	All natives			
	By individual-years		By individuals	
	Freq.	%	Freq.	%
	(1)	(2)	(3)	(4)
First	29,869	9.53	13,256	16.20
Second	174,497	55.69	53,921	65.88
Third	42,026	13.41	15,703	19.19
Fourth	66,933	21.36	21,464	26.23
Total	313,325	100.00	104,344	78.44
			(No. of individuals = 81,843)	

Source: authors calculation based on ECHP data.

Note: Columns (1) and (2) report statistics by individual-years, summing up to the total sample size. Columns (3) and (4) report frequencies and shares of individual who have ever been of each tier. The total frequency is higher that the number of individuals suggesting that some individuals have been employed in different tiers over the period considered.

Table 3: Immigration and native "occupational upgrading"

Specification:	(1) OLS	(2) 2SLS	(3) 2SLS with country-year	(4) 2SLS with country-year and occupation-year effects	(5) As (3) aggregated at the country-occupation-year	(6) As (4) aggregated at the country-occupation-year
Occupation Upgrade, 2-year interval	-0.0252 [0.1046]	0.4409** [0.2090]	0.5854*** [0.1991]	0.6066*** [0.1994]	0.9794*** [0.2072]	1.1390*** [0.2391]
Occupation Upgrade, 3-year interval	0.0496 [0.1161]	0.4658** [0.2322]	0.5939*** [0.2256]	0.5960*** [0.2264]	1.1427*** [0.2076]	1.3251*** [0.2371]
Occupation Upgrade, 4-year interval	0.2915* [0.1583]	0.9294*** [0.2945]	0.9674*** [0.2842]	0.9602*** [0.2852]	1.4644*** [0.2132]	1.5140*** [0.1947]
Fixed Effects	Individual Year	Individual Year	Individual Year	Individual Year	Year	Year
Interaction effects	No	No	Country*Year	Country*Year, Occupation* year	Country* Year	Country* Year, Occupation* year
F-test 1st stage	-	5543.68	7040.78	6768.66	68	43
Estimation level	Individual	Individual	Individual	Individual	Cells of country, year, occupations	Cells of country, year, occupations
Cluster	Individual	Individual	Individual	Individual	Country, Occupation	Country, Occupation
N. obs.	116,839	82,537	82,537	82,537	210	210

Note: Each cell reports the estimate from a different regression. The coefficient reported in columns (1) to (4) is the coefficient of interest on the dummy for occupational upgrade, as written at the beginning of each row. In columns (5) and (6) is on the share of individuals upgrading in the year-country-occupation cells. The length of the time interval t, t+r is also indicated in the first cell of each row. Regressions in columns (1) to (4) are performed at individual level and include dummies for tenure, education, occupation and industry as well as individual fixed effects. Regressions in columns (5) and (6) are performed at country-year-occupation level and include dummies for occupation and countries and variables with the share of individuals in the i category of tenure, education and industry. In parenthesis we report the standard error clustered at the individual level in columns (1) to (4) and at country- occupation levels in columns (5) to (6). *,** indicate significance at the 5 and 1% level. The F-test and the number of observations are relative to the 2-year interval.

Table 4: Immigration and native exit from employment

Specification:	(1) OLS	(2) 2SLS	(3) 2SLS with country-year	(4) 2SLS with country-year and occupation-year effects	(5) As (3) aggregated at the country-occupation-year	(6) As (4) aggregated at the country-occupation-year
Out of Employment, 2-year interval	-0.0065 [0.0538]	-0.0006 [0.1124]	-0.0172 [0.1081]	-0.0098 [0.1082]	-0.0472 [0.0612]	-0.1029 [0.0639]
Out of Employment, 3-year interval	-0.1187** [0.0565]	-0.0469 [0.1142]	-0.0185 [0.1113]	-0.0245 [0.1116]	-0.1416** [0.0639]	-0.2143*** [0.0583]
Out of Employment, 4-year interval	-0.0275 [0.0789]	0.0137 [0.1639]	-0.0115 [0.1581]	-0.0071 [0.1583]	-0.2029*** [0.0778]	-0.2509*** [0.0819]
Fixed Effects	Individual Year	Individual Year	Individual Year	Individual Year	Year	Year
Interaction effects	No	No	Country*Year	Country*Year, Occupation* year	Country* Year	Country* Year, Occ* year
F-test 1st stage	-	6768	8471	8335	65	49
Estimation level	Individual	Individual	Individual	Individual	Cells of country, year, occupations	Cells of country, year, occupations
Cluster	Individual	Individual	Individual	Individual	Country, Occupation	Country, Occupation
N. obs.	168,928	112,688	112,688	112,688	270	270

Note: Each cell reports the estimate from a different regression. The coefficient reported in columns (1) to (4) is the coefficient of interest on the dummy for out of employment, as written at the beginning of each row. In columns (5) and (6) is on the share of individuals exiting from employment in the wave-country and occupation cells. The length of the time interval t, t+r is also indicated in the first cell of each row. Regressions in columns (1) to (4) are performed at individual level and include dummies for tenure, education, occupation and industry. Regressions in columns (5) and (5) are performed at country-year-occupation level and include dummies for occupation, year and countries and variables with the share of individuals in the i category of tenure, education and industry. In parenthesis we report the standard error clustered at the individual level in columns (1) to (4) and at country-occupation levels in columns (5) to (6). *,** indicate significance at the 5 and 1% level. The F-test and the number of observations are relative to the 2-year interval.

Table 5: Immigration and native geographical mobility

Specification:	(1) OLS	(2) 2SLS	(3) 2SLS with country-year	(4) 2SLS with country-year and occupation-year effects	(5) As (3) aggregated at the country-occupation-year	(6) As (4) aggregated at the country-occupation-year
Reg. mobility 2-year interval	-0.0173 [0.0156]	-0.0266 [0.0399]	-0.0307 [0.0389]	0.0078 [0.0256]	0.0472 [0.0333]	0.0391 [0.0350]
Reg. mobility 3-year interval	-0.0195 [0.0206]	-0.0269 [0.0453]	-0.0256 [0.0453]	0.0100 [0.0315]	0.0261 [0.0477]	0.0160 [0.0534]
Reg. mobility 4-year interval	-0.0173 [0.0289]	0.0080 [0.0468]	0.0073 [0.0460]	0.0113 [0.0448]	0.1280 [0.0801]	0.1217 [0.0805]
Fixed Effects	Individual Year	Individual Year	Individual Year	Individual Year	Year	Year
Interaction effects	No	No	Country*Year	Country*Year, Occupation* year	Country* Year	Country* Year, Occ* year
F-test 1st stage		2704	3124	115.2	20.65	18.05
Estimation level	Individual	Individual	Individual	Individual	Cells of country, year, occupations	Cells of country, year, occupations
Cluster	Individual	Individual	Individual	Individual	-	-
N. obs.	155,189	116,698	116,698	123,698	270	270

Note: Each cell reports the estimate from a different regression. The coefficient reported in columns (1) to (4) is the coefficient of interest on the dummy for Regional Migration within the Same Country, as written at the beginning of each row. In columns (5) and (6) is on the share of those who moved for datasets collapsed at the cells of country, year and occupation. The length of the time interval t, t+r is also indicated in the first cell of each row. Regressions in columns (1) to (4) are performed at individual level and include dummies for tenure, education, occupation and industry. Regressions in columns (1) to (4) are performed at individual level and include dummies for tenure, education, occupation and industry as well as individual fixed effects. Regressions in columns (5) and (6) are performed at country-year-occupation level and include dummies for occupation and countries and variables with the share of individuals in the i category of tenure, education and industry. In parenthesis we report the standard error clustered at the individual level in columns (1) to (4) and at country- occupation levels in columns (5) to (6). *,** indicate significance at the 5 and 1% level. The F-test and the number of observations are relative to the 2-year interval.

Table 6: Immigration and native wage and salary earnings

Specification:	(1) OLS	(2) 2SLS	(3) 2SLS with country-year	(4) 2SLS with country-year and occupation-year effects	(5) As (3) aggregated at the country-occupation-year	(6) As (4) aggregated at the country-occupation-year
logWage change 2 years interval	-0.3775** [0.1644]	0.6734 [0.4117]	0.3765 [0.3921]	0.3951 [0.3910]	0.1874 [0.1780]	0.2190 [0.1699]
logWage change 3 years interval	0.0655 [0.1862]	0.6947 [0.4698]	0.5076 [0.4551]	0.5303 [0.4546]	0.5399* [0.2891]	0.7636** [0.3019]
logWage change 4 years interval	-0.3312 [0.2410]	0.5766 [0.5991]	0.3043 [0.5703]	0.3074 [0.5684]	0.1295 [0.3111]	-0.0296 [0.3190]
Fixed Effects	Individual Year	Individual Year	Individual Year	Individual Year	Year	Year
Interaction effects	No	No	Country*Year	Country*Year, Occupation* year	Country* Year	Country* Year, Occ* year
F-test 1st stage		2078	2371	2389	20.65	18.05
Estimation level	Individual	Individual	Individual	Individual	Cells of country, year, occupations	Cells of country, year, occupations
Cluster	Individual	Individual	Individual	Individual	-	-
N. obs.	135,309	83,943	83,943	83,943	270	270

Note: The dependent variable is change in log wage income. Each cell reports the estimate from a different regression. The coefficient reported in columns (1) to (4) is the coefficient of interest on change in log wage income, as written at the beginning of each row. In columns (5) and (6) is on the average of log wage income in the wave-country and occupation cells. The length of the time interval t, t+r is also indicated in the first cell of each row. Regressions in columns (1) to (4) are performed at individual level and include dummies for tenure, education, occupation and industry as well as individual fixed effects. Regressions in columns (5) and (6) are performed at country-year-occupation level and include dummies for occupation and countries and variables with the share of individuals in the i category of tenure, education and industry. In parenthesis we report the standard error clustered at the individual level in columns (1) to (4) and at country- occupation levels in columns (5) to (6). *,** indicate significance at the 5 and 1% level. The F-test and the number of observations are relative to the 2-year interval.

Table 7: Immigration and native self-employment income

Specification:	(1) OLS	(2) 2SLS	(3) 2SLS with country-year	(4) 2SLS with country-year and occupation-year effects	(5) As (3) aggregated at the country-occupation-year	(6) As (4) aggregated at the country-occupation-year
logSelf-empl change	0.4212	7.6479*	5.2368	5.2625	0.7803	0.8283
2 years interval	[1.0728]	[4.2991]	[4.0026]	[3.9537]	[1.0696]	[1.2885]
logSelf-empl change	-1.1151	7.3435	3.0003	2.4698	5.9340***	6.0152***
3 years interval	[1.2634]	[4.7988]	[4.6478]	[4.5955]	[1.7644]	[1.4429]
logSelf-empl change	-0.8126	5.0226	4.2763	4.1058	7.4888***	7.5245***
4 years interval	[2.0017]	[5.3492]	[5.5269]	[5.8179]	[1.5641]	[1.7068]
F-test 1st stage		104.2	132.1	146.0	23.64	21.59
N. obs	21,029	15,233	15,233	15,233	265	265
Prob of self-empl	0.0995**	0.2116**	0.1960**	0.2009**	0.2136*	0.2431*
2 years interval	[0.0453]	[0.0867]	[0.0833]	[0.0830]	[0.1264]	[0.1274]
Prob self-empl	0.1111**	0.1233	0.1250	0.1296	0.2319*	0.2496*
3 years interval	[0.0537]	[0.1263]	[0.1233]	[0.1228]	[0.1270]	[0.1386]
Prob of self-empl	0.0263	-0.0846	-0.0795	-0.0734	0.2363	0.2629
4 years interval	[0.0659]	[0.1409]	[0.1367]	[0.1365]	[0.1841]	[0.1952]
F-test 1st stage		2684	3114	3131	20.65	18.05
N. obs	173,337	113,770	113,770	113,770	270	270
Fixed Effects	Individual Year	Individual Year	Individual Year	Individual Year	Year	Year
Interaction effects	No	No	Country*Year	Country*Year, Occupation* year	Country* Year	Country* Year, Occ*year
Estimation level	Individual	Individual	Individual	Individual	Cells of country, year, occupations	Cells of country, year, occupations
Cluster	Individual	Individual	Individual	Individual	-	-

Note: Each cell reports the estimate from a different regression. The coefficient reported in columns (1) to (4) is the coefficient of interest on log self-employment income in the above panel and on the dummy for receiving a self-employment income in the below panel, as written at the beginning of each row. In columns (5) and (6) is on the average of log wage income in the wave-country and occupation cells in the above panel and on the share of individuals receiving self-employment income in the wave-country and occupation cells. The length of the time interval t, t+r is also indicated in the first cell of each row. Regressions in columns (1) to (4) are performed at individual level and include dummies for tenure, education, occupation and industry as well as individual fixed effects. Regressions in columns (5) and (6) are performed at country-year-occupation level and include dummies for occupation and countries and variables with the share of individuals in the i category of tenure, education and industry. In parenthesis we report the standard error clustered at the individual level in columns (1) to (4) and at country-occupation levels in columns (5) to (6). *,** indicate significance at the 5 and 1% level. The F-test and the number of observations are relative to the 2-year interval. significance at the 5 and 1% level. The F-test and number of observations are relative to the 2-year interval.

Table 8: Immigration and native occupational mobility

Specification:	(1) OLS	(2) 2SLS	(3) 2SLS with country-year	(4) 2SLS with country-year and occupation-year effects	(5) As (3) aggregated at the country-occupation-year	(6) As (4) aggregated at the country-occupation-year
Occupational Change 2-year interval	0.0505 [0.158]	1.0598*** [0.3349]	1.3877*** [0.3144]	1.3873*** [0.3103]	0.2945 [0.1972]	0.3241 [0.2037]
Fixed Effects	Individual Year	Individual Year	Individual Year	Individual Year	Year	Year
Interaction effects	No	No	Country*Year	Country*Year, Occupation* year	Country* Year	Country* Year, Occupation* year
F-test 1st stage	-	5968	7681	7537	65	49
Estimation level	Individual	Individual	Individual	Individual	Cells of country, year, occupations	Cells of country, year, occupations
Cluster N. obs.	Individual 149,636	Individual 103,522	Individual 103,522	Individual 103,522	Country, Occupation 270	Country, Occupation 270

Note: Each cell reports the estimate from a different regression. The coefficient reported in columns (1) to (4) is the coefficient of interest on the dummy for occupation change. In columns (5) and (6) is on the share of individuals changing occupation in the wave-country and occupation cells. The length of the time interval t, t+2. Regressions in columns (1) to (4) are performed at individual level and include dummies for tenure, education, occupation and industry as well as individual fixed effects. Regressions in columns (5) and (6) are performed at country-year-occupation level and include dummies for occupation and countries and variables with the share of individuals in the i category of tenure, education and industry. In parenthesis we report the standard error clustered at the individual level in columns (1) to (4) and at country-occupation levels in columns (5) to (6). *,** indicate significance at the 5 and 1% level. The F-test and the number of observations are relative to the 2-year interval.

Table 9: Immigration and native occupational upgrading: by skill, age, gender

Specification:		(1) OLS	(2) 2SLS	(3) 2SLS with country-year effects	(4) 2SLS with country-year and occupation-year effects	(5) As (3) aggregated at the country-occupation-year	(6) As (4) aggregated at the country-occupation-year
SECTION A	Tier 1-2	-0.0837	0.4902**	0.6205***	0.6499***	0.9821***	1.2207***
		[0.1056]	[0.2139]	[0.2020]	[0.2023]	[0.2249]	[0.2789]
	Tier 3	1.4991***	2.0367**	2.1758**	2.7255***	3.1733***	4.1629***
		[0.3211]	[0.9948]	[0.9608]	[1.0169]	[1.0815]	[1.4972]
SECTION B	Young	0.3459***	0.5521**	0.6912***	0.7232***	0.7336***	0.8564***
		[0.1101]	[0.2164]	[0.2163]	[0.2180]	[0.2073]	[0.2338]
	Old	0.1919*	0.7100***	0.7688***	0.8071***	0.2639	0.3432
		[0.1139]	[0.2320]	[0.2199]	[0.2246]	[0.2302]	[0.2308]
SECTION C	Male	0.0477	0.5010**	0.6772***	0.7101***	0.6334**	0.6468**
		[0.1269]	[0.2511]	[0.2435]	[0.2446]	[0.2561]	[0.2783]
	Female	-0.1344	0.3588	0.4607*	0.4672*	0.4820	0.5486
		[0.1608]	[0.2775]	[0.2647]	[0.2647]	[0.3381]	[0.3699]
Fixed Effects		Individual, Year	Individual, Year	Individual Year	Individual Year	Year	Year
Interaction effects		No	No	Country-Year	Country-Year and occupation-year	Country* Year	Country* Year, Occupation* year
Cluster		Individual	Individual	Individual	Individual	Country, Occupation	Country, Occupation

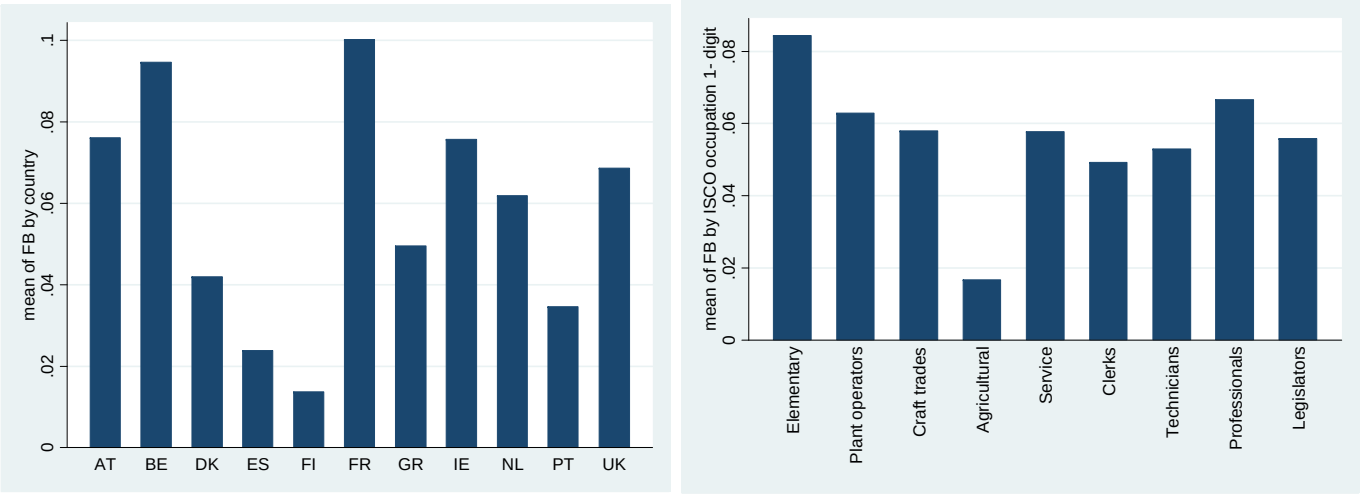
Note: Each cell reports the estimate from a different regression. The coefficient reported is the coefficient of interest on the dummy for occupational upgrade, distinguished for workers occupied in Tiers 1-2 and Tier 3 (section A), for workers of age less than 40 years old and higher (section B) and for male and female (section C). The length of the time interval is two years. Each regression includes individual fixed effects, year effects and dummies for tenure, education, occupation and industry of the individual. In parenthesis we report the standard error clustered at the individual level. *,**,*** indicate significance at the 1, 5 and 1% level.

Table 10: Immigration and native occupational upgrading. Employment protection legislation.

	(1) OLS	(2) 2SLS	(3) 2SLS with country-year effects	(4) 2SLS with country-year and occupation-year effects	(5) As (3) aggregated at the country-occupation-year	(6) As (4) aggregated at the country-occupation-year
HighEPL	-0.4649***	0.4227	0.6312	0.6499	0.5925	0.7162*
	[0.1205]	[0.4139]	[0.4453]	[0.4466]	[0.4174]	[0.4013]
LowEPL	0.6161***	0.4422**	0.5810***	0.6026***	1.0345***	1.1971***
	[0.1600]	[0.2110]	[0.2002]	[0.2002]	[0.1691]	[0.1937]
Fixed Effects	Individual, Year	Individual, Year	Individual, Year	Individual Year	Year	Year
Interaction effects	No	No	Country-Year	Country-Year and occupation-year	Country-Year	Country-Year and occupation-year
Cluster		Individual	Individual	Individual	Country, Occupation	Country, Occupation
N	116,839	82,537	82,537	82,537	210	210

Note: Each cell reports the estimate from a different regression. The coefficient reported is the coefficient of interest on the dummy for occupational upgrade, distinguished by country with different EPL levels (section A) and different GDP level (section B). The length of the time interval is two years. Each regression includes individual fixed effects, year effects and dummies for tenure, education, occupation and industry of the individual. In parenthesis we report the standard error clustered at the individual level. *,**,*** indicate significance at the 1, 5 and 1% level.

Figure 1: Share (%) of foreign born workers over total population by ISCO 1-digit. Average 1995-2001



Source: authors' calculations based on ELFS.

Note: Isco occupation 1-digit codes are grouped in Tiers as follows: Elementary occupations = Elementary; Plant and machine operators and assemblers, Craft and related trades workers, Skilled agricultural and fishery workers, Service workers and shop and market sales workers, Clerks= Clerical and Craft; Technicians and associate professionals= Technical and associate; Professionals, Legislators, senior officials and managers= Professionals and managers.

Appendix

Table A1: summary statistics of native workers, by occupation tiers. Average 1995-2001

Occupation tiers	Tertiary education (%)	Wage and salary earnings	Self-employment income	O*NET score in complex skills	O*NET score in manual skills	O*NET complex/manual score
	(1)	(2)	(3)	(4)	(5)	(6)
First	6.32	2,471.68	3,657.39	34.50	64.25	0.54
Second	14.24	4,074.49	3,113.88	42.45	60.00	0.71
Third	45.36	5,835.55	4,569.13	69.22	43.67	1.59
Fourth	66.55	9,864.26	6,330.36	77.53	40.50	1.91

Source: authors calculation based on ECHP data and O*NET data. Column (1) provides the percentage of native workers with tertiary education. Monetary values in ECU until 1998, in Euro from 1999 onwards. The scores in column (4) are the average scores in complex, mental and communication skills. A score equals to 78 in complex skills for Tier 4 implies that 78 percent of all workers use complex skills less intensively than workers in Tier 4. The scores in column (5) are the average scores in manual and routine skills. Young workers are defined as those with less than 40 years of age. Statistics weighted using individual weights.

Table A2: Frequency of occupation mobility (upgrade and downgrade), exit of employment and geographical mobility, using 2-year interval. Average 1995-2001.

	All natives			
	By individual-years		By individuals	
	Freq.	%	Freq.	%
	(1)	(2)	(3)	(4)
Upgrade				
Upgrade	16,160	10.19	11,642	22.68
No move	129,551	81.68	46,975	91.49
Downgrade	12,892	8.13	9,652	18.80
Total	158,603	100	68,269	132.97
			(No. of individuals = 51,342)	
Out of employment				
No change	160,702	93.27	51,389	93.72
Out of employment	11,592	6.73	8,958	16.34
Total	172,294	100.00	6,0347	110.06
			(No. of individuals =54,833)	
Regional mobility				
No change	156,638	98.73	50,001	99.41
Change of region	2,016	1.27	1,340	2.66
Total	158,654	100.00	51,341	102.07
			(No. of individuals = 50,298)	

Source: authors calculation based on ECHP data. The upgrade and downgrade are computed within a 2 years interval.

Table A3: Share of foreign workers (%), by occupation tiers and country. Selected years.

year	Occupation tiers	AT	BE	DK	ES	FI	FR	IE	GR	NL	PT	UK
1995	First	19.06	12.34	3.85	1.98		17.47		10.89	9.07	1.03	5.56
1998	First	21.98	14.02	6.26	3.08	2.17	18.00	5.65	23.88	11.87	3.10	6.98
2001	First	22.53	13.48	7.48	5.64	2.02	18.23	6.94	22.32	9.55	4.71	7.02
1995	Second	6.48	8.06	2.39	1.67		9.79		3.29	6.18	1.01	5.42
1998	Second	7.53	8.96	3.97	1.88	1.41	9.45	6.75	4.90	7.11	3.19	6.25
2001	Second	8.23	10.84	4.01	2.62	1.78	9.81	7.47	5.67	6.38	3.81	6.32
1995	Third	5.74	7.77	2.43	2.44		7.01		3.88	4.68	1.40	5.66
1998	Third	5.69	8.16	3.41	2.37	1.39	6.92	9.68	2.16	5.25	6.98	6.71
2001	Third	5.89	7.44	4.13	2.73	1.42	6.88	9.39	2.82	5.47	5.46	8.56
1995	Fourth	5.33	9.24	4.85	2.66		10.95		3.12	4.68	1.79	8.38
1998	Fourth	7.07	11.13	6.12	2.96	1.24	11.50	8.21	2.78	5.33	6.36	9.09
2001	Fourth	6.82	11.01	5.35	3.28	2.15	11.42	9.56	2.55	5.11	6.94	9.97

Source: authors calculation based on ELFS data.

Table A4: Summary statistics of the main variables

Variable	Obs	Mean	Std. Dev.
Foreign-born share, by occupation-country-year	313,325	0.0566	0.0370
Occupation Upgrade: 2-year interval	124,443	0.1299	0.3361
Occupation Upgrade: 3-year interval	91,153	0.1470	0.3541
Occupation Upgrade: 4-year interval	61,131	0.1638	0.3701
Out of Employment: 2-year interval	172,287	0.0673	0.2505
Out of Employment: 3-year interval	126,753	0.0751	0.2635
Out of Employment: 4-year interval	86,270	0.0829	0.2758
Change in log wage and salary earnings: 2-year interval	138217	0.1629	0.5980
Change in log wage and salary earnings: 3-year interval	99875	0.2115	0.6432
Change in log wage and salary earnings: 4-year interval	66890	0.2582	0.6793
Change in log self-employment income: 2-year interval	21170	0.1123	1.1370
Change in log self-employment income: 3-year interval	14802	0.1654	1.1776
Change in log self-employment income: 4-year interval	9641	0.2095	1.1999
Regional mobility: 2-year interval	158461	0.0119	0.1083
Regional mobility: 3-year interval	117979	0.0167	0.1280
Regional mobility: 4-year interval	81156	0.0206	0.1420
Occupation change: 2-year interval	158,603	0.2452	0.4302

Source: authors calculation based on ECHP data. Monetary values in ECU until 1998, in Euro from 1999 onwards. Statistics weighted using individual weights.