Migration and Production Structure in Europe *

Stefania Borelli †

Abstract

This work assesses the effect of the immigration on the production structure of a selection of European countries in 2001-2009 with a task based approach. The inflow of immigrants in the host country represents an increase in the supply of manual-physical tasks. What is it the effect on the productive sectors? The analysis confirms that the increase in the supply of simple tasks is absorbed in the production sectors characterized by low task complexity: that is a positive impact on the value added on the productive sectors that use more intensively simple tasks. These effects are more intense when considering countries as Italy and Spain characterized by a recent, rapid and intense inflow of migrants.

Important empirical contribution of the work is the use of a new OECD dataset, PIAAC, to calculate the intensity index at country-industry-task level.

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†PhD Candidate in Economics, Department of Economics and Social Sciences, Sapienza - University of Rome. Email address: stefania.borelli@uniroma1.it

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1 Introduction

The incidence of foreign-born population on natives in European countries has greatly increased in the last decades: just to give an example, in Italy the stock of foreign-born population grows from 990 thousand in 1998 to over 4 million in 2013 according to Eurostat.

The object of reflection for policy makers and economists is the effect of immigration on the key variables of the labor market of the host countries. Most of the studies in the US focused on the impact of low-skilled immigrant workers on natives' wages and employment: Borjas (2003, 2006) and Borjas and Katz (2005) argue that immigration reduced real wages paid to native-born workers without a high school degree. Card (2001, 2007), Card and Lewis (2007), and Lewis (2005), in contrast, find no effect of immigration on the wages of less-educated native workers; Ottaviano and Peri (2006, 2008, 2012) find a positive effect due to complementarity between natives and migrants. In Europe economists have investigated the effect of immigrants in specific countries using an approach similar to those used in the US studies. For instance, Dustmann and Glitz (2012), analyzing the case of Germany, emphasize further the role of newly created firms, explaining 18 percent of the overall adjustment to migration-induced labor supply shocks. The authors also find significant negative wage effects for the non-traded sector.

Among the works that have analyzed a sample of European countries there are Angrist and Kugler (2003) and D'Amuri and Peri (2014). The latter work, in particular, considering all workers, finds that the effect of reallocation of natives workers is different between countries (in those with more flexible labor laws the reallocation is greater).

When wages are not affected, the literature has considered two possible effects: on the one hand, the firms absorb the change in employment, caused by the immigration, through changes in production techniques, switching to techniques that are more complementary to the characteristics of the new labor force. Hanson and Slaughter (2002) considered the local effect of the inflow of migrants in the US, whereas Gandal et al. (2004) analyzed the effects of the inflow of foreign workers, in particular from the Soviet Union, in Israel. Although in the first work the new labor force is typically low-skilled and in the latter case it is typically high-skilled, both works conclude for a more evident role of the changes in production techniques rather than the change in the production mix. Along the same line, Lewis (2004) analyzed the large inflow of Cuban migrants in Miami and reached similar conclusions on the rate of technology adoption rather than an effect in the industry mix. Gonzalez and Ortega (2011) analyzing the inflow of migrants in Spain, find that the effect on the production is represented by within-industry adjustments. The inflow of unskilled migrant workers into a region is almost completely absorbed through an increase in the intensity of use of unskilled labor, given the output mix. Looking at the *type of change* in production techniques, Accetturo et al. (2012) conclude for an increase in the capital-to-labor ratio when using Italian manufacturing data at the firm level, whereas Lewis (2011) finds a tendency to slow the adoption of automated techniques in US metropolitan areas where migration has been more intense.

On the other hand, immigration may cause an effect in the production structure: for instance, Card and Lewis (2007) and Card (2007) find effects on the production structure, but claim that this occurs within sectors (or within firms) rather than between sectors. Bettin et al. (2012) find evidence of production recomposition in favor of low-skilled manufacturing when using firm-level data for the case of Italy, but only for the years 2001-2003.

This work investigates the effect of immigration on the production structure in a selection of European countries with a task based approach. The task based approach has found application in several branches of recent empirical research. Many recent studies have used the task based approach to explore the causes of job polarization and the link between technological change and shift in wage structure. In this strand of work there are Autor et al. (2003), Autor, Katz, and Kearney (2006, 2008), Spitz-Oener (2006), Bartel, Ichniowski, and Shaw (2007), Felstead et al. (2007), Goos and Manning (2007), Smith (2008), Dustmann, Ludsteck, and Schonberg (2009), Antonczyk, DeLeire, and Fitzenberger (2010), Black and Spitz-Oener (2010), Gathmann and Schonberg (2010), Firpo, Fortin, and Lemieux (2011), Goos, Manning, and Salomons (2012). In these studies the primary hypothesis is that work-place computerization leads to the displacement of human labor in tasks that can be described as routine.

The task based approach is also employed in several recent studies on immigration. Works by Cortes (2008) and Peri and Sparber (2009), Ottaviano and Peri (2012), D'Amuri and Peri (2012) compare the task assignment of native and migrant workers with similar education.

Many other studies consider the effects of international outsourcing on the employment. Antràs, Garicano, and Rossi-Hansberg (2006) and Grossman and Rossi-Hansberg (2008) develop theoretical models of international offshoring starting with the assumption that routine job tasks are more suitable for offshoring than non-routine job tasks.

The hypothesis at the origin of this work, in line with the migration literature, is that the inflow of immigrants in the host country represents a shock for the structure of the labor market, a shift in the supply of tasks and in particular an increase in the supply of manual-physical tasks (D'Amuri and Peri (2014)). Assuming that the relative wages of complex-to-simple task is given (the output prices are given), in this work I estimate the effect of immigration on the production structure in terms of sectoral recomposition: an increase in the supply of *simple* tasks is absorbed in the production sector characterized by a "low" task complexity [1].

The main contribution of this work is the use of a new database, PIAAC (Programme for the International Assessment of Adult Competencies, OECD), to calculate the "Task Intensity Index" at industry level. Only three countries have task data available: the United States (see Autor et al., 2003), Germany (see Spitz-Oener, 2006), and Britain (see Felstead et al., 2007). To the best of my knowledge, as reported in Table 1, the data sources for analysis of job tasks come from a module of the Princeton Data Improvement Initiative survey (PDII) to the Survey of Skills, Technology, and Management Practices (STAMP). All dataset provide information on job task at single country level. The Princeton Data Improvement Initiative survey collects data on the cognitive, interpersonal, and physical job tasks that workers regularly perform on their jobs; the US Department of Labor's Occupational Information Network, which contains occupation-level measures and replaces the Dictionary of Occupational Titles as an official career counseling tool, is probably the dataset used more frequently in empirical works on jobs task. The survey of Skills, Technology, and Management Practices (STAMP) fielded by Michael Handel provides a detailed cross-sectional view of work activities in the U.S. German Qualification and Career Survey, which is conducted jointly by the Federal Institute for Vocational Education and Training (BIBB) and the Institute for Employment (IAB) offer detailed

[1] This effect reminds the well-known Rybczynski effect

Table 1: Data sources on job tasks

Dataset	Level	Country	Year	Works
Princeton Data Improvement Initiative survey (**PDII**)	Workers	USA	2008	Autor and Handel 2013
IAB/BIBB labor force data	Workers	Germany	1979, 1984/85, 1991/92, 1998/99, 2005/06	Spitz-Oener 2006
O*NET	Occupations	USA	Last version 2009	Autor et al. 2003
British Skills Survey **BSS**	Workers	UK	1986, 1992, 1997, 2001, 2006	Rojas and Romagosa 2013
Skills, Technology, and Management Practices (**STAMP**)	Workers	USA	2007	Handel 2007

self-reported data on workers' primary activities at their jobs. British Skills Survey by Francis Green and collaborators, has sought to provide consistent measures of skills used in the workplace by surveying workers about their work activities. Both last surveys are collected in different years, but only data from BSS are comparable for three year: 1997, 2001 and 2006. In IAB/BIBB, the set of job activity questions used varies substantially across the different survey years. This almost certainly reduces the reliability of the IAB/BIBB data as a source for tracking the evolution of job task inputs in aggregate.

Common characteristics of the considered surveys is that are collected at level of the single countries. The main advantage of using the international survey PIAAC, which also uses a self-reported individual worker's survey, is that it allows to highlight the country-level and eventually over time (provided that the survey is repeated) differences across the European countries.

In this work the model and empirical specification are intentionally basic to isolate the effect of the inflow of foreign born workers on the value added of the industries. However problems of possible reverse causality may be confounding the effects, then I implement instrumental variables regressions, where I predict industry's share of immigrant workers in the first stage regressions using various instrumental variables, inspired in part to the approach of Altonji and Card (1991) and Card (2001). The set of instrumental variables is composed by five different instruments: in the first four (called IV1-IV4) I use an integrated approach consisting in the estimation of the rate of growth of immigrants through "gravity -based model" and the consequent imputation of the workers into industries using the share of foreign workers in the first available year. The last instrument (IV5) is properly constructed using

Altonji-Card approach.

The main conclusion adduced by the empirical findings is that an increase in immigration rates, raising the supply of the *simple* tasks, affects positively the value added of the *simple* sectors relative to all other sectors.

The remaining sections of the paper are organized as follows. Section 2 describes the data and presents descriptive statistics of the immigration in the considered countries. Section 3 and 4 present respectively the empirical specification and econometric strategy, whereas 5 and 6 show the empirical results considering respectively the full sample of countries and the two countries where "occupational segregation" is more pronounced. Section 7 concludes.

2 Data and Descriptive Statistics

In order to analyse the relationship between migration and production structure of the selected countries I use different sources of data. First of all, to measure the employment of foreign-born workers[2] I use data from the European Union Labor Force Survey (EU-LFS) which homogenizes country-specific labor force surveys at the European level. I calculate immigrants' distribution across countries of destination and industry (NACE Rev. 1.1 and Rev. 2). I restrict the analysis to the 2001-2009 period and I consider the working age population (age 15-64) of Western European countries only.[3]

From 2001 to 2009 the share of foreign born in the total labor force almost increase by nearly 50% from below 8% to almost 12% in 2009 (Figure 1). Figure 2 reports

[2] In line with the previous literature, immigrants are all foreign-born workers who were not citizens at birth.

[3] Belgium, Denmark, France, Netherlands, Norway, Spain, Sweden, United Kingdom, Germany (2002-2009) and Italy (2005-2009).

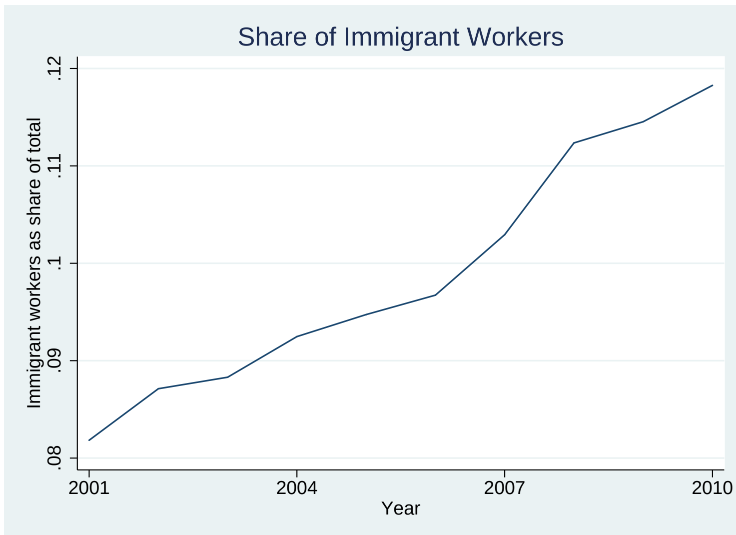
the immigrant share in each of our ten countries of interest – Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Spain, Sweden and the UK – between 2001 and 2009. In France the immigrant share has been relatively stable since the 1970s, in Germany has experienced sustained growth in its foreign-born population over the last half century and in Netherlands restrictive immigration policy has led to a decline of immigrant flows. All other countries have experienced large increases over the last few decades, with particularly fast growth rates in Italy and Spain since the year 2000. In particular, unlike Germany and France, Italy has, for most of the last half century, been one of the most important emigration countries in Europe, but since the year 2000, it has experienced rapid growth in its foreign population, which by 2009 amounted to 5.5 million individuals or 10 percent of the population. The migration experience of Spain resembles that of Italy: Spain was also until quite recently a net emigration country. However, since the end of the 1990s, Spain has been experiencing inflows of migrants at a rate surpassing that of any other European country. Within less than 10 years, the foreign-born share in Spain increased to 15.3 percent.

Figure 3 reports the evolution of the employment shares of immigrant workers across productive sector in each year and country: the highest shares of foreign workers seem to be particularly pronounced in sectors such as manufacturing, construction and the low-skill service sector with important differences between countries. From a dynamic point of view, workplace "segregation" (Ortega et al. 2013) declines with time in Germany and Denmark but never disappears entirely, while it remains evident in countries as Italy and Spain.

Figure 4 reports the evolution of share of foreign born by industry considering all countries together.

Data on value added at industry-level (ISIC rev. 3) are drawn from the OECD's Structural Analysis (STAN) Database.

Figure 1: Foreign born workers as share of total in EU 2001-2009

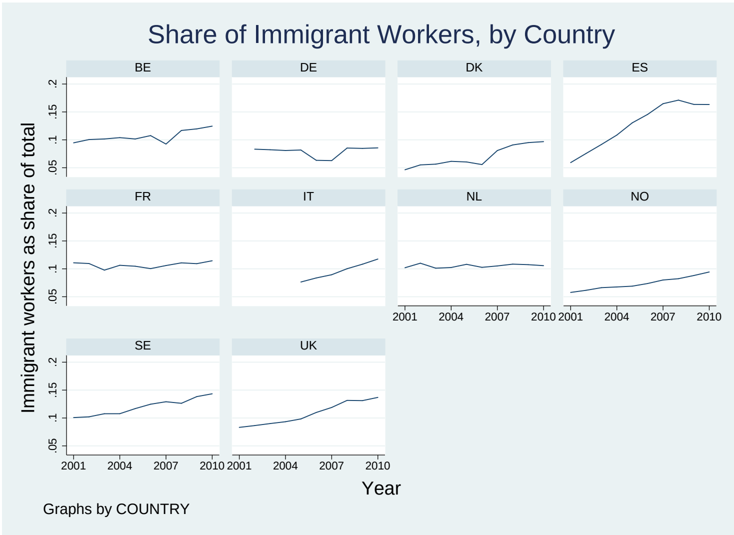


Source: Author's calculation from EU-LFS data.
It does not include countries for which one or more years of data are missing (Italy and Germany).

2.1 Task Variables

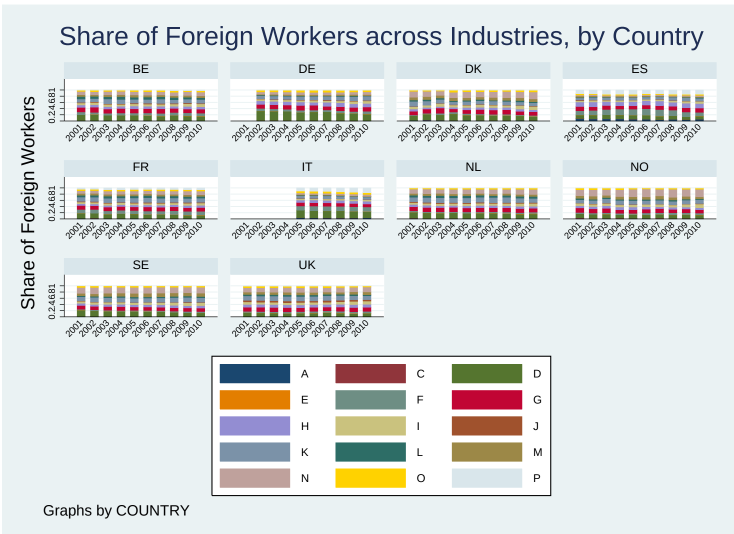
Data on the tasks performed by workers is constructed using Programme for the International Assessment of Adult Competencies (PIAAC). "The Survey of Adult Skills (PIAAC) assesses the proficiency of adults from age 16 onwards in literacy, numeracy and problem solving in technology-rich environments. These skills are "key information-processing competencies" that are relevant to adults in many social contexts and work situations, and necessary for fully integrating and participating in the labor market, education and training, and social and civic life. In addition, the survey collects a range of information on the reading- and numeracy-related activi-

Figure 2: Foreign born workers as share of total in EU 2001-2009, by country



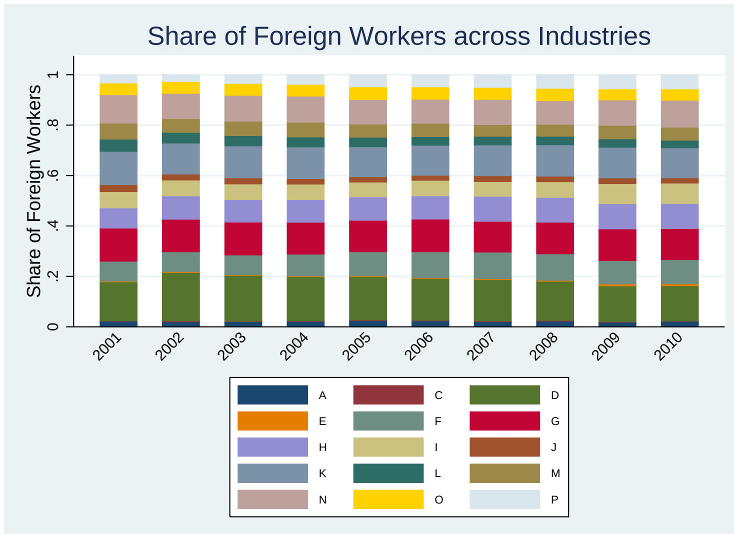
Source: Author's calculation from EU-LFS data.

Figure 3: Foreign born workers as share of total in EU 2001-2009 across sectors, by country



Source: Author's calculation from EU-LFS data.

Figure 4: Foreign born workers as share of total in EU 2001-2009 across sectors



Source: Author's calculation from EU-LFS data.
It does not include countries for which one or more years of data are missing (Italy and Germany).

ties of respondents, the use of information and communication technologies at work and in everyday life, and on a range of generic skills, such as collaborating with others and organising one's time, required of individuals in their work" (OECD Skills Outlook. First results from the survey on adult skills, 2013).

There were 24[4] national participants in PIAAC, comprising 20 OECD member countries, regional entities from two OECD member countries (UK and Belgium) and two partner countries (Cyprus and the Russian Federation). Although the Russian Federation also participated in PIAAC, its data was not ready for inclusion in the first international report on PIAAC. The tables for England and Northern Ireland are available separately. Unit of analysis are the individual and his competencies,

[4]Australia, Italy, Austria, Japan, Canada, Republic of Korea, Norway, Cyprus, Poland, Czech Republic, Russian Federation, Denmark, Slovak Republic, Estonia, Spain, Finland, Sweden, Flanders (Belgium), United Kingdom, France, England (UK), Germany, N. Ireland (UK), United States of America

so the PIAAC target population consists of all adults between age 16 and 65 (inclusive) who reside in the country (usual place of residency is in the country) at the time of data collection. Adults were to be included regardless of citizenship, nationality or language. The normal territorial unit covered by the survey was that of the country as a whole. The sampling frames used by participating countries were of three broad types: population registers (administrative lists of residents maintained at either national or regional level); master samples (lists of dwelling units or primary sampling units maintained at national level for official surveys); or area frames (a frame of geographic clusters formed by combining adjacent geographic areas, respecting their population sizes and taking into consideration travel distances for interviewers). The minimum sample size required for the Survey of Adult Skills depended on two variables: the number of cognitive domains assessed and the number of languages in which the assessment was administered. Assuming the assessment was administered in only one language, the minimum sample size required was 5 000 completed cases if all three domains were assessed and 4 500 if only literacy and numeracy were assessed.

In addition to the conventional measures of occupation and educational qualifications, PIAAC includes detailed questions about the frequency with which respondents perform specific tasks in their jobs. Indeed, PIAAC collected a considerable amount of information on the skills possessed and used by adults in addition to the measures of proficiency in literacy, numeracy and PSTRE. Based on this information, the survey measures the use of a wide range of skills, including both information-processing skills, which are also measured in the direct assessment, and generic skills, for which only self-reported use at work is available.[5] The survey

[5] "Although there is some parallel between the skills included in the direct assessment exercise – literacy, numeracy and problem solving in technology-rich environments – and the use of reading,

generates very many items describing generic activities involved in doing the job. The choice of items is informed by theories of skill and the practices of commercial psychology; but to reduce the multiple items to a smaller and more meaningful set of 'generic skills', statistical techniques[6] are used to generate several generic skill indicators from the responses on these items.

Twelve indicators were created, five of which refer to information-processing skills (reading, writing, numeracy, ICT skills and problem solving); the remaining seven correspond to general skills (task discretion, learning at work, influencing skills, co-operative skills, self-organising skills, gross physical skills and dexterity). For these skills-use variables numerical comparisons between the use of different skills are possible: a value of 0 indicates that the skill is never used; a value of 1 indicates that it is used less than once a month; a value of 2 indicates that it is used less than once a week but at least once a month; a value of 3 indicates that it is used at least once a week but not every day; and a value of 4 indicates that it is used every day.

Following Peri and Sparber (2009) I merge task-specific value (score between 0 and 4) with individual European workers in the 2000 Labor Force Survey, re-scaling each value so that it equals the percentile score in that year. This gives a standardized

numeracy, problem solving and ICT at work (and at home), there are important differences. The skills use variables are derived by aggregating background questions on tasks carried out at work (or at home). For instance, these questions cover both reading and writing at work but two separate indices are created to maintain, to the extent possible, consistency with the direct assessment module which only tests reading skills in the literacy module. Similarly, the use of problem solving and ICT skills at work are not to be confused with the assessment of proficiency in problem solving in technology-rich environments. Finally, it should be kept in mind that even when there is a parallel between skills use and skills proficiency concepts – notably between reading use and literacy proficiency and between numeracy use and proficiency – there is no correspondence between the questions concerning the tasks performed at work (or at home) and those asked in the direct assessment modules. These issues should be kept in mind when comparing skills proficiency to skills use" (OECD Skills Outlook 2013: First Results from the Survey of Adult Skills, OECD Publishing, 2013).

[6]For further information on the statistical techniques: Technical Report of the Survey of Adult Skills (PIAAC), Chapter 17: Scaling PIAAC Cognitive Data.

measure of the relative importance of a given skill among European workers. Then, a task with a score of 0.06 for some skill indicates that only 6 percent of workers in the European country in 2000 were supplying that skill less intensively. I consider a partition of productive tasks into "complex" tasks (cognitive, interactive and organising/problem-solving tasks) and "simple" tasks (manual tasks) and then I construct an index for each group of tasks as the mean of the scores.

Each index is constructed as a mean of the competencies scores, where, for each index, the competencies/variables are given in Table 2.

I have also calculated a synthetic *Simplicity Index* summarizing the intensity of a task in manual skills relative to cognitive-organising-interactive skills. This index is defined as:

$$S_i = ln\left[\frac{MII_i}{CII_i + III_i + OII_i}\right]$$

where i is referred industry , MII_i, III_i, OII_i and CII_i are respectively the Manual Intensity Index, the Interactive Intensity Index, the Organising and Problem Solving Index and the Cognitive Intensity Index. The S_i is standardized between 0 and 1 (the industry with the highest Simplicity Index has score 1 and the industry with the lowest Simplicity Index has score 0).

Figures 5, 6 and 7 plot the share of foreign workers in 2001-2009 relative to total workers (foreign + native) in each sector against, respectively, the Manual Intensity Index, Cognitive Intensity Index, Interactive Intensity Index, Organising-Problem Solving Intensity Index and Simplicity Index. So, each point on the graph represents the immigrant workers'share in a specific sector and the line represents the relation

Table 2: Skill Types and Variables from PIAAC

Type of skill	Sub-type of skill	PIAAC Variables
Manual Skills	Dexterity	Using hands or fingers
	Finger Dexterity	
	Physical Activities	Working physically for long
Cognitive Skills	Writing	Index of use of writing skills
	Reading	Index of use of reading skills
	Mathematics	Index of use of numeracy skills
	Use of PC	Index of use of ICT skills
	Learning Activities	Index of readiness to learn
Organising and Problem Solving Skills	Problem Solving	Complex Problems
	Planning	Planning Own Activities
		Planning Others Activities
		Organizing Own Time
Interactive Skills	Selling	Selling
	Teaching	Teaching People
	Consulting	Advising People
	Persuading	Influencing People
	Communicating	Presentations
	Negotiating	Negotiating with People
	Planning	Planning Others Activities
	Cooperation	Sharing Work-related Info

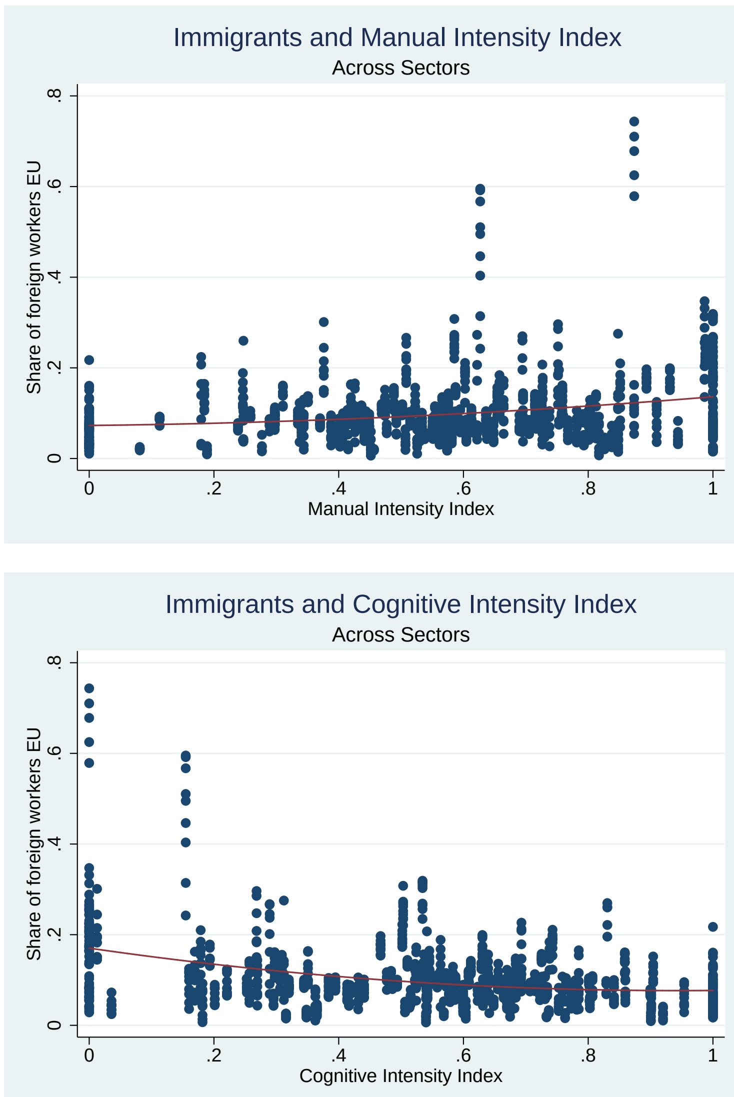
Source: Author's elaboration from PIAAC data.

between foreign labor force and the considered intensity index.

Looking at the graphs, it is clear that that immigrants are proportionately represented in sectors characterized high Manual Intensity Index. The relation between share of foreign workers and the indices becomes negative when the Cognitive Intensity Index, the Interactive Intensity Index, the Organising-Problem Solving Intensity Index are considered. Finally, it's positive the relation between share of foreign workers and the Simplicity Index.[7] These results are in accordance with previous research, in particular Ottaviano, Peri and Wright (2013) reports similar findings using US Data and O*Net Data. In Figures 8, 9 and 10 there are reported the graphs for each country: the positive relation between share of foreign workers and Manual Intensity Index is clearly positive for some countries as Belgium, Germany, Spain, France, Italy and Sweden; it's more less evident in Denmark, Netherlands, Norway and UK. Looking at the other Intensity Index, also in this case, the relation (negative) between share of foreign born workers and the considered index, is stronger for some countries than in others. The final result is that the immigrants are proportionately represented in sectors characterized by high Simplicity Index, but the relation between share of immigrant workers and Simplicity Index is stronger in some countries than in others.

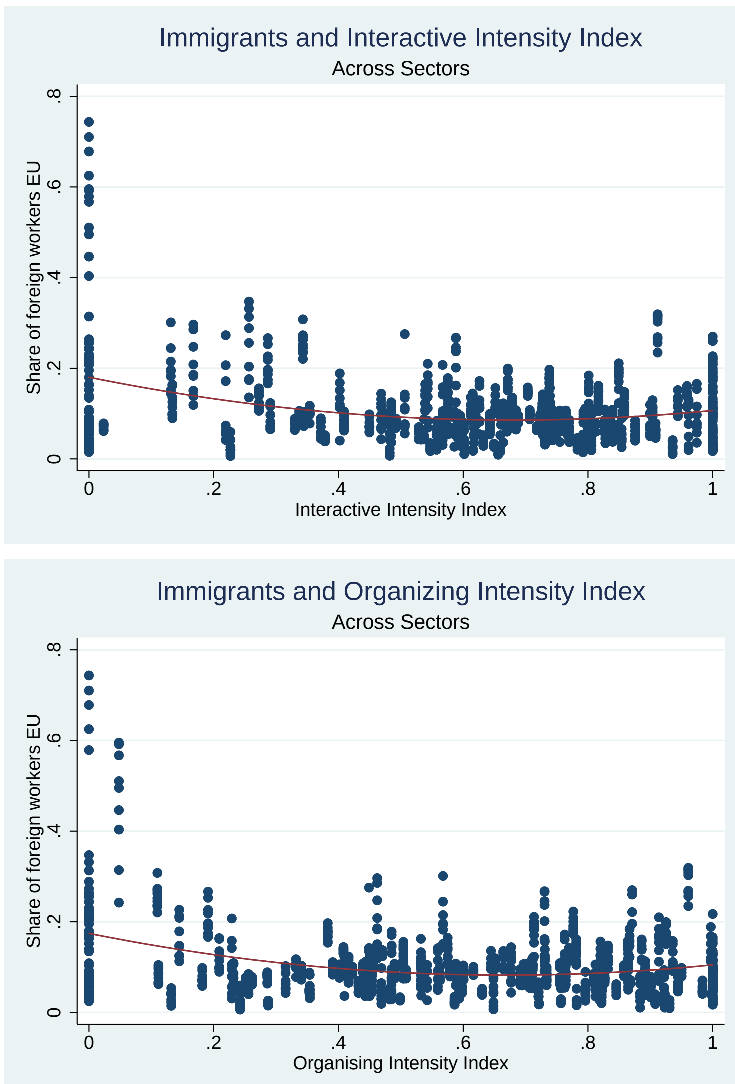
[7] Graphs in figures 6 and 7 are constructed using the total share in all considered countries as share of immigrant workers and the mean of the each index in all countries as Intensity Index.

Figure 5: Immigrant Workers and Manual - Cognitive Intensity Indices, across Sectors



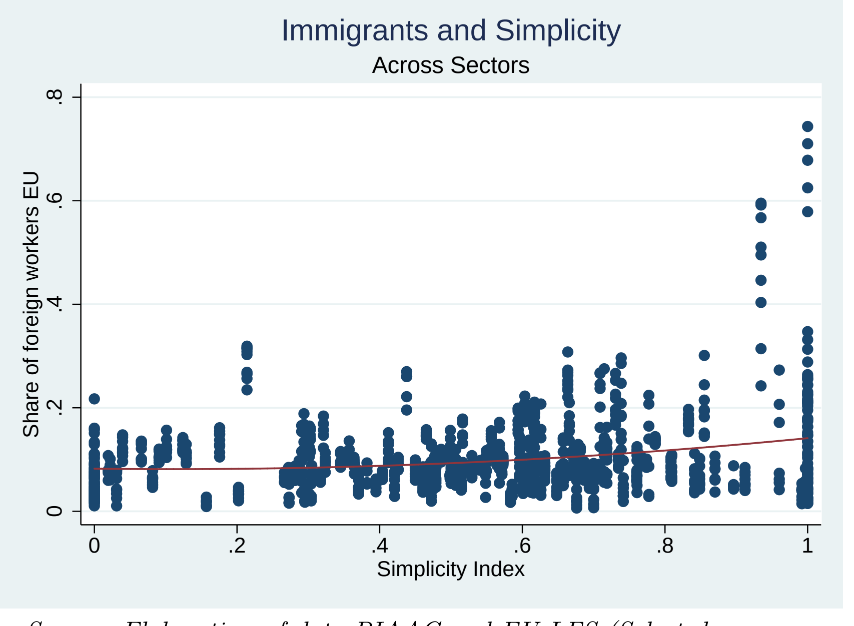
Source: Elaboration of data PIAAC and EU-LFS (Selected Countries)

Figure 6: Immigrant Workers and Interactive - Organising Intensity Indices, across sectors



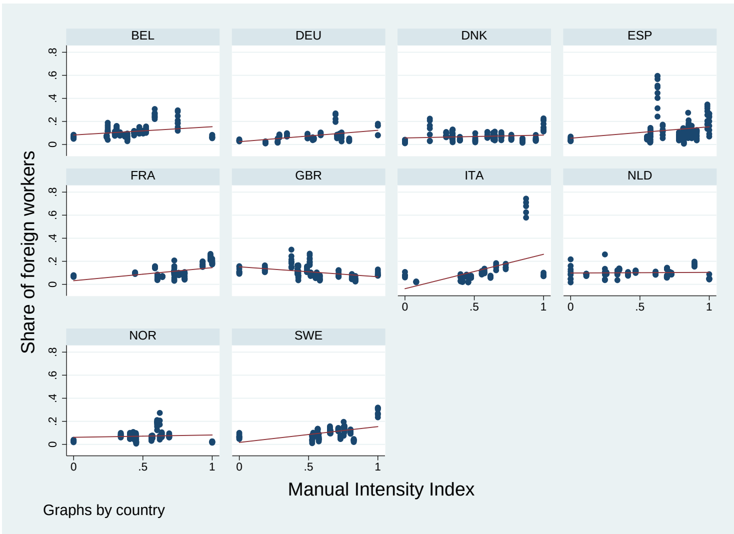
Source: Elaboration of data PIAAC and EU-LFS (Selected Countries)

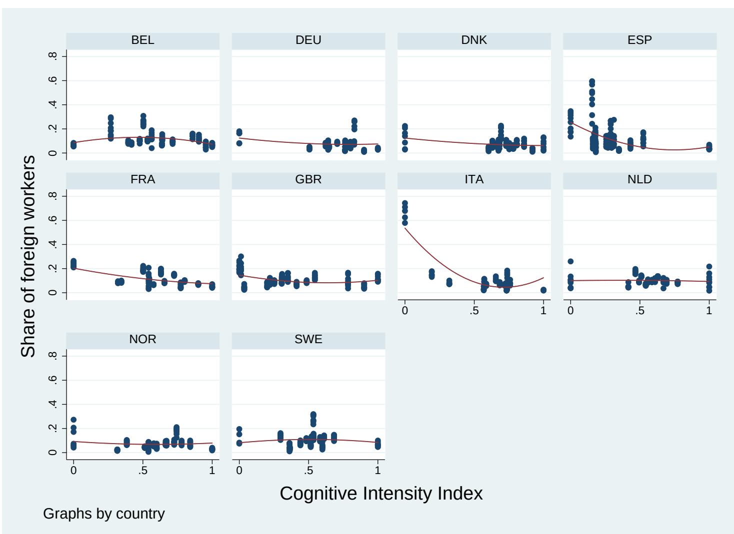
Figure 7: Immigrant Workers and Simplicity Index, across Sectors



Source: Elaboration of data PIAAC and EU-LFS (Selected Countries)

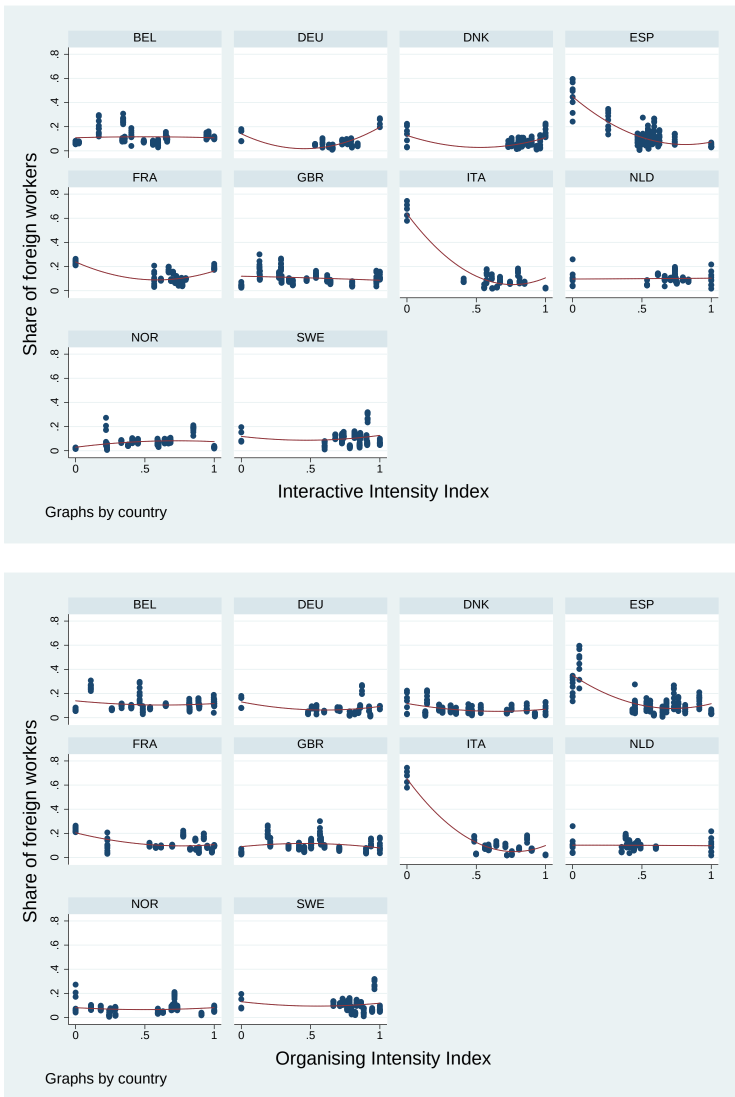
Figure 8: Immigrant Workers and Manual - Cognitive Intensity Indices across Sectors, by country





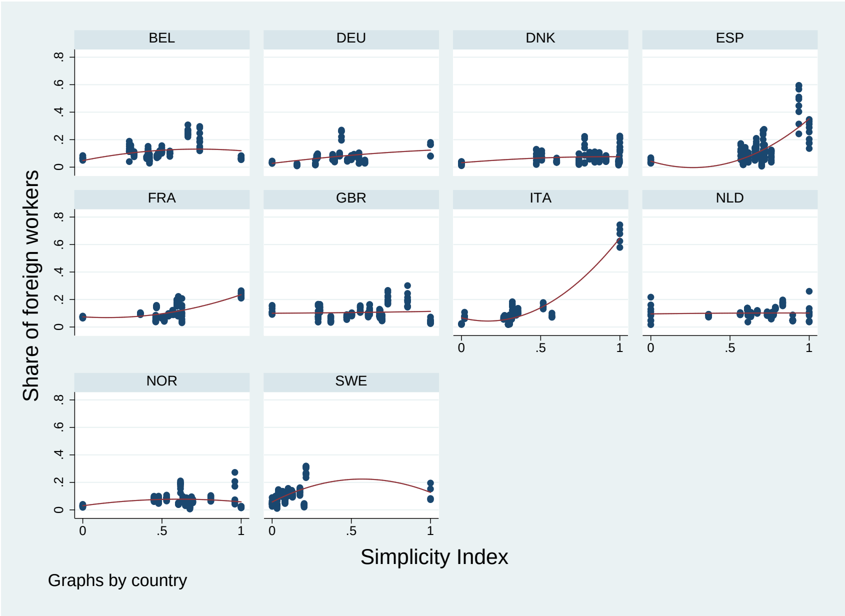
Source: Elaboration of data PIAAC and EU-LFS (Selected Countries)

Figure 9: Immigrant Workers and Interactive - Organising Intensity Indices across sectors, by country



Source: Elaboration of data PIAAC and EU-LFS (Selected Countries)

Figure 10: Immigrant Workers and Simplicity Index across Sectors, by country



Source: Elaboration of data PIAAC and EU-LFS (Selected Countries)

3 Empirical specification

The aim of this work is to analyse the relationship between migration and the production structure of the European economies in 2001-2009. In particular the main objective is to provide evidence of what recalled as Rybczynski effect.

The analysis is conducted at sector/country level, using data on migration from EU-LFS (2001-2009) and data on Value Added from OECD-STAN (2001-2009).

In order to provide empirical evidence for theoretical findings I estimate the relationship between the extent of migrants working in sector s in country c at time t - measured by the ratio of the foreign workers (working in a specific productive sector) to the total workers - and the relative value added of sectors (at level NACE rev. 2, 1 digit).

The sectors of each country's economy are classified according to Simplicity Index (see previous section) by descending order from the *simplest* sector to the *most complex* one. According to the model, an inflow of migrants generates an increase in the weight to the less complex-task intensive sector. A variation in the migrants-to-total workers population ratio is assumed as a reliable indicator for the changes in the composition of relative task supply. The intensity of the effect on the value added of a sector should be positively correlated to the "*Simplicity*" of the sector.

The covariates of interest are the ratio migrants-to-native workers in the sector s in country c at time t, $\frac{MIG}{POP}_{sct}$, and the interaction between the ratio migrants-to-total workers and the index of "*Simplicity*" of the sector s in country c, S_{sc}; the general econometric model is specified as follows:

$$\begin{aligned} \frac{VA_{sct}}{\sum_s VA_{sct}} &= \beta_0 + \beta_1 \left(\frac{MIG}{POP}\right)_{sct} + \beta_2 S_{sc} + \\ + \beta_3 S_{sc} \left(\frac{MIG}{POP}\right)_{sct} &+ country\, and\, time\, effects + \epsilon_{sct} \end{aligned} \tag{1}$$

where the dependent variable of interest $\left(\frac{VA_{sct}}{\sum_s VA_{sct}}\right)$ is the ratio of the value added in sector s to the value added in the economy of the country c at time t. Accordingly, the marginal effect of immigrant workers on the value added can be denoted as:

$$\frac{\partial \frac{VA_{sct}}{\sum_s VA_{sct}}}{\partial \left(\frac{MIG}{POP}\right)_{sct}} = \beta_1 + \beta_3 S_{sc} \tag{2}$$

Two scenarios can occur, one when high levels of one variable have an accelerating effect on the other (β_3 has the same sign as β_1), and the other when high levels of one variable have a dampening effect on the other (β_3 has the opposite sign of β_1). The hypothesis is that measured share of foreign workers may be expected to have stronger effects on value added carrying out tasks that are simpler. Since $S_{sc}\left(\frac{MIG}{POP}\right)_{sct}$ is an interaction between two continuous variables, it is useful centering (i.e. subtracting the mean from each case so the new mean is zero) both variables. This method reduces multicollinearity and it makes the regression more interpretable, β_3 is the effect of the inflow of migrants when both variables are at mean. It can calculate the coefficient β_3 at different levels of variables, respectively at "high" and "low" level, i.e., 1 sd above and 1 sd below the mean.

To establish whether there is a correlation between the inflow of immigrants in a specific industry/country cell and the relative value added of the considered industry and whether the "*Simplicity*" of the sector have a positive impact on the correlation, I estimate the Equation (1) by simple OLS under different specifications.

4 Econometric Strategy

The estimates by OLS can be affected by bias (migrants' location choices are not random; the drivers for these choices, e.g. network effects, economic magnet effects, etc.) and then I proceed to Instrumental Variable method, using instruments borrowed by the recent literature on migration. In particular I elaborate five different instrumental variables: the first four are based on gravity-model and the last one based on the strategy first developed by Altonji and Card (1991).

More specifically, the first instrument (that I name IV1 throughout the work) is developed using a mixed strategy using data from European Labor Force Survey (EU-LFS) and information contained in the dataset by Ortega and Peri (2009, 2011)[8] that includes information on migration flows and stock for 15 destination countries and 120 countries of origin for the period 1980-2006. I added data on migration flows (from International Migration Dataset) until 2009 and data for France (from IMD and CEPII). By gravity based approach I construct the overall growth rates of immigrants by country of origin and then I collapsed them into growth rates by area of origin.[9] More precisely, as in Ortega and Peri (2013) I build my IV1 including only the determinants of bilateral migration flows that are exogenous to specific location decision: includes the following bilateral variables: geographic area and population of two countries, geographic distance, dummies for common bor-

[8] These can be downloaded in Stata format from G. Peri's personal website

[9] The groups of origin of immigrants are: North Africa and Near Middle East, Other Africa, North America and Oceania, Central and South America, South and Eastern Asia, Other Europe, EU 15, New Members of EU.

der, common language and past colonial relationship. I estimate a gravity equation of migration flows from country j to country c by the following specification (the area-of-origin subscript (a) is omitted for simplicity):

$$\begin{aligned} ln\left(\frac{MIG}{POP}\right)_{c,j,t} = \alpha_0 + \alpha_1 ln(POP)_{jt} + \alpha_2 ln(AREA)_j + \alpha_3 ln(POP)_{ct} + \\ + \alpha_4 ln(AREA)_c + \alpha_5 ln(DIST)_{jc} + \alpha_6 BORDER_{jc} + \\ + \alpha_7 LANGUAGE_j + \alpha_8 COLONY_j + \epsilon_{cjt} \end{aligned} \tag{3}$$

where $ln\left(\frac{MIG}{POP}\right)_{jct}$ is the share of migrants from country$j$ in country$c$; $ln(POP)_{jt}$ and $ln(AREA)_j$ are the log of population and area of country j while $ln(POP)_{ct}$ and $ln(AREA)_c$ refer to country c; $ln(DIST)_{jc}$ is the log of distance between country j and country c; $BORDER_{jc}$ is a dummy equal to one if country j and country c share a common border; $LANGUAGE_j$ is a dummy equal to one if in country j at least 9% of the population speaks the same official language of country c; $COLONY_j$ is equal to one if in the country was a former colony of the European country.

Fitted values do not include the contribution of the fixed effects in explaining migration flows because they may not necessarily reflect the decision of migration. According with the former expectations, results show that geographic distance discourages migration flows, which conversely are stimulated by common border, common language and past colonial relationship between home and partner country.

Then the gravity "instrument" is given by the OLS predicted bilateral migrant share from Equation (3): $\left(\frac{MIG}{POP}\right)_{c,j,t} = exp\left(\prod_{c,j,t}\hat{\theta}\right)$ where $\prod_{c,j,t}$ contains the whole set of regressors and $\hat{\theta}$ contains the estimated coefficients in Equation (3). I collapsed the coefficients by the area of origin $\left(\frac{MIG}{POP}\right)^{Gravity}_{c,a,t} = \sum_a exp\left(\prod_{c,j,a,t}\hat{\theta}\right)$. Finally I construct the overall growth rates of each area-of-origin immigrant group.

By data from EU-LFS I estimate the initial distribution (2004)[10] of foreign born workers as share of the total by area of origin, industry and country of destination. The instrument is obtained by multiplying in each country of destination and year the initial distribution by area-of-origin of foreign born workers by the growth rate of migrants. Finally I aggregate across area of origin within each country, industry and year. The same method is used for the second instrument, but with respect to the growth rate of immigrant workers I use data from EU-LFS, available only by area-of-origin. In this case I estimate a gravity equation of migration flows from area-of-origin a to country c by the following specification:

$$\begin{aligned} ln\left(\frac{MIG}{POP}\right)_{c,a,t} &= \alpha_0 + \alpha_1 ln(POP)_{at} + \alpha_2 ln(AREA)_a + \alpha_3 ln(POP)_{ct} + \\ &+ \alpha_4 ln(AREA)_c + \alpha_5 ln(DIST)_{ac} + \alpha_6 BORDER_{ac} + \\ &+ \alpha_7 LANGUAGE_a + \alpha_8 COLONY_a + \epsilon_{cat} \end{aligned} \tag{4}$$

where $ln\left(\frac{MIG}{POP}\right)_{act}$ is the share of migrants from area-of-origin a in country c; $ln(POP)_{at}$ and $ln(AREA)_a$ are the log of population and area of area-of-origin a while $ln(POP)_{ct}$ and $ln(AREA)_c$ refer to country c; $ln(DIST)_{ac}$ is the log of mean distance between area-of-origin a and country c; $BORDER_{ac}$ is a dummy equal to one if at least one country in area-of-origin a and country c share a common border; $LANGUAGE_a$ is a dummy equal to one if in at least on country in area-of-origin a at least 9% of the population speaks the same official language of country c; $COLONY_a$ is equal to one if in at least on country in area-of-origin was a former colony of the

[10]In EU-LFS, information on the area of origin of migrants is available from 2004. For Italy this information is available from 2005

European country. In this case I directly obtain $\left(\frac{MIG}{POP}\right)_{c,a,t} = exp\left(\prod_{c,a,t}\hat{\theta}\right)$.
As the first instrument, I construct the overall growth rates of each area-of-origin immigrant group and the instrument is obtained by multiplying in each country of destination and year the initial distribution (from EU-LFS data) by area-of-origin and industry of foreign born workers by the growth rate of migrants. Finally I aggregate across area of origin within each country, industry and year.
The instrument IV3 is constructed using the same fitted values of IV1, but they are not aggregated into area-of-origin because I calculate the initial distribution of immigrant workers across sectors and countries using data from Database on Immigrants in OECD countries (DIOC). The DIOC, in fact, provides comprehensive and comparative information on a broad range of demographic and labor market characteristics of immigrants living in OECD countries. The database has been compiled in collaboration with OECD national statistical offices. The main sources of data are population censuses and population registers, sometimes supplemented by labor force surveys. In particular, the DIOC includes information on place of birth and sectors of activity. The reference year of the data is the year 2000. Using DIOC data I calculate the initial distribution, corresponding to the year 2000, of immigrant workers by country of origin and sector. The main disadvantage is that it does not cover all considered countries, but only Denmark, Spain, United Kingdom, Italy, Norway and Sweden.
I construct the overall growth rates of each country-of-origin immigrant group and the instrument is obtained by multiplying in each country of destination and year the initial distribution (from DIOC data) by country-of-origin of foreign born workers by the growth rate of migrants. Finally I aggregate across country of origin within each country, industry and year.

In the IV4 I use the same fitted values of IV2 for growth rates of immigrants, but the initial distribution is calculated using data from DIOC.

Method using in IV1-IV4 implies that the variation in immigrant shares across industries and years is only driven by the initial composition of immigrants by area-of-origin and sector of activity (country of origin and sector in IV3) and the variation in inflows in the aggregate area-of-origin (country of origin in IV3) groups over time.

The last instrument, IV5, is based on method first proposed by Altonji and Card (1991) and Card (2001) and it is developed using only information contained in EU-LFS dataset. In this case I calculate immigrant's distribution across countries of destination and industry for the year 2000. I augment the share of migrants so calculated by the aggregate growth rate of the specific immigrant workers group in the European Union relative to the total workers. Then within an industry I obtain the imputed share of foreign-born in total employment.

As a consequence, the stock of immigrants imputed with this method depends on the initial distribution of immigrants across countries and industries, and on the evolution of the total number of foreign born in Europe.

Tables 3 and 4 reports, respectively, the results of the gravity "instrument", given by the OLS, in the two specifications. The first table reports the results using data from IMD (the resulting predicted values are used to construct the growth rate for the IV1 and IV3); the second table reports the results using data from EU-LFS, in which I consider the macro-area of migrants (the resulting predicted values are used to construct the growth rates for IV2 and IV4).

Figures 11-13 show the correlation between the instruments and the observed migrants-to-total ratio and it ensures relevance for the instruments.

Table 3: Gravity-based Instrument, data from IMD

	1
Dep. Var.: $ln(Mig)/(Pop)_{cj}$	b/se
$ln(Pop)_c$	-.336***
	(.018)
$ln(Area)_c$	.098***
	(.019)
$ln(Area)_j$	-.051***
	(.012)
$ln(Pop)_j$	.851***
	(.015)
$ln(Dist)_{cj}$	-1.187***
	(.022)
$Border_{cj}$	-.358**
	(.132)
$Colony_{cj}$	1.292***
	(.094)
$Language_{cj}$	1.448***
	(.092)
R^2	.614
Observations	8211
FE	No

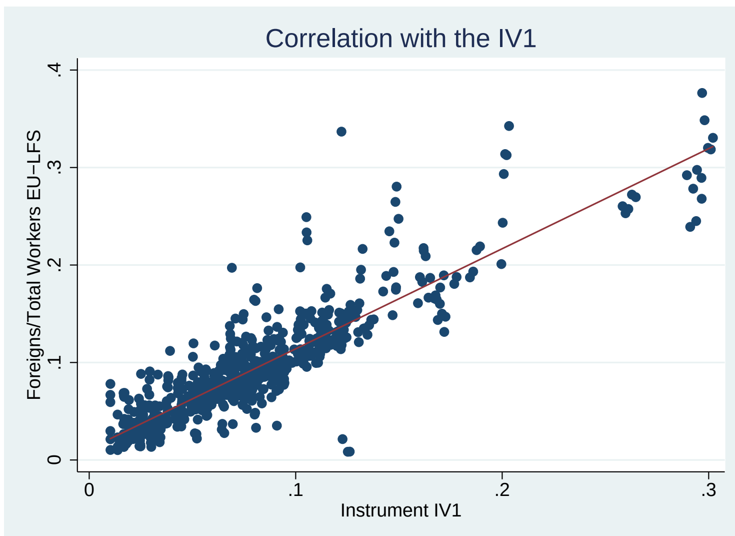
Standard errors in parentheses, *** p¡0.01, ** p¡0.05, * p¡0.1. Dependent variable is the log of the ratio of bilateral migration from Country j to Country c to population in Country c at time t excluding zero values. Data for migration from IMD.

Table 4: Gravity-based Instrument, data from EU-LFS

	1
Dep. Var.: $ln(Mig)/(Pop)_{cj}$	b/se
$ln(Pop)_c$	-.265***
	(.007)
$ln(Area)_c$	.145***
	(.007)
$ln(Area)_a$	.484***
	(.009)
$ln(Pop)_a$	.199***
	(.017)
$ln(Dist)_{ca}$	-1.119***
	(.023)
$Border_{ca}$	.113**
	(.040)
$Colony_{ca}$	.245***
	(.042)
$Language_{ca}$	1.102***
	(.017)
R^2	.530
Observations	10181
FE	No

Standard errors in parentheses, *** p¡0.01, ** p¡0.05, * p¡0.1. Dependent variable is the log of the ratio of bilateral migration from Macro-area a to Country c to population in Country c at time t excluding zero values. Data for migration from EU-LFS.

Figure 11: Relationship between the Share of foreign born to Total Workers and Instruments IV1 and IV2



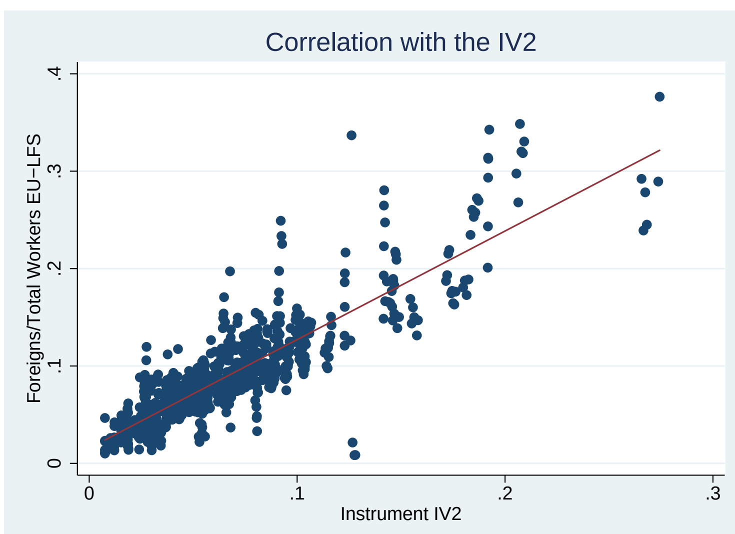


Figure 12: Relationship between the Share of foreign born to Total Workers and Instruments IV3 and IV4

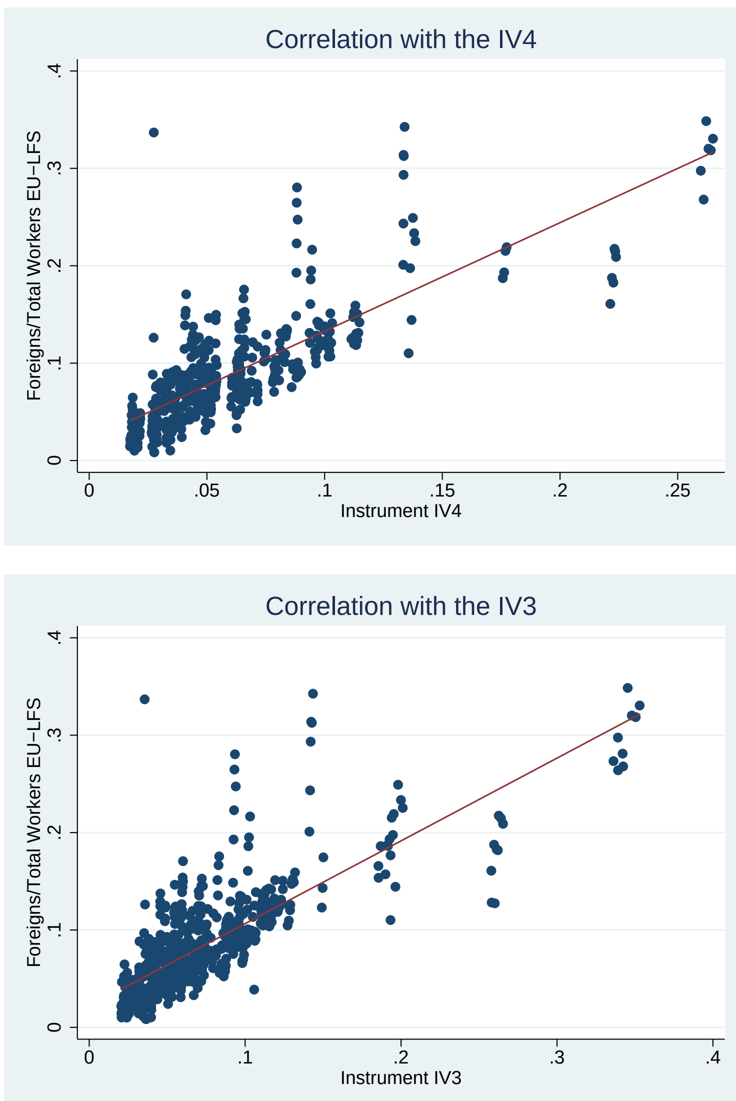
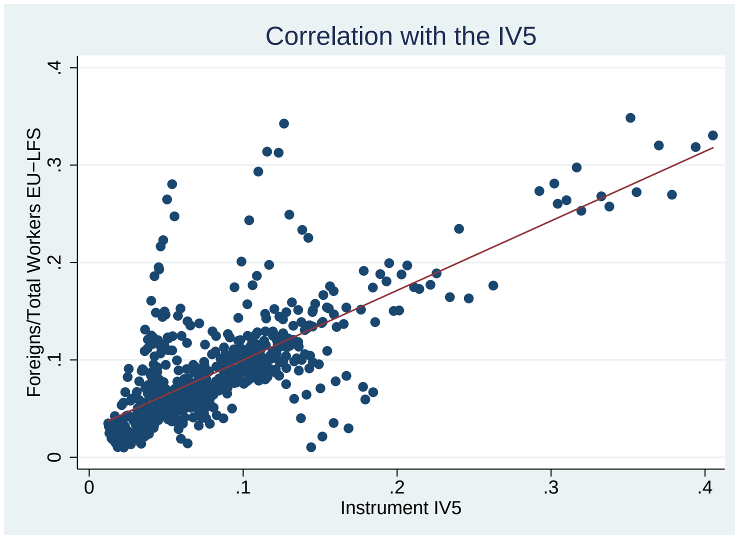


Figure 13: Relationship between the Share of foreign born to Total Workers and its Instrument IV5



5 Estimation Results

In Table 5 I report the results of the baseline regression, equation (1)[11]. The model is estimated by OLS. The first three columns show the specification without time and country effects. More specifically, the first column reports the results when the variables $\left(\frac{MIG}{POP}\right)_{sct}$ and S_{sc} are at their means.The second column refers to the specification in which the variables of interest are at their means plus one standard deviation and the third column reports the results when the variables are at their means menus one standard deviation. The last three columns reports the results when time and country effects are included.

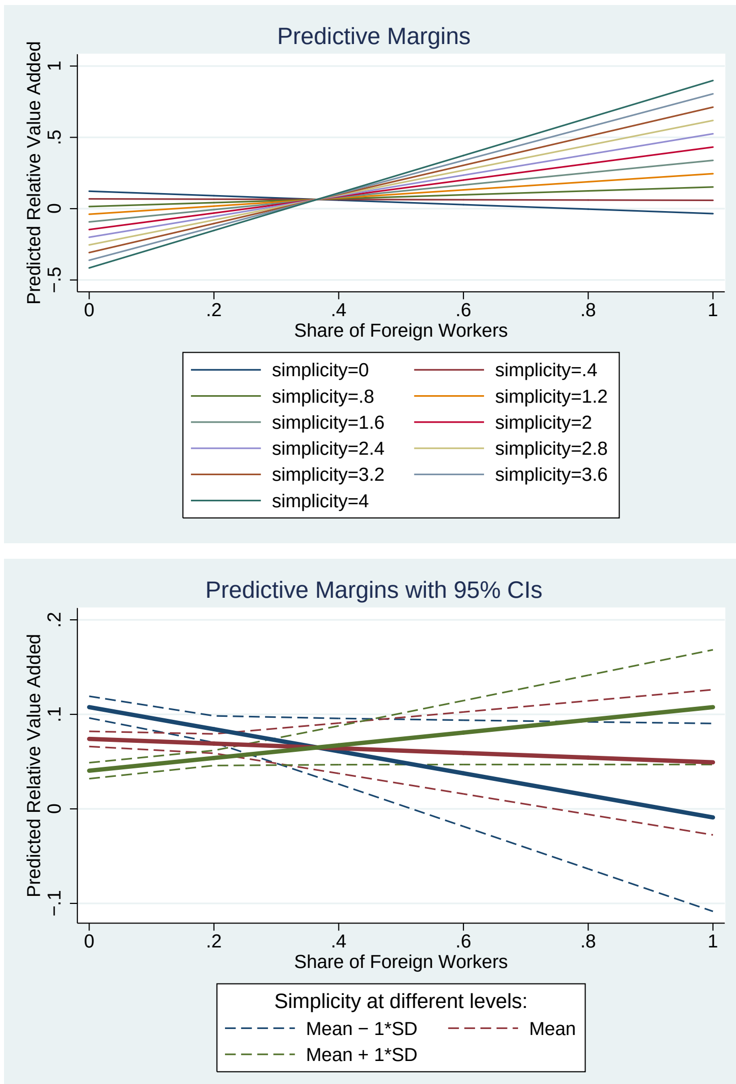
In line with the hypothesis of this work, in all specifications the coefficient β_3 is positive and significant. Remembering that correct interpretation of the effect of

[11]Estimation results do not include the "Activities of household as employers" sector (it is important given that the employment share of foreign-born is particularly relevant) because the total weight in GDP is lower than 0.1 percent.

the inflow of migrant workers on value added is given by equation (2), the positive coefficient β_3 means that it accelerates effect of the positive effect of β_1 , whereas β_3 dampens the negative effect of β_1. In all specifications (without and with country and time effects) the coefficients β_1 and β_3 are both positive when I consider the variables $\left(\frac{MIG}{POP}\right)_{sct}$ and S_{sc} at their mean plus one standard deviation, representing the interaction between *high Simplicity* and *high share of foreign born workers.*
Figure 14 illustrates how the marginal effect of share of immigrant workers on relative value added changes over the range of the industry's simplicity. The graphs show that, as simplicity increases, the effect of the increase of immigrant workers on relative value added gets positive.

The results in Tables 6-10 are obtained by IV-2SLS method with the relevant instruments IV1-IV5 discussed in the previous section. In all regressions, the tests for underidentification (Kleibergen-Paap LM test: significant at 1%) and weak identification (Kleibergen-Paap Wald test: F-statistic >> 10) are rejected. This confirms that the instruments are sufficiently correlated with variables of interest.
As in table 5, the first three columns refer to the specification without country and time effects, whereas the last three columns are with effects. Also in this case the coefficient β_3 is positive and significant.
The same results are reported in table 7. Looking at the tables 8 and 9, also in this case the results of OLS specification are confirmed (note that in these last two specifications the sample of countries is reduced).
Only considering the IV5 instrument (Table 10), the results are not confirmed, however the coefficients are not significant.
Overall, I interpret the results as follows. Considering immigration as an increase

Figure 14: Marginal effect of share of foreign workers on relative value added for different level of Simplicity



in supply in *simple* tasks respect to *complex* ones, it gives rise to adjustment in the production mix with a positive impact on value added of the productive sectors that use more intensively *simple* tasks. In other words, an increase in immigration rates raises the relative weight of the simple-task intensive sector.

6 Estimation results: reduced sample

Could the effect on value added be affected by the different historical trends of immigration in the destination countries?

As mentioned in section 2 and confirmed in Dustmann and Frattini (2011)[12], immigrants, in general, are employed in simplest sectors (or occupations). This occupational "segregation" is more pronounced in Italy and Spain than in other considered countries. A possible explanation of this phenomenon can be the recent, rapid and intense inflow of immigrants.

Considering only Spain and Italy, Tables 11 -16 report the results of the regressions. As in Tables 5-10 the first three columns refer to specification without country and time effects. The results confirmed the positive sign of β_3 that is greater than in full sample, but considering only Spain and Italy, even IV5 confirmed a positive and significant effect of inflow of migrants in the simplest sectors.

[12] It provides comparative evidence on the occupational gaps for their sample of 15 EU countries. To measure the degree of segregation of immigrants into particular occupations, the authors construct an index of skills, the socalled ISEI scale, and estimate the differences in the distribution of immigrants relative to natives along this scale

Table 5: Regression OLS

	1	2	3	4	5	6
Dep. Var.: $VA_s/\sum_s VA_s$	b/se	b/se	b/se	b/se	b/se	b/se
Mig/Tot at Mean	.011			-.006		
	(.040)			(.041)		
S * Mig/Tot at Mean	.357***			.368***		
	(.067)			(.068)		
S at Mean	-.090***			-.100***		
	(.008)			(.009)		
Mig/Tot at Mean+1sd		.161***			.149***	
		(.031)			(.033)	
S * Mig/Tot at Mean+1sd		.357***			.368***	
		(.067)			(.068)	
S at Mean+1sd		-.067***			-.075***	
		(.009)			(.009)	
Mig/Tot at Mean-1sd			-.138*			-.160**
			(.062)			(.062)
S * Mig/Tot at Mean-1sd			.357***			.368***
			(.067)			(.068)
S at Mean-1sd			-.114***			-.124***
			(.010)			(.011)
Country and Time Effects	No	No	No	Yes	Yes	Yes
Adj. R^2	.119	.119	.119	.122	.122	.122
Observations	1098	1098	1098	1098	1098	1098

Standard errors (in parenthesis) are robust to heteroscedasticity and arbitrary autocorrelation *** p<0.01,** p<0.05, * p<0.1.
Considered countries: Belgium, Denmark, Spain, UK, Germany, Netherlands, Italy, France, Norway and Sweden.
Years: 2001-2009

Table 6: Regression IV1

	1	2	3	4	5	6
Dep. Var.: $VA_s/\sum_s VA_s$	b/se	b/se	b/se	b/se	b/se	b/se
Mig/Tot at Mean	.068			.069		
	(.062)			(.063)		
S * Mig/Tot at Mean	.249*			.264*		
	(.106)			(.107)		
S at Mean	-.101***			-.112***		
	(.012)			(.014)		
Mig/Tot at Mean+1sd		.173***			.180***	
		(.050)			(.054)	
S * Mig/Tot at Mean+1sd		.249*			.264*	
		(.106)			(.107)	
S at Mean+1sd		-.084***			-.095***	
		(.012)			(.014)	
Mig/Tot at Mean-1sd			-.036			-.042
			(.096)			(.096)
S * Mig/Tot at Mean-1sd			.249*			.264*
			(.106)			(.107)
S at Mean-1sd			-.117***			-.130***
			(.015)			(.017)
Country and Time Effects	No	No	No	Yes	Yes	Yes
Adj. R^2	.121	.121	.121	.125	.125	.125
Observations	643	643	643	643	643	643
Kleibergen-Paap Wald test: F	522	522	522	384	384	384

Standard errors (in parenthesis) are robust to heteroscedasticity and arbitrary autocorrelation
*** p<0.01,** p<0.05, * p<0.1.
Considered countries: Belgium, Denmark, Spain, UK, Germany, Netherlands, Italy, France, Norway and Sweden.
Years: 2005-2009

Table 7: Regression IV2

	1	2	3	4	5	6
Dep. Var.: $VA_s/\sum_s VA_s$	b/se	b/se	b/se	b/se	b/se	b/se
Mig/Tot at Mean	.068			.034		
	(.065)			(.065)		
S * Mig/Tot at Mean	.261*			.299**		
	(.106)			(.104)		
S at Mean	-.102***			-.112***		
	(.012)			(.014)		
Mig/Tot at Mean+1sd		.178***			.160**	
		(.050)			(.053)	
S * Mig/Tot at Mean+1sd		.261*			.299**	
		(.106)			(.104)	
S at Mean+1sd		-.085***			-.093***	
		(.012)			(.014)	
Mig/Tot at Mean-1sd			-.041			-.092
			(.100)			(.097)
S * Mig/Tot at Mean-1sd			.261*			.299**
			(.106)			(.104)
S at Mean-1sd			-.119***			-.132***
			(.015)			(.017)
Country and Time Effects	No	No	No	Yes	Yes	Yes
Adj. R^2	.123	.123	.123	.130	.130	.130
Observations	638	638	638	638	638	638
Kleibergen-Paap Wald test: F	348	348	348	251	251	251

Standard errors (in parenthesis) are robust to heteroscedasticity and arbitrary autocorrelation
*** p<0.01,** p<0.05, * p<0.1.
Considered countries: Belgium, Denmark, Spain, UK, Germany, Netherlands, Italy, France, Norway and Sweden.
Years: 2005-2009

Table 8: Regression IV3

	1	2	3	4	5	6
Dep. Var.: $VA_s/\sum_s VA_s$	b/se	b/se	b/se	b/se	b/se	b/se
Mig/Tot at Mean	-.022			-.036		
	(.058)			(.052)		
S * Mig/Tot at Mean	.410***			.464***		
	(.110)			(.109)		
S at Mean	-.093***			-.109***		
	(.010)			(.011)		
Mig/Tot at Mean+1sd		.150**			.159**	
		(.051)			(.052)	
S * Mig/Tot at Mean+1sd		.410***			.464***	
		(.110)			(.109)	
S at Mean+1sd		-.066***			-.079***	
		(.012)			(.013)	
Mig/Tot at Mean-1sd			-.194*			-.230**
			(.092)			(.083)
S * Mig/Tot at Mean-1sd			.410***			.464***
			(.110)			(.109)
S at Mean-1sd			-.120***			-.139***
			(.013)			(.014)
Country and Time Effects	No	No	No	Yes	Yes	Yes
Adj. R^2	.125	.125	.125	.137	.137	.137
Observations	672	672	672	672	672	672
Kleibergen-Paap Wald test: F	511	511	511	37	37	37

Standard errors (in parenthesis) are robust to heteroscedasticity and arbitrary autocorrelation
*** p<0.01,** p<0.05, * p<0.1.
Considered countries: Denmark, Spain, United Kingdom, Italy, Norway and Sweden.
Years: 2001-2009

Table 9: Regression IV4

	1	2	3	4	5	6
Dep. Var.: $VA_s/\sum_s VA_s$	b/se	b/se	b/se	b/se	b/se	b/se
Mig/Tot at Mean	.036			-.012		
	(.086)			(.069)		
S * Mig/Tot at Mean	.333**			.413***		
	(.123)			(.105)		
S at Mean	-.108***			-.127***		
	(.015)			(.016)		
Mig/Tot at Mean+1sd		.176**			.161**	
		(.063)			(.059)	
S * Mig/Tot at Mean+1sd		.333**			.413***	
		(.123)			(.105)	
S at Mean+1sd		-.086***			-.100***	
		(.016)			(.016)	
Mig/Tot at Mean-1sd			-.104			-.186
			(.128)			(.100)
S * Mig/Tot at Mean-1sd			.333**			.413***
			(.123)			(.105)
S at Mean-1sd			-.130***			-.154***
			(.018)			(.019)
Country and Time Effects	No	No	No	Yes	Yes	Yes
Adj. R^2	.130	.130	.130	.152	.152	.152
Observations	395	395	395	395	395	395
Kleibergen-Paap Wald test: F	232	232	232	200	200	200

Standard errors (in parenthesis) are robust to heteroscedasticity and arbitrary autocorrelation
*** p<0.01,** p<0.05, * p<0.1.
Considered countries: Denmark, Spain, United Kingdom, Italy, Norway and Sweden.
Years: 2005-2009

Table 10: Regression IV5

	1	2	3	4	5	6
Dep. Var.: $VA_s/\sum_s VA_s$	b/se	b/se	b/se	b/se	b/se	b/se
Mig/Tot at Mean	-.095*			-.051		
	(.043)			(.046)		
S * Mig/Tot at Mean	-.037			-.100		
	(.160)			(.167)		
S at Mean	-.080***			-.092***		
	(.008)			(.009)		
Mig/Tot at Mean+1sd		-.111			-.093	
		(.059)			(.062)	
S * Mig/Tot at Mean+1sd		-.037			-.100	
		(.160)			(.167)	
S at Mean+1sd		-.083***			-.098***	
		(.016)			(.017)	
Mig/Tot at Mean-1sd			-.080			-.009
			(.096)			(.102)
S * Mig/Tot at Mean-1sd			-.037			-.100
			(.160)			(.167)
S at Mean-1sd			-.078***			-.085***
			(.011)			(.012)
Country and Time Effects	No	No	No	Yes	Yes	Yes
Adj. R^2	.095	.095	.095	.098	.098	.098
Observations	1083	1083	1083	1083	1083	1083
Kleibergen-Paap Wald test: F	30	30	30	34	34	34

Standard errors (in parenthesis) are robust to heteroscedasticity and arbitrary autocorrelation
*** $p<0.01$,** $p<0.05$, * $p<0.1$.
Considered countries: Belgium, Denmark, Spain, UK, Germany, Netherlands, Italy, France, Norway and Sweden.
Years:2001-2009

Table 11: Regression OLS: Reduced Sample

	1	2	3	4	5	6
Dep. Var.: $VA_s/\sum_s VA_s$	b/se	b/se	b/se	b/se	b/se	b/se
Mig/Tot at Mean	.046			.076		
	(.069)			(.074)		
S * Mig/Tot at Mean	.434***			.464***		
	(.122)			(.120)		
S at Mean	-.076***			-.087***		
	(.020)			(.019)		
Mig/Tot at Mean+1sd		.329**			.378***	
		(.103)			(.105)	
S * Mig/Tot at Mean+1sd		.434***			.464***	
		(.122)			(.120)	
S at Mean+1sd		-.029*			-.036*	
		(.014)			(.014)	
Mig/Tot at Mean-1sd			-.236*			-.226*
			(.107)			(.111)
S * Mig/Tot at Mean-1sd			.434***			.464***
			(.122)			(.120)
S at Mean-1sd			-.124***			-.138***
			(.031)			(.030)
Country and Time Effects	No	No	No	Yes	Yes	Yes
Adj. R^2	.103	.103	.103	.072	.072	.072
Observations	196	196	196	196	196	196

Standard errors (in parenthesis) are robust to heteroscedasticity and arbitrary autocorrelation *** p<0.01,** p<0.05, * p<0.1.
Considered countries: Spain and Italy.
Years: 2001-2009

Table 12: Regression IV1: Reduced Sample

	1	2	3	4	5	6
Dep. Var.: $VA_s/\sum_s VA_s$	b/se	b/se	b/se	b/se	b/se	b/se
Mig/Tot at Mean	.235**			.219**		
	(.079)			(.081)		
S * Mig/Tot at Mean	.565***			.586***		
	(.159)			(.152)		
S at Mean	-.139***			-.144***		
	(.029)			(.027)		
Mig/Tot at Mean+1sd		.603***			.600***	
		(.131)			(.131)	
S * Mig/Tot at Mean+1sd		.565***			.586***	
		(.159)			(.152)	
S at Mean+1sd		-.077***			-.079***	
		(.017)			(.016)	
Mig/Tot at Mean-1sd			-.133			-.163
			(.129)			(.125)
S * Mig/Tot at Mean-1sd			.565***			.586***
			(.159)			(.152)
S at Mean-1sd			-.201***			-.208***
			(.045)			(.042)
Country and Time Effects	No	No	No	Yes	Yes	Yes
Adj. R^2	.142	.142	.142	.121	.121	.121
Observations	140	140	140	140	140	140
Kleibergen-Paap Wald test: F	149	149	149	184	184	184

Standard errors (in parenthesis) are robust to heteroscedasticity and arbitrary autocorrelation
*** p<0.01,** p<0.05, * p<0.1.
Considered countries: Spain and Italy.
Years: 2005-2009

Table 13: Regression IV2: Reduced Sample

	1	2	3	4	5	6
Dep. Var.: $VA_s/\sum_s VA_s$	b/se	b/se	b/se	b/se	b/se	b/se
Mig/Tot at Mean	.263***			.217**		
	(.077)			(.083)		
S * Mig/Tot at Mean	.570***			.592***		
	(.154)			(.145)		
S at Mean	-.144***			-.144***		
	(.028)			(.028)		
Mig/Tot at Mean+1sd		.634***			.603***	
		(.127)			(.133)	
S * Mig/Tot at Mean+1sd		.570***			.592***	
		(.154)			(.145)	
S at Mean+1sd		-.081***			-.079***	
		(.017)			(.017)	
Mig/Tot at Mean-1sd			-.108			-.169
			(.126)			(.118)
S * Mig/Tot at Mean-1sd			.570***			.592***
			(.154)			(.145)
S at Mean-1sd			-.206***			-.209***
			(.043)			(.042)
Country and Time Effects	No	No	No	Yes	Yes	Yes
Adj. R^2	.138	.138	.138	.121	.121	.121
Observations	140	140	140	140	140	140
Kleibergen-Paap Wald test: F	169	169	169	163	163	163

Standard errors (in parenthesis) are robust to heteroscedasticity and arbitrary autocorrelation
*** p<0.01,** p<0.05, * p<0.1.
Considered countries: Spain and Italy.
Years: 2005-2009

Table 14: Regression IV3: Reduced Sample

	1	2	3	4	5	6
Dep. Var.: $VA_s/\sum_s VA_s$	b/se	b/se	b/se	b/se	b/se	b/se
Mig/Tot at Mean	.180			.117		
	(.114)			(.113)		
S * Mig/Tot at Mean	.729***			.775***		
	(.197)			(.179)		
S at Mean	-.114***			-.116***		
	(.026)			(.024)		
Mig/Tot at Mean+1sd		.655***			.621***	
		(.193)			(.186)	
S * Mig/Tot at Mean+1sd		.729***			.775***	
		(.197)			(.179)	
S at Mean+1sd		-.034			-.031	
		(.021)			(.020)	
Mig/Tot at Mean-1sd			-.295*			-.388**
			(.147)			(.135)
S * Mig/Tot at Mean-1sd			.729***			.775***
			(.197)			(.179)
S at Mean-1sd			-.194***			-.201***
			(.043)			(.039)
Country and Time Effects	No	No	No	Yes	Yes	Yes
Adj. R^2	.057	.057	.057	.038	.038	.038
Observations	196	196	196	196	196	196
Kleibergen-Paap Wald test: F	35	35	35	46	46	46

Standard errors (in parenthesis) are robust to heteroscedasticity and arbitrary autocorrelation *** p<0.01,** p<0.05, * p<0.1.
Considered countries: Spain and Italy.
Years: 2001-2009

Table 15: Regression IV4: Reduced Sample

	1	2	3	4	5	6
Dep. Var.: $VA_s/\sum_s VA_s$	b/se	b/se	b/se	b/se	b/se	b/se
Mig/Tot at Mean	.144			.055		
	(.102)			(.113)		
S * Mig/Tot at Mean	.566***			.602***		
	(.143)			(.130)		
S at Mean	-.125***			-.123***		
	(.029)			(.028)		
Mig/Tot at Mean+1sd		.512***			.447**	
		(.139)			(.149)	
S * Mig/Tot at Mean+1sd		.566***			.602***	
		(.143)			(.130)	
S at Mean+1sd		-.063**			-.057**	
		(.020)			(.020)	
Mig/Tot at Mean-1sd			-.225			-.337*
			(.137)			(.133)
S * Mig/Tot at Mean-1sd			.566***			.602***
			(.143)			(.130)
S at Mean-1sd			-.187***			-.189***
			(.042)			(.040)
Country and Time Effects	No	No	No	Yes	Yes	Yes
Adj. R^2	.147	.147	.147	.123	.123	.123
Observations	140	140	140	140	140	140
Kleibergen-Paap Wald test: F	92	92	92	79	79	79

Standard errors (in parenthesis) are robust to heteroscedasticity and arbitrary autocorrelation *** p<0.01,** p<0.05, * p<0.1.
Considered countries: Spain and Italy.
Years: 2005-2009

Table 16: Regression IV5: Reduced Sample

	1	2	3	4	5	6
Dep. Var.: $VA_s/\sum_s VA_s$	b/se	b/se	b/se	b/se	b/se	b/se
Mig/Tot at Mean	-.210			-.040		
	(.134)			(.133)		
S * Mig/Tot at Mean	.537***			.560***		
	(.152)			(.154)		
S at Mean	-.054*			-.081***		
	(.025)			(.023)		
Mig/Tot at Mean+1sd		.140			.325*	
		(.169)			(.162)	
S * Mig/Tot at Mean+1sd		.537***			.560***	
		(.152)			(.154)	
S at Mean+1sd		.005			-.019	
		(.018)			(.019)	
Mig/Tot at Mean-1sd			-.560***			-.405*
			(.165)			(.172)
S * Mig/Tot at Mean-1sd			.537***			.560***
			(.152)			(.154)
S at Mean-1sd			-.113**			-.143***
			(.039)			(.036)
Country and Time Effects	No	No	No	Yes	Yes	Yes
Adj. R^2	.049	.049	.049	.061	.061	.061
Observations	196	196	196	196	196	196
Kleibergen-Paap Wald test: F	56	56	56	98	98	98

Standard errors (in parenthesis) are robust to heteroscedasticity and arbitrary autocorrelation *** p<0.01,** p<0.05, * p<0.1.
Considered countries: Spain and Italy.
Years:2001-2009

7 Concluding Remarks

In the last ten years Europe has experienced an unprecedented increase in its immigrant population, in particular in some countries as Italy and Spain. Starting from this evidence, the purpose of this work is to evaluate, through the task approach, the impact of the inflow of migrants on the labor market of the host countries, in particular on the production structure in the selection of European countries. The hypothesis is that the inflow of migrants represents a shock of the supply of manual and physical tasks and this increase is absorbed in the production sectors characterized by a *low* task complexity. The task complexity at industry level is estimated using a recent dataset PIAAC (Programme for the International Assessment od Adult Competencies, OECD).

The effect of immigrants on the production is evaluated in term of value added of the industry, so the idea is simple: an inflow of migrants gives an increase in *simple* tasks and this has a positive effect on the value added of the sectors (relative to all other sectors) in which the foreign born workers are employed.

This intuition is confirmed by the empirical analysis conducted on OECD's Structural Analysis (STAN) Database and European Labor Force Survey data (2001-2009). This result is robust to the use of five sets of reasonable instrumental variables, constructed borrowing by recent literature on migration.

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Table A1: Activity Sectors NACE rev. 1.1 (1 digit)

Agriculture, hunting and forestry	A
Fishing	B
Mining and quarrying	C
Manufacturing	D
Electricity, gas and water supply	E
Construction	F
Wholesale and retail trade; repair of motor vehicles motorcycles and personal and household goods	G
Hotels and restaurants	H
Transport, storage and communication	I
Financial intermediation	J
Real estate, renting and business activities	K
Public administration and defence; compulsory social security	L
Education	M
Health and social work	N
Other community, social and personal service activities	O
Activities of households	P
Extra-territorial organisations and bodies	Q

Table A2: Activity Sectors NACE rev. 2 (1 digit)

Agriculture, forestry and fishing	A
Mining and quarrying	B
Manufacturing	C
Electricity, gas, steam and air conditioning supply	D
Water supply; sewerage, waste management and remediation activities	E
Construction	F
Wholesale and retail trade; repair of motor vehicles and motorcycles	G
Transportation and storage	H
Accommodation and food service activities	I
Information and communication	J
Financial and insurance activities	K
Real estate activities	L
Professional, scientific and technical activities	M
Administrative and support service activities	N
Public administration and defence; compulsory social security	O
Education	P
Human health and social work activities	Q
Arts, entertainment and recreation	R
Other service activities	S
Activities of households as employers	T