

# The Impact of Immigration on Occupational Specialisation among Natives in Spain: Does the Business Cycle Matter?

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**Abstract:** We test whether the impact of immigration on native workers differs depending on the business cycle. We divide the Spanish Labour Force Survey (2001-2012) into two periods: 2001-2007, when Spain was in a clear expansionary period, and 2008-2012, a period of deep economic recession. For the expansionary years we find a sizable relocation of native workers to occupations with more interactive rather than manual content as a response to immigration and a null impact on native employment levels. Nor do we find any negative impact of immigration on the employment levels of earlier immigrants. However, the pattern changes completely in the recession period of 2008-2012. There is no evidence of any relocation of natives to different occupations as a response to an immigration shock. But although we find no impact of immigration on the employment levels of natives, we do find a sizable negative impact on the employment levels of earlier immigrants. This means that new immigrants in recession years displace earlier immigrants, as they are likely to be close substitutes in terms of jobs.

**Keywords:** Immigration, Task specialisation, Gender segregation, Occupational mobility, Business Cycle

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## Introduction

The impact of immigration on the host country's labour market is a topic of major concern for many immigrant-receiving nations. There is a large and growing body of literature on the consequences of migration on the employment and wages of native workers in the United States (see Borjas (1994, 1995, 1999, 2003, 2005), Borjas and Katz (2007), Card (1990, 2001, 2005), Card and Di Nardo (2000), Card and Lewis (2007), Lewis (2003), Ottaviano and Peri (2005, 2006), among others). In general, this literature finds that immigration appears to have small wage effects but does not affect the employment rate of natives.

As noted by Ottaviano and Peri (2006), this is not surprising given that the effect of immigration depends on the degree of substitution between native and immigrant workers *within* educational groups. If native and immigrant workers of similar educational attainment levels possess skills that lead them to specialise in different occupations, it is reasonable to find a null to small impact of immigration on the employment and wages of natives. After all, immigrants and natives are not competing for the same jobs. In this vein, Peri and Sparber (2009) and Amuedo and De la Rica (2011) have recently shown, for the United States and Spain respectively, that less-educated natives adjust to an increase in less-educated immigrant workers by changing their task specialisation. In particular, less-educated natives appear to shift to occupations with a lower manual, as opposed to interactive, task content.

However, this empirical evidence refers to the years prior to 2008, i.e. a clear expansionary period. Given that most developed economies have entered a deep economic recession since 2008, it is worth considering whether the impact of immigration on natives found in the previous period has persisted in more recent years.

Peri (2010) studies the impact of immigrants on the US economy during recession and economic expansion. He finds that the short-run effect of immigrants depends on the state of economy. In an expansionary period immigration creates jobs and natives are not displaced from the labour market. However during a recession the economy does not absorb immigration so quickly, and there seems to be a small

negative impact on native unemployment in the short run (but not in the long run). It is not surprising that there is a change in the way in which the labour market reacts to immigration with respect to the state of the economy.

Our study extends the previous paper by Amuedo and De la Rica (2011) (hereafter AR) to account for the impact of immigration in Spain in the recent recession years of 2008-2012. A comparison between the impact of immigration in Spain in this period and the previous one is pertinent because the phenomenon of immigration in Spain very quickly took on huge proportions from 2000 to 2008: immigrants rose from 4 to 13 percent of the population, giving Spain one of the highest immigration rates of any country in the world. In those years immigrants found jobs in low-skilled occupations – essentially construction, hotels and restaurants, agriculture and household services. However, since 2008 Spain has been going through a very deep recession, with unemployment rocketing from 10% in 2008 to 25% by the end of 2012, leaving a great many immigrants and natives without jobs.

These economic changes provide a unique opportunity to test whether the displacement effect found in an expansionary period in AR – with natives moving from occupations with more manual to less manual and more interactive content as a result of an increase in immigration – persists in the current recession period. Moreover, our empirical approach extends the work of AR by using a more precise definition of "tasks" for both the expansionary and recession periods. In particular, we use a 3 digit task classification instead of a 2 digit one, which should define occupations in a much more accurate way in terms of required tasks.

Given that jobs are scarcer in a recession than in an expansionary period, the labour market cannot be expected to absorb the increase in immigration as quickly as in expansionary periods. As a result the occupational mobility exhibited by natives in the former period is likely to be smaller or even to disappear. In such circumstances, an increase in immigration may entail negative employment effects not only for natives, but also for earlier immigrants, as new and earlier immigrants may be close substitutes in terms of the labour force. We seek to provide evidence here of all these possible economic effects.

The rest of the paper is organised as follows: Section 2 briefly sketches out the the theoretical framework used later for the empirical analysis. Section 3 describes the datasets used and discusses some changes in the Spanish labour market between the expansionary and recession periods. Section 4 presents the task variables used to measure the manual and interactive task components of jobs. Section 5 explains the methodology. The results of the empirical analysis are shown in Section 6. Conclusions are presented in Section 7.

## 2. The Theoretical Framework

The paper is based on a simple general equilibrium model developed by Peri and Sparber (2009) to illustrate the effects of immigration on specialisation and wages. In their model immigrants have a comparative advantage in performing manual<sup>1</sup>, as opposed to interactive<sup>2</sup>, tasks owing to their limited language proficiency and their frequent lack of host-country-specific human capital skills. The theoretical model assumes a final tradable consumption good  $Y$  that is produced using two non-tradable intermediate services  $Y_H$  and  $Y_L$ .  $Y_H$  is the supply of highly-educated workers and  $Y_L$  is that of less-educated workers. The model is developed for less-educated workers – it is implicitly assumed that highly-educated natives and immigrants are perfect substitutes. However, less-educated native and immigrant workers may differ from one another in their relative task productivity. A CES production function of less-educated workers combines two tasks - manual (M) and interactive (I) - to produce a final consumption good  $Y_L$ :

$$Y_L = [\beta_L M^{\frac{\lambda-1}{\lambda}} + (1 - \beta_L) I^{\frac{\lambda-1}{\lambda}}]^{\frac{\lambda}{\lambda-1}}$$

where:

- $\beta_L$  is the productivity in manual versus interactive tasks of less-educated workers,
- $\lambda$  is the elasticity of substitution between manual and interactive tasks.

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<sup>1</sup>Examples of manual tasks include body coordination and physical strength.

<sup>2</sup>Interactive tasks require good communication skills, such as being able to easily converse with other people, working in a team or supervising the work of others.

The model assumes two types of workers: less-educated native-born workers and less-educated immigrant workers, who may differ in their comparative advantages. Denoting by  $e_{mn}$  ( $e_{mi}$ ) the relative manual to interactive efficiency in tasks of natives (immigrants), the assumed difference in comparative advantage implies that on average the relative efficiency of immigrants in manual versus interactive tasks is higher than that of natives, i.e.  $(e_m)_n < (e_m)_i$ . This leads immigrants to occupy jobs with more manual than interactive or non-manual content.

Peri and Sparber (2009) solve the equilibrium provision of relative manual tasks by natives, which is given by:

$$m_n^* = \left( \frac{\beta_L}{1 - \beta_L} \right)^{\frac{\alpha\lambda}{(1-\alpha)\lambda + \alpha}} \left[ f(e_m)_i^{\frac{1}{1-\alpha}} + (1-f)(e_m)_n^{\frac{1}{1-\alpha}} \right]^{\frac{-\alpha}{(1-\alpha)\lambda + \alpha}} \left[ (e_m)_n^{\frac{1}{1-\alpha}} \right]^{\frac{1}{1-\alpha}} \quad (1)$$

where  $f$  is the share of foreign-born workers<sup>3</sup>.

It is immediately apparent that  $\frac{\partial(m)_n^*}{\partial f} < 0$  under the assumption that  $(e_m)_n < (e_m)_i$ , which is precisely the empirical implication that we test in our empirical analysis of the expansionary and the recession periods in Spain. For the empirical implementation we use a log-linearisation and a reduced form of the equilibrium equation.

The interpretation of this implication is simple: immigration increases the supply of manual tasks because immigrants, making use of their comparative advantage, concentrate on jobs with more manual content. The increase in supply reduces the remuneration for jobs with more manual content and increases the remuneration for jobs with less manual or more interactive skills. Natives respond rationally and, using their comparative advantage, relocate to non-manual positions where wages are

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<sup>3</sup>A detailed derivation of this optimal provision can be found in Amuedo and De la Rica (2011) – Appendix A.

higher. In the new equilibrium, natives and immigrants do not compete for the same jobs and native wages are therefore not affected by immigration.

### **3. The Data – Descriptive Statistics**

Three different datasets are used in the paper. The first is the Spanish Labour Force Survey, which contains individual data covering the period from 2001 to 2012. We use the 2001-2007 to account for the expansionary period and 2008-2012 to account for the recession period. The second dataset comprises population registers (*Padrón*), which are used to create instrumental variables for the share of foreign-born workers. The third is the ONET Survey, which provides information on the task intensity of each of the 3-digit occupational classifications. This survey is provided by the US Department of Labor and is described in detail in the next section.

In our definition “immigrants” refers to individuals who were born outside Spain and were not citizens at birth. We exclude those with double nationality (less than 5% of the whole immigrant population) and consider only recent immigrants (those with a residency of 5 years or less), presuming that they are still lacking the language proficiency and other Spanish-specific human capital skills of natives.

Our sample considers non-college-educated workers between 15 and 65 since most immigrants in Spain do not have a college degree, are employed in unskilled jobs and compete with less-educated Spanish workers. We should highlight that our sample covers only workers: given that there has been a net destruction of around 3 million jobs as a result of the recession, the composition of workers is expected to have changed substantially from the first period to the second.

Table 1 presents descriptive statistics of natives and immigrants for two time periods. Immigrant workers are on average 7 years younger and more educated. The proportion of women among them is higher than among natives in both periods. The average age of native workers is 40 in the first period and 42 in the second, while the average age of recent immigrant workers is 33 in both periods. The proportion of women increases from 35% to 40% among native workers and from 43% to 49% among immigrant workers in the second period. There is an increase in the number of women in the labour market from one period to the other.

[Insert Table 1]

A comparison of the two periods analysed reveals various features that deserve attention. First, there is an interesting change in the age structure of natives. In the expansionary period 24% of native workers were younger than 30, while in the second period the figure drops to 18 %. By contrast 45% of native workers were aged between 36 and 45 in the expansion period, compared to 52% in the recession period. The change is significantly less pronounced among immigrants. This is a consequence of the dual contract system in Spain – a large number of older native workers have indefinite contracts with high severance payments and hence are far less likely to be laid off. Almost all job adjustments affect workers with fixed-term contracts, which are particularly prevalent among younger people. This age-composition change is not observed among immigrants, as most of them held fixed-term contracts in the expansionary and in the recession period.

The second interesting feature concerns the educational attainment of the samples of workers for the two periods. There is a significant increase in the proportion of workers with secondary education and a corresponding decrease in the percentage of less-educated workers (with only primary education or less) in the second period. The proportion of native (immigrant) workers with secondary education increases from 72 to 81% (72 to 76%). This suggests that the workers who have been hit hardest by the recession are those with lower levels of education. As mentioned above, many unskilled workers have been laid off during the recession, and this pushes the educational composition of the sample of workers towards more skilled workers.

Table 2 presents a breakdown of immigrants by region of origin in the two periods, focusing on recent immigrant workers. Between 2001 and 2007 more than half of all immigrants were Latinos. The second largest group (23%) comprises immigrants from the non EU-15 countries of Europe, while African immigrants account for 12%. A comparison with the second period reveals a decrease in the proportion of Latin and African immigrants and a corresponding increase in the proportion of non EU-15 immigrants. This is mainly driven by the large increase in Romanian immigrants which followed the EU enlargement of 2007. Through the Schengen Agreement the entry of

Romania into the European Union (EU) has allowed its citizens free access to work in any European country since 2007. The fact that entry visas were no longer required significantly decreased the costs of migration for Romanians, who headed mainly for Spain, Italy and the UK (Stan, 2009). More than 700,000 Romanian immigrants have entered Spain since 2007.

[Insert Table 2]

#### 4. Manual and Non-Manual Task Measures

To test the hypothesis that native workers relocate to jobs with relatively less manual content as the share of immigrants increases we need to identify the manual and interactive tasks required in each occupation.

We use the task requirements for each occupational classification provided by the U.S. Department of Labor through its O\*Net occupation classification<sup>4</sup>. The dataset assigns numerical values (from 1 to 10) to describe the importance of 52 abilities required by each occupation<sup>5</sup>. A representative sample of individuals from the 2000 US Census are asked two questions about each ability indicator: “How important is the ability to your current job?” and “What level of the ability is needed to perform your current job?”.

Through the development of careful crosswalks with the International Standard Classification of Occupations (ISCO88), *O\*Net* data has come to be used increasingly by a large number of researchers and institutions outside the United States.<sup>6</sup> The O\*Net data are transformed using crosswalks with the International Standard Classification of Occupations (ISCO88). Occupations in Spanish data are classified according to the National Classification of Occupations (CNO) 94<sup>7</sup> and CNO 11<sup>8</sup>. Like previous authors, we merge the data under the assumption that occupations in the United States and in Spain are not that different in terms of their manual and interactive task content.

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<sup>4</sup> For more details on the O\*NET data set, visit <http://www.onetcenter.org/>.

<sup>5</sup> Some examples of ability: (i) finger dexterity, (ii) body coordination, (iii) oral comprehension

<sup>6</sup> See [http://www.onetcenter.org/dl\\_files/paw/Products\\_at\\_Work.pdf](http://www.onetcenter.org/dl_files/paw/Products_at_Work.pdf) for a summary of its many applications outside the United States.

<sup>7</sup> Clasificación Nacional de Ocupaciones 1994

<sup>8</sup> Clasificación Nacional de Ocupaciones 2011

Given that the scale of measurement in the O\*Net survey for the tasks is rather arbitrary each skill is rescaled to obtain a percentage score that represents the relative importance of each ability in the context of the whole distribution of occupations. The measure of manual abilities contains job task requirements such as finger dexterity, body coordination and strength. By contrast the measure of interactive skills includes for example the importance of oral and written comprehension and expression<sup>9</sup>.

The manual-to-interactive relative task ratio for each occupation is created as the weighted average manual task content divided by the average interactive task content<sup>10</sup>. Table 1 in the Appendix shows the average manual and interactive task values and their ratios for each of the 3-digit occupational classifications. It can be observed that skilled non-manual occupations in broad categories such as managers, professionals and clerks are the ones with the highest (lowest) interactive (manual) skills. At the other extreme, occupations in broad categories such as assemblers and craft workers are the ones with the highest (lowest) manual (interactive) skill requirements.

The average manual and interactive tasks intensities for our sample of native workers (the figures are in the interval (0,1)) and for recent immigrants for both periods are shown in Table 3. The following interesting issues emerge: First, the intensity of immigrants in interactive tasks is lower than that of natives, among both men and women and in both the expansionary and recession periods. Second, recent immigrants display similar manual task intensity to native men but less than native women in the expansionary period. But when the expansionary period is compared to the recession period the intensity of immigrants in manual tasks is observed to have increased to a point where it is higher than for native men and women. Finally, a comparison of manual task intensity among natives in the first and second periods reveals increases among both men and women, which means that the proportion of

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<sup>9</sup>We did some robustness checks to test whether the inclusion of different ability indicators in the definition of manual and interactive tasks changed the results, but they did not, so we finally decided to include the same ability indicators as previous studies for comparability reasons.

<sup>10</sup> More precisely, the relative manual-to-interactive ratio supply of each year and each group of workers is constructed as the weighted average of the manual-to-interactive skill ratio supplied by individual workers from each group in each particular year, weighted by the number of hours worked and personal survey weight. Workers aged between 16 and 65 and recent immigrants are considered.

workers in more manual-task-intensive occupations has increased from one period to the other.

[Insert Table 3]

The time trend in the manual-to-interactive task ratio for our samples of natives and immigrants for the whole period (2001-2012) can be seen in Figure 1.

[Insert Figure 1]

It can be observed that natives on average work in occupations with significantly lower manual-to-interactive task ratios than immigrants in both the expansionary and recession periods. Moreover, the ratio for natives is more or less constant throughout the two periods, while for immigrants there is a sharp increase in the ratio after 2007, when the expansionary period comes to an end, followed by a decrease in 2011 and 2012. This latter decrease may be a result of our selecting immigrants who enter employment from 2010 onwards. Given the high rate of destruction of unskilled jobs since 2009, which has affected immigrants to a large extent, it is likely that only the most qualified immigrants remain in work.

## **5. Empirical Implementation**

Our methodology closely follows that used in AR. It is based on the spatial correlation approach. Individual-level data from 2001 to 2012 are collapsed into cells (province-year), and the hypothesis to be tested is whether the increase in the share of foreign-born workers per cell leads to a decrease in the average manual-to-interactive intensity per cell. For the first period there are 364 observations (52x7) and for the second there are 260 (52x5)<sup>11</sup>.

This type of analysis assumes that labour markets are local, and therefore requires there to be no outmigration of natives in response to increases in immigration inflows. This assumption is not likely to be very strong for Spain given that internal mobility of natives has been shown to be rather low (e.g. Bentolila, 2011).

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<sup>11</sup> The fact that we only have 260 observations for the recession period prevents us from conducting any empirical checks on the impact of immigrants per place of origin. Standard errors increase greatly when immigrants are separated according to their places of origin – e.g. Latinos versus non-Latinos.

We weight each individual by his/her personal Census weight, multiplied by the number of hours that he/she usually works in a week. This allows us to create variables which reflect the individual labour supply on an hourly basis. Each cell is also weighted by the number of individuals that belong to it.

A log-linearisation of equation (1) is used to examine the effects of immigration on task specialisation among natives:

$$\ln(M/I)_{n,p,t} = \mu_n(\text{share}_{\text{foreign}})_{pt} + X_{pt}\beta + \alpha_p + \delta_t + \varepsilon_{pt}, \quad (2)$$

- $\ln(M/I)_{n,p,t}$  is the average manual-to-interactive task ratio of natives in each cell;
- $t$  represents time, in our case 2001-2007 in the first data set and 2008-2011 in the second;
- $p$  represents region (i.e. province in the case of Spain);
- $n$  represents natives;
- $\delta_t$  represents year fixed-effects intended to account for common time-varying technological parameters;
- $\alpha_p$  is a vector that contains region (province) fixed effects that account for variations in unobserved population characteristics;
- $X_{pt}$  is a vector that contains information on the average personal characteristics of workers in each cell (four age group dummies, a secondary education dummy);
- $(\text{share}_{\text{foreign}})_{pt}$  represents the share of foreign-born workers (recent immigrants) in each cell, set as the number of recent immigrants in the cell divided by number of natives in the cell.

We use Weighted Least Square estimation, in which the weights are the number of individuals in each cell. Robust standard errors clustered by province are reported under the estimates.

The dependent variable is the (log) level of manual-to-interactive tasks of natives in each cell. The relevant parameter for our study is  $\mu_n$ . A negative, statistically

significant value of  $\eta_n$  would confirm that natives specialise in occupations with lower manual content as the share of foreign born workers in the region increases.

However, immigrants do not establish randomly across regions, and hence the endogeneity of the share of foreign-born workers must be accounted for. To correct for this we use instrumental variables and assume, as previous studies do, that the main determinant for the decision of recent immigrants on where to locate is the settlement of previous immigrants (see Card 2001, Cortes 2006, Lewis 2003, Ottaviano and Peri 2006, Peri 2006, Saiz 2003, Dustman *et al.* (2008) among others for similar strategies). This is also true in Spain (Sandell 2008).<sup>12</sup> We do this by using the ratio of immigrants to natives in each province four years before, which we construct using data from the Population Register (*Padrón*), which provides the most representative information about immigration in Spain given that almost all immigrants register in order to gain access to public medical care.

As mentioned in the introduction, an increase in the inflow of immigrants is very likely, particularly in recession years when jobs are scarce, to have a negative impact on the employment rates of host-country workers. This may apply not only to natives, but also to earlier immigrants. Longhi (2008), comparing 45 studies published between 1982 and 2007, finds that there seems to be a negative effect of new immigrant inflows on the employment rate of earlier immigrants. A similar result was found by D'Amuri *et al.* (2009) for Germany.

We check whether an increase in immigration inflow crowds out less educated natives and/or non-recent immigrants from employment. To that end we estimate the employment rate (ER) of (i) natives and (ii) non-recent immigrants as a proportion of the share of foreign-born workers, time and province dummies at cell level for both periods (equation 2).

$$ER_{i,p,t} = \mu_n(\text{share}_{foreign})_{pt} + \alpha_p + \delta_t + \varepsilon_{pt}, \quad (3)$$

In this equation  $i$  refers to either natives or non-recent immigrants. The analysis is carried out using OLS and IV methods. Each individual is weighted by his/her personal survey weight and cells are weighted by the number of individuals in them. The

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<sup>12</sup> Using data on immigrants obtained from Spanish population registers, Sandell (2008) shows that networks play a crucial role in the location choices of immigrants.

heteroskedasticity problem is solved by using robust standard errors, where standard deviations are clustered by province.

## 6. Results

### ***6.1. The Impact of Immigration on the Relative Task Supply of Natives – Expansion versus Recession***

Table 4 displays the estimated effect of immigrants on the manual-to-interactive task content of native jobs for the two periods. We estimate the effects for all natives, and separately for native men and women. Previous studies, such as AR, find that immigration has a stronger impact on native women than on native men. Estimations are carried out using OLS and IV methods.

For the expansionary period we find, as expected, the same results as AR. Very briefly, this means (i) an increase in the share of foreign-born workers has a strong, negative impact on the manual-to-interactive task content of native jobs. 2SLS results, based on the IV strategy, show a greater negative impact on the share of immigrants in general. That would imply that OLS is biased downwards. However, the standard errors of the IV estimation are much higher than those of the OLS estimation, so we should be cautious as regards the precision of this higher magnitude. (ii) Immigration has a greater impact on the task specialisation of native women than native men, independently of whether the OLS or IV estimation is used.

[Insert Table 4]

The results for the recession period are shown in the right-hand panel of Table 3. They indicate that in 2008-2012 there is no significant effect of immigrants on the task specialisation of natives. The OLS estimates for the recession period are about one third the size of those for the expansionary period and none of them is significant. None of the IV estimates is significant, although in general the magnitude of the coefficients is not negligible – they are even higher than those found for the expansionary period. However, the standard errors are very high and this prevents them from being significant. The instruments used for the recession period are the

same as those used for the expansionary period. Although they pass the validity tests, they seem to be much less precise for the recession than for the expansionary period. However, the significant decrease in OLS estimates in recession compared to the expansionary period together with the non-significant impact in the IV estimates lead us to conclude that in the recession years, we find no significant impact of immigrants on the relocation of manual versus non-manual tasks among natives.

If immigration does not relocate natives to other occupations, then the question of what specific effect immigration has on natives arises. Three possible labour market responses to an immigration shock can be posited, particularly in a recession period:

1. Native wages, particularly among those who are more likely to compete with immigrants for jobs, decrease in a recession to absorb the immigration shock.
2. If new immigrants compete with natives for scarce jobs, natives might be displaced by new immigrants and this would decrease the employment rate among natives following the immigration shock.
3. If new immigrants compete with non-recent immigrants, the latter might be displaced by the immigration shock. Therefore the employment rate among non-recent immigrants would decrease following the immigration shock.

Unfortunately, we cannot test hypothesis 1 because of a lack of adequate individual data. However, we can try to test the second and third hypotheses. With respect to the second, Peri (2010) shows that in the US immigration in periods of economic weakness seems to have some slight negative effect on native employment and income per worker in the short run but not in the long run. On the other hand, as mentioned above, Longhi (2008) and D'Amuri et al. (2009) find sizable decreases in employment rates among earlier immigrants following new immigration shocks.

Below we test the second and third hypotheses for Spain, for both the expansionary and recession periods:

## ***6.2. The Impact of Immigration on the Employment Rate of Natives and Non-Recent Immigrants***

Using the Spanish Labour Force Survey we estimate equation (3), where the dependent variable is the employment rate of natives or of non-recent immigrants as a proportion of the share of recent immigrants. In addition to time and region dummies, we also include the unemployment rate for each province. Each individual is weighted by his/her survey weight. Equation (3) is estimated using OLS and IV methods. The 4-year lagged values of the immigrant-to-native ratio are used as instrumental variables, following the same logic as for the manual-to-interactive task ratio regression. As before, non-university-educated individuals between 16 and 65 are considered. Table 5 reports the results.

The employment rate of natives shows no response following the immigration shock for either the expansionary period or the recession, whichever estimation method is used. However, the impact of immigration seems to have completely different effects on the employment level of non-recent immigrants in the expansionary period and in the recession. In the former we find either no impact (from OLS estimation) or a positive, significant impact (from the IV estimation), but the sign is clearly reversed in the latter. Independently of which estimation method is used, the employment level of non-recent immigrants decreases with the entry of new immigrants in the recession period. The magnitude of the IV coefficients is higher than that of the OLS estimates, but the important finding is that in the recession period new immigrants have displaced non-recent immigrants. The explanation is obvious: in a period of job scarcity new immigrants, who are very close substitutes for non-recent immigrants, compete with the latter for the few jobs available and that competition displaces some non-recent immigrants to an out-of-employment situation. As a result, the employment rate among this group of immigrants decreases.

## 7. Conclusions

Previous studies have analyzed the impact of immigration on task specialisation and employment rates among natives. Most of them conclude that native workers respond to immigration by relocating to occupations with more interactive, rather than manual, content. In addition, no impact of immigration on the employment rate of natives is found whatsoever. However, this empirical evidence refers to the years prior to 2008, i.e. a clear expansionary period. Given that most developed economies have entered a deep economic recession since 2008, it is worth wondering whether the impact of immigration on natives found in the previous period persists in these new circumstances. Indeed, given that jobs are scarcer in a recession than in an expansionary period, the labour market in the host country may be expected not to be able to absorb the increase in immigration in the short run. Hence, the occupational mobility exhibited by natives in the earlier period may be expected to decrease or even disappear. In such circumstances, an increase in immigration may entail negative employment effects not only on natives but also on earlier immigrants, as new immigrants may be competing for the same scarce jobs with workers in the host country.

Our study focuses on Spain, which has been going through a deep economic recession since 2008. Basically, it extends a previous paper by Amuedo and De la Rica (2011) in an attempt to account for the impact of immigration in Spain in the recent recession years, 2008-2012.

We use the Spanish Labour Force Survey (2001-2012) and, overall, our findings suggest that the impact of immigration on the labour market of a host country clearly depends on the business cycle. More specifically, we find a sizable relocation of native workers to occupations with more interactive rather than manual content as a response to immigration as well as a null impact on native employment levels for the expansionary years (2001-2007). Nor do we find any negative impact of immigration on the employment levels of earlier immigrants in that period. However, the pattern changes completely when we focus on the recession period: first, there is no evidence of any relocation of natives to different occupations as a response to an immigration shock. Second, we find no impact of immigration on the employment levels of natives,

but we do find a sizable negative impact on the employment levels of earlier immigrants. Therefore, new immigrants in recession years displace earlier immigrants, for whom they are likely to be close substitutes in terms of jobs.

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**Table 1: Non-University-Educated Natives and Immigrants (%)**

<b>2001 - 2007</b>	<b>Natives</b>	<b>Native women</b>	<b>Native men</b>	<b>Immigrants</b>
<b>Average age</b>	<b>39.6</b>	39.3	39.8	<b>32.7</b>
<b>Age categories (%)</b>				
Below 30	24	23	23	43
31–35	26	26	26	34.5
36–40	26	28	20	17
41–45	19	18	26	5
Over 46	5	4	5	0.5
<b>Women (%)</b>	<b>35</b>			<b>43</b>
<b>Education (%)</b>				
primary or less	28	29	25	28
secondary	72	71	75	72
<b>2008 - 2012</b>	<b>Natives</b>	<b>Native women</b>	<b>Native men</b>	<b>Immigrants</b>
<b>Average age</b>	<b>41.9</b>	41.9	41.9	<b>33.2</b>
<b>Age categories (%)</b>				
Below 30	18	17	17	40
31–35	24	23	26	36
36–40	28	30	23	17
41–45	24	23	28	6
Over 46	6	6	6	1
<b>Women (%)</b>	<b>40</b>			<b>49</b>
<b>Education (%)</b>				
primary or less	18	17	19	24
secondary	81	83	81	76

Notes: Non-university-educated individuals in work, aged between 16 and 65 from the 2001-2007 and 2008-2012 Spanish Labour Force Surveys. "Immigrants" refers only to those with at most five years of residence in Spain, i.e. recent immigrants.

**Table 2: Breakdown of Immigrants by Regions of Origin (%)**

<b>2001 - 2007</b>	<b>All immigrants</b>	<b>Recent immigrants</b>
Latin America	44	58
Africa	18	12
EU15	14	4
EU other than EU15	16	23
Other	8	3
<b>Total</b>	<b>33507</b>	<b>8808</b>

<b>2008 - 2012</b>	<b>All immigrants</b>	<b>Recent immigrants</b>
Latin America	40	53
Africa	17	11
EU15	10	4
EU other than EU15	21	28
Other	12	4
<b>Total</b>	<b>38389</b>	<b>6145</b>

Notes: All immigrants and employed recent immigrants aged from 16 to 65 in Spain, as per the Spanish Labour Force Survey for two periods. Individuals are weighted by their personal survey weight.

**Table 3: Average Relative Task Supply of Less-Educated Workers**

<b>2001-2007</b>				
<b>Average</b>	<b>Natives</b>			<b>Immigrants</b>
	<b>All</b>	<b>Men</b>	<b>Women</b>	<b>All</b>
Manual tasks	0.59	0.63	0.52	0.62
Interactive tasks	0.35	0.34	0.39	0.23
Ratio M/I	3.07	3.17	2.84	4.55
<b>2008-2012</b>				
<b>Average</b>	<b>Natives</b>			<b>Immigrants</b>
	<b>All</b>	<b>Men</b>	<b>Women</b>	<b>All</b>
Manual tasks	0.63	0.66	0.57	0.7
Interactive tasks	0.37	0.35	0.39	0.25
Ratio M/I	3.12	3.24	3.06	5.41

Notes: Non-university-educated individuals in work aged between 16 and 65 from the 2001-2007 and 2008-2012 Spanish Labour Force Surveys. "Immigrants" refers only to those with at most five years of residence in Spain, i.e. recent immigrants. Each individual is weighted by his/her personal survey weight and by the number of hours per week usually worked.

**Table 4: Impact of the Share of Foreign-Born Workers on the  
Relative M/I Task Supply of Natives –  
2001-2007 versus 2008-2012**

Recent immigrants	2001-2007		2008-2012	
	OLS	IV	OLS	IV
<b>All Natives</b>	-0.742*** (0.235)	-1.237** (0.486)	-0.256 (0.336)	-2.175 (1.372)
<b>Native men</b>	-0.626 ** (0.281)	-1.038* (0.559)	-0.208 (0.345)	-1.826 (1.656)
<b>Native women</b>	-0.965 *** (0.316)	-1.548** (0.713)	-0.327 (0.535)	-2.505* (1.482)

Notes: (1) Non-university-educated individuals in work aged between 16 and 65 age from the 2001-2007 and 2008-2012 Spanish Labour Force Surveys. “Immigrants” refers only to those with at most five years of residence in Spain, i.e. recent immigrants. Each individual is weighted by his/her personal survey weight and by the number of hours per week usually worked.

(2) We estimate the manual-to-interactive ratio for natives in terms of the share of immigrants, year dummies and province dummies. In the estimation at cell level (year, province) each cell is weighted by the number of individuals in it. Robust standard errors are reported, clustered by province.

(3): \*\*\* significant at 1%, \*\* significant at 5%, \* significant at 10%

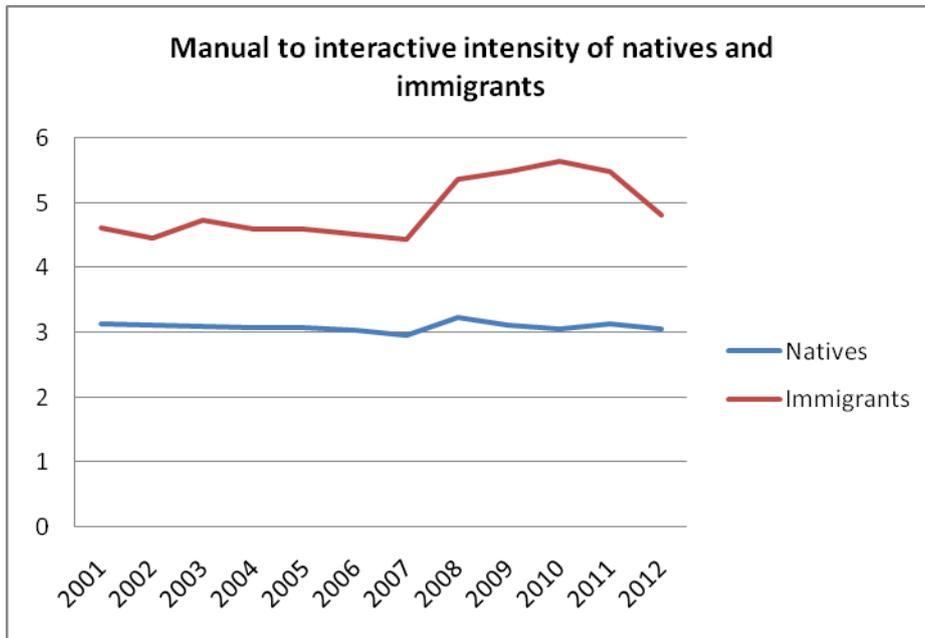
**Table 5: Impact of Recent Immigrants on Employment**

<b>2001-2007</b>		
	<b>OLS</b>	<b>IV</b>
<b>Employment rate of natives</b>	-0.00005 (0.0003)	-0.001 (0.0008)
<b>Employment rate of Non-Recent Immigrants</b>	1.0910 (0.7444)	5.961*** (1.961)

<b>2008-2012</b>		
	<b>OLS</b>	<b>IV</b>
<b>Employment rate of natives</b>	-0.0003 (0.0006)	-0.0031 (0.0024)
<b>Employment rate of Non-Recent Immigrants</b>	-0.4076*** (0.1498)	-1.2609** (0.543)

**Figure 1: Trend in Manual-to-Interactive Intensity**



## Appendix

**Table 1: The Skill Content of Each Occupation**

Occupation	Interactive	Manual	Ratio
<b>MAJOR GROUP 1: LEGISLATORS, SENIOR OFFICIALS AND MANAGERS</b>			
<b>12 Corporate managers</b>			
121 Directors and chief executives	0.9067	0.2057	0.2269
122 Production and operations managers	0.7802	0.3937	0.5047
123 Other specialist managers	0.8208	0.3562	0.4340
<b>13 Managers of small enterprises</b>			
131 Managers of small enterprises	0.7542	0.2661	0.3528
<b>MAJOR GROUP 2: PROFESSIONALS</b>			
<b>21 Physical, mathematical and engineering science professionals</b>			
211 Physicists, chemists and related professionals	0.6728	0.3924	0.5832
212 Mathematicians, statisticians and related professionals	0.4594	0.1605	0.3493
213 Computing professionals	0.5619	0.5543	0.9864
214 Architects, engineers and related professionals	0.5909	0.5412	0.9159
<b>22 Life science and health professionals</b>			
221 Life science professionals	0.6078	0.3919	0.6448
222 Health professionals (except nursing)	0.7793	0.6677	0.8568
223 Nursing and midwifery professionals	0.8883	0.4671	0.5259
<b>23 Teaching professionals</b>			
231 College, university and higher education teaching professionals	0.8367	0.1171	0.1400
232 Secondary education teaching professionals	0.7967	0.5500	0.6904
233 Primary and pre-primary education teaching professionals	0.6800	0.3993	0.5872
234 Special education teaching professionals	0.8267	0.2857	0.3456
235 Other teaching professionals	0.4683	0.3686	0.7870
<b>24 Other professionals</b>			
241 Business professionals	0.7820	0.2998	0.3834
242 Legal professionals	0.8567	0.3079	0.3594
243 Archivists, librarians and related information professionals	0.6492	0.5575	0.8588
244 Social science and related professionals	0.7857	0.1297	0.1651
245 Writers and creative or performing artists	0.6746	0.3486	0.5167
246 Religious professionals	0.8258	0.2936	0.3555
<b>MAJOR GROUP 3: TECHNICIANS AND ASSOCIATE PROFESSIONALS</b>			
<b>31 Physical and engineering science associate professionals</b>			
311 Physical and engineering science technicians	0.4239	0.6693	1.5789
312 Computer associate professionals	0.5228	0.5762	1.1022
313 Optical and electronic equipment operators	0.4042	0.8514	2.1066
314 Ship and aircraft controllers and technicians	0.4922	0.6981	1.4183

315 Safety and quality inspectors	0.5450	0.6021	1.1048
<b>32 Life science and health associate professionals</b>			
321 Life science technicians and related associate professional	0.5144	0.7005	1.3616
322 Health associate professionals (except nursing)	0.6363	0.5857	0.9205
323 Nursing and midwifery associate professionals	0.7350	0.5657	0.7697
<b>33 Teaching associate professionals</b>			
334 Other teaching associate professionals	0.5316667	0.26	0.4890
<b>34 Other associate professionals</b>			
341 Finance and sales associate professionals	0.7014	0.2937	0.4187
342 Business services agents and trade brokers	0.7750	0.2129	0.2747
343 Administrative associate professionals	0.5317	0.2600	0.4890
344 Customs, tax and related government associate professionals	0.5638	0.3586	0.6360
345 Police inspectors and detectives	0.6558	0.5214	0.7951
346 Social work associate professionals	0.8217	0.2743	0.3338
347 Artistic, entertainment and sports associate professionals	0.4408	0.6114	1.3870
<b>MAJOR GROUP 4: CLERKS</b>			
<b>41 Office clerks 1</b>			
411 Secretaries and keyboard-operating clerks	0.5361	0.4781	0.8918
412 Numerical clerks	0.6157	0.3257	0.5290
413 Material-recording and transport clerks	0.4900	0.4590	0.9367
414 Library, mail and related clerks	0.4035	0.5255	1.3023
419 Other office clerks	0.4975	0.3571	0.7179
<b>42 Customer services clerks</b>			
421 Cashiers, tellers and related clerks	0.5400	0.4169	0.7720
422 Client information clerks	0.6663	0.4043	0.6067
<b>MAJOR GROUP 5: SERVICE WORKERS AND SHOP AND MARKET SALES WORKERS</b>			
<b>51 Personal and protective services workers</b>			
511 Travel attendants and related workers	0.4875	0.5100	1.0462
512 Housekeeping and restaurant services workers	0.4465	0.4742	1.0619
513 Personal care and related workers	0.5779	0.5118	0.8856
514 Other personal services workers	0.3542	0.6119	1.7277
516 Protective services workers	0.5615	0.5069	0.9027
<b>52 Models, salespersons and demonstrators</b>			
521 Fashion and other models	0.1950	0.2886	1.4799
522 Shop, stall and market salespersons and demonstrators1	0.4642	0.5579	1.2018
<b>MAJOR GROUP 6: SKILLED AGRICULTURAL AND FISHERY WORKERS</b>			
<b>61 Skilled agricultural and fishery workers 1</b>			
611 Market gardeners and crop growers	0.2933	0.7271	2.4789
612 Animal producers and related workers	0.2013	0.6886	3.4215
613 Crop and animal producers	0.4000	0.6686	1.6714
614 Forestry and related workers	0.0683	0.6314	9.2404
<b>MAJOR GROUP 7: CRAFT AND RELATED TRADES WORKERS 1</b>			
<b>71 Extraction and building trades workers</b>			

711 Miners, shot firers, stone cutters and carvers	0.3467	0.9057	2.6126
712 Building frame and related trades workers	0.1959	0.7621	3.8895
713 Building finishers and related trades workers	0.1821	0.7302	4.0090
714 Painters, building structure cleaners and related trades workers	0.2450	0.7119	2.9057
<b>72 Metal, machinery and related trades workers</b>			
721 Metal molders, welders, sheet-metal workers, structural-metal preparers,	0.1356	0.8055	5.9394
722 Blacksmiths, tool-makers and related trades workers	0.1585	0.7979	5.0347
723 Machinery mechanics and fitters	0.2461	0.8506	3.4558
724 Electrical and electronic equipment mechanics and fitters	0.2550	0.8556	3.3553
<b>73 Precision, handicraft, craft printing and related trades workers</b>			
731 Precision workers in metal and related materials	0.1272	0.9271	7.2876
732 Potters, glass-makers and related trades workers	0.1358	0.8200	6.0368
734 Craft printing and related trades workers	0.0889	0.8290	9.3268
<b>74 Other craft and related trades workers</b>			
741 Food processing and related trades workers	0.1283	0.7462	5.8145
742 Wood theaters, cabinet-makers and related trades workers	0.1192	0.9150	7.6783
743 Textile, garment and related trades workers	0.0667	0.8707	13.0607
744 Pelt, leather and shoemaking trades workers	0.1633	0.9514	5.8251
<b>MAJOR GROUP 8: PLANT AND MACHINE OPERATORS AND ASSEMBLERS</b>			
<b>81 Stationary plant and related operators 1</b>			
811 Mining and mineral-processing-plant operators	0.1228	0.8357	6.8067
812 Metal-processing plant operators	0.1925	0.8829	4.5863
813 Glass, ceramics and related plant operators	0.1678	0.8576	5.1116
814 Wood-processing- and papermaking-plant operators	0.1800	0.6707	3.7262
815 Chemical-processing-plant operators	0.2511	0.6814	2.7137
<b>82 Machine operators and assemblers</b>			
822 Chemical-products machine operators	0.2150	0.8243	3.8339
823 Rubber- and plastic-products machine operators	0.1306	0.7845	6.0091
825 Printing-, binding- and paper-products machine operators	0.0683	0.8071	11.8119
826 Textile-, fur- and leather-products machine operators	0.1231	0.8411	6.8310
827 Food and related products machine operators	0.2233	0.6490	2.9062
828 Assemblers 1	0.1450	0.9314	6.4236
829 Other machine operators not elsewhere classified	0.3000	0.8186	2.7286
<b>83 Drivers and mobile plant operators</b>			
831 Locomotive engine drivers and related workers	0.2439	0.7648	3.1357
832 Motor vehicle drivers	0.3529	0.7143	2.0239
833 Agricultural and other mobile plant operators	0.2057	0.7782	3.7827
834 Ships' deck crews and related workers	0.1400	0.5557	3.9694
<b>MAJOR GROUP 9: ELEMENTARY OCCUPATIONS 1</b>			
<b>91 Sales and services elementary occupations</b>			
911 Street vendors and related workers	0.3667	0.2529	0.6896
913 Domestic and related helpers, cleaners and launderers	0.0750	0.5500	7.3333

914 Building caretakers, window and related cleaners	0.1406	0.4348	3.0932
915 Messengers, porters, doorkeepers and related workers	0.3764	0.5494	1.4595
916 Garbage collectors and related laborers	0.2117	0.7871	3.7188
<b>92 Agricultural, fishery and related laborers</b>			
921 Agricultural, fishery and related laborers	0.1192	0.7293	6.1199
<b>93 Laborers in mining, construction, manufacturing and transport</b>			
931 Mining and construction laborers	0.0833	0.6597	7.9166
932 Manufacturing labourers 1	0.0994	0.5952	5.9856
933 Transport laborers and freight handlers	0.0925	0.6379	6.8958