Immigrants' employment and the business cycle in Spain: taking account of gender and origin

Authors
Mercè Sala-Rios (corresponding author)
e-mail: mercesa@econap.udl.cat
Phone number: 34 973 70 3305
Teresa Torres-Solé
torres@econap.udl.cat
Mariona Farré-Perdiguer
Mariona.farre@econap.udl.cat

Address: Universitat de Lleida, Departament d'Economia Aplicada. Carrer de Jaume II, 73. Campus Cappont. 25001 Lleida
Institution: Department of Applied Economics. University of Lleida

Abstract The purpose of this paper is to provide an empirical overview of the relationship between the business cycle and the immigrant employment cycle in Spain, differentiating by gender and origin, during the period 1999–2016. The study focuses on three main goals. First, we identify and compare the phases and the main features of the female and male immigrant employment cycles and the business cycle by means of their turning points. Second, we wonder to what extent the global financial crisis initiated in the middle of 2007 modified the cyclical fluctuations of immigrants' employment and whether female and male employment presents significant differences. Finally, we study whether immigrants' origin plays some role in employment fluctuations during the pre- and post-crisis periods. We find that the Spanish economy has more capacity for growth than for the creation of immigrant employment, being more evident in the case of females. However, in contraction phases, females show higher resilience to losing their employment than do males. The study also confirms the origin of the immigrants' influence over their employment fluctuations in the pre- and post-crisis periods. In the post-crisis period, the employment of South American and Asian females shows advantages both in origin and gender with respect to the other cohorts.

Key words: immigrants' employment, business cycle, turning points, synchronization, Shift-share.

JEL: J21, J61, E32, F22

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1. Introduction

There is no doubt that since the end of the 1990s, immigration has become an important issue in the Spanish society and economy. From 2000 to 2005, the number of immigrants was multiplied by four, reaching in 2010 roughly 12% of the total population. In this year and due to the global economic crisis, a trend towards change was discernible, with total immigrants reduced in both absolute and relative terms. At the beginning of 2016, immigrants comprised about 9.9% of the total population—two points below the pre-crisis levels. The highest proportion of immigrants comes from eastern European countries, South America, and Africa. At the same time, over the years, Spanish immigration has moved towards a more balanced situation between foreign-born females and males.

A large percentage of the immigrant population are between 20 and 45 years old and play an active role in the labour market. They usually have activity and unemployment rates above those of natives. Data from the Spanish National Statistics Institute (INE) indicate that the immigrant activity rate reaches around 75% and that of natives around 60%. With respect to the unemployment rate, before the 2007 crisis, the rate for immigrants was around 12%, and that for natives was around 8%. In the core of the crisis, the figures increased to 30% and 21%, respectively. Moreover, more than 30% of immigrants are overqualified for the job they carry out (Godenau et al., 2014; García, 2009)[1].

[1] According to Godenau et al. (2014), regional differences are substantial among immigrants. The lowest overqualified rate is located in the Northwest (20.76%), and the highest in the South (41.43%). However, among national workers, the interregional disparity almost does not exist. Madrid and the East have the lowest rates (3.5%) and the Canary Islands the highest (6.8%).

This framework provides the basis for interesting analysis about how immigrants fare in the labour market and what is their linkage with the business cycle. There is a large literature that concentrates on the relationship between the business cycle and employment. As Salman and Shukur (2014) well summarize, the majority of studies find a significant linkage between economic activity and employment. However, another important question to analyse is whether the response of the labour market supply to movements in economic activity depends on the gender and the origin of the labour force. We deal with this issue by focusing on the Spanish economy.

Hence, the purpose of this paper is to provide an empirical overview of the relationship between the business cycle and the immigrant employment cycle in Spain, differentiating by gender and origin, during the period 1999–2016. The study focuses on three main goals. First, we identify and compare the phases of the female and male immigrant employment cycles and the phases of the business cycle by means of their turning points. This enables us to document the main features of the immigrant employment and business cycles and examine how these characteristics affect their interactions. A well-established methodology is used to analyse the intensity of the cycles' synchronization. Second, we wonder to what extent the crisis initiated in the middle of 2007 modified the cyclical fluctuations of immigrants' employment and whether there are significant differences between female and male employment. Finally, we study whether immigrants' origin plays some role in their employment fluctuations during the pre- and post-crisis periods. We carry out a shift-share analysis to find out whether origin matters.

We seek to contribute to the debate from an empirical perspective in the following ways. First, analysis of the differences in employment between immigrants and natives over the business cycle in Spain has already been carried out. However, in previous analyses of the linkages between immigrants' employment and the business cycle in Spain, no work has previously looked at distinctions between gender and origin. This paper aims to fill this gap. Second, any future line of enquiry that tries to model the interactions between immigrants' employment and economic factors in Spain will require an adequate understanding of immigrants' employment cycle features, which can be provided by the results presented in this paper. Third, in our opinion, it is necessary to determine the link between immigrants' employment and business cycles to redirect or avoid future unwanted fluctuations. Fourth, our results provide information about the effect of the crisis on the immigrant labour force, and furthermore, we answer the question as to whether gender and origin matter. This is important not only from a demographic point of view, but also because it should be taken into account in any socioeconomic policy.

The overall conclusions are that the Spanish economy has more capacity for growth than for creating immigrant employment, being more evident in the case of females. However, in contraction phases, females show higher resilience to losing their employment than do males. The study also confirms that the origin of immigrants matters. We find that origin influences the immigrant employment fluctuations, in both the pre- and post-crisis periods. In the post-crisis period, the employment of South American and Asian females shows advantages both in origin and gender with respect to the other cohorts.

The paper is organized as follows. Section 2 presents a literature review related to our analysis. Section 3 describes the data used in this study. Section 4 identifies and compares the cycle phases by means of their turning points. The section closes by dealing with the cycles' synchronization. Section 5 discusses to what extent the 2007 crisis modified the cyclical fluctuations of immigrants' employment and whether there are significant differences between females and males. In Section 6 we study whether the origin of immigrants matters. The conclusions are drawn in Section 7.

2. Literature review

Our work complements the literature on the economics of immigration. Without being an exhaustive review, some of the main aspects addressed in the literature are as follows. We can find quite a large number of studies that focus on wage patterns for natives and immigrants, their wage differentials, and the role of wages in explaining the immigration flows and unemployment rates. There is a consensus around two main results: the existence of a wage gap between natives and immigrants, and a positive relationship between wage growth and the time from the year of arrival (e.g., Borjas, 1987; Chiswick et al., 2006; Adsera & Chiswick, 2007; Mandelman & Zlate, 2012; Ottaviano & Peri, 2012; Damette & Fromentin, 2013; Dustmann & Görlach, 2016).

In Spain, Canal-Domínguez and Rodríguez Gutierrez (2008) and Simón et al. (2008) examine differences between immigrants' and natives' wage structures. Among their main findings, we highlight that wage distribution differs significantly depending on the origin of the immigrants, their characteristics, and their segregation in labour structures. The core of the analysis of Fernández and Ortega (2008) is how differences within the labour market between immigrants and natives behave over time. They pinpoint that

initially, immigrants suffer higher unemployment rates, exhibit clear overeducation levels, and procure worse contracts. However, five years after arrival, unemployment rates tend to draw close to those of natives, while the gaps in overeducation and worse contracts do not fade away. Sanromá et al. (2015) analyse the wage returns of human capital. They find that human capital acquired in Spain has higher returns than that acquired in origin countries. However, the closer the origin country to Spain in terms of development and culture, the higher the returns of the human capital acquired in the home country. Murillo-Huertas and Simón (2017) assess the native-immigrant wage gap before and during the great recession. Their results show that the differences in the endowments of characteristics explain this gap. Factors such as the high presence of immigrants in low-skilled occupations, their relatively lower endowments of tenure, and the segregation of immigrants into low-wage firms are factors with significant influence on the wage differentials.

The analysis of the differences in employment between immigrants and natives over the business cycle is a supplementary field of study which is related with that we propose in this paper. There is a broad consensus in recognizing that the labour market shows several differences within the framework of native and immigrant workers. Most literature in this field agrees that immigrants relative to natives show larger unemployment sensitivity to economic downturns and economic shocks (see, for instance, Aydemir, 2003; Orrenius & Zadodny, 2009, 2010a, b; Dustmann et al., 2010; Mandelman & Zlate, 2012; Prean & Mayr, 2016; Clemens & Hart, 2017).

For the Spanish economy, Lacuesta and Puente (2010) estimate the effect of the business cycle over the migrant flows. The immigrant inflows depend on both the

growth rate and the presence in the destination region of other immigrants born in the same country. In the case of immigrant outflows, they depend on the wealth level both of the country of origin and that of the destination. De la Rica and Polonyankina (2013) indicate that the impact of immigration on native workers differs depending on the business cycle. In expansionary years, there exists a relocation of native workers towards occupations with less manual content as a response to the immigration; this however, is not present in recession years. Carrasco and García-Pérez (2015) conclude that immigrant unemployment rates are more sensitive to economic activity changes and that the effect of the business cycle is not constant but decreases with duration at a higher rate among immigrants.

Other lines of enquiry focus on showing how the crisis initiated in the middle of 2007 influences the labour market. The results indicate that immigrant workers seem to be more affected than natives. The impact differs according to the characteristics of foreign workers, and is particularly important in foreign workers occupied in low-skilled jobs, which are more prone to cyclical fluctuations (Fromentin, 2016; Fromentin et al., 2016; Xuanren & Sakamoto, 2016).

Regarding the Spanish economy, numerous researchers (Garrido et al., 2010; Medina et al., 2010; Carrasco & García-Pérez, 2015; Motellón & López-Bazo, 2015; Murillo-Huertas & Simón, 2017) indicate that the last recession hit immigrants harder than native workers. One of the main reasons is that it destroyed a great number of low-skilled jobs held mostly by immigrants. De la Rica and Polonyankina (2013) conclude that there is no evidence the crisis produced a negative impact of immigration on the employment levels of natives, but it produced a negative effect on the employment

levels of earlier immigrants. The immigrant selection over the business cycle is analysed by Fernández-Huertas (2014). He finds that both pre-crisis and post-crisis immigrants were positively selected, yet the post-crisis ones were more positively selected. The institutional response facing the economic crisis is assessed by Domínguez-Mujica et al. (2014). The study presents the main Spanish government measures implemented to restrict the arrival of new immigrants: reducing work permit quotas, toughening permit requirements, and encouraging voluntary returns. The authors point out that their results were rather small-scale in nature.

The impact of the crisis on the employment of female immigrants in Spain is explored by Muñoz (2012). Results show that females were less affected by recession than males and that human capital had a higher positive impact in fighting unemployment among immigrant females than among males. Bradatan and Kolloju (2015) and Aysa and Cachón (2012) focus on Latin American immigrants in the US and Spain. The authors conclude that in Spain the deterioration of the unemployment rate was more significant. One reason is that immigrants in Spain remain in low-status employment even a long time since their arrival.

3. Sources and data

The dataset used in this paper covers 17 years with a quarterly frequency. We analyse the interactions between the fluctuations in immigrant employment, distinguishing between male (IM) and female (IF), and the Spanish business cycle during the period 1999-4Q/2016-3Q. The business cycle indicator is GDP in real terms. Immigrant employment corresponds to foreign workers affiliated with Social Security and registered as working. The sources of the data are the Spanish National Statistics

Institute (INE) for the GDP and the Ministry of Employment and Social Security for immigrant employment.

Based on the pioneer paper of Burns and Mitchell (1946), the fluctuations of the business cycle can be identified following different approaches. Our study is based on the 'growth cycle', which defines the cycle as fluctuations in periods of fast growth followed by periods of slow growth. Concretely, we use the growth cycle named 'deviation cycle' due to the fact that the analysis is based on fluctuations of the series with respect to the trend (Lucas, 1977) [2]. Thus, the cyclical component is calculated as the deviation of the original series with respect to the trend using the Hodrick-Prescott filter (HP)[3]. The cyclical component fluctuations determine the cycle and its turning points, peaks (P), and troughs (T). We identify two phases in the cycle: expansion and contraction. The cyclical component increases in the expansion phase, trough to peak, and decreases in the contraction phase, peak to trough.

Therefore, the variables are at quarterly frequency, seasonally adjusted, and in log-levels; thus, IF, IM, and GDP are the log-levels of the cyclical components.

4. Main features of cycles and synchronization

To identify the turning points, our study works with the algorithm of Bry and Boschan (1971) adapted to quarterly data by Harding and Pagan (2002). The procedure entails certain censoring rules. First, a local maximum/minimum is defined as the

[2] An alternative approach, known as the 'classical business cycle', focuses on changes in economic activity levels. However, many authors recommend the study of cycles by means of the 'growth cycle' and demonstrate its advantages. See for example Niemira and Klein (1994) or Diebold and Rudebusch (1999).

[3] Another possibility would be to calculate and compare the growth rates of the original series and of the trend.

highest/lowest point between the two preceding and following quarters to its position. That is, y_t is a peak at time t if y_t is the maximum ($y_{t-2}\ldots,y_{t+2}$), and it is a trough if y_t is the minimum ($y_{t-2}\ldots,y_{t+2}$). Second, a peak must be followed by a trough and vice versa to ensure that only completed cycles may be used. Finally, the minimum phase length is three quarters, and the minimum complete cycle length is five quarters.

Once we identify the turning points and define the expansion and contraction phases, we will present the features of the cycle in terms of duration, amplitude, delay, and synchronization. The duration (D) of a contraction (expansion) is the number of quarters that elapse between a peak and the next trough (trough and peak). The duration of the cycle is the number of quarters that elapse between peak and peak (trough and trough). The amplitude of a contraction (expansion) is calculated as the percentage change between the cyclical component value in the trough (peak) and the value in the previous peak (trough). The amplitude estimates the gains in terms of production (employment) in expansion phases and the losses in contraction phases. The delay is the number of quarters that a series lags (leads) in reaching the turning point with respect to a reference series; in our study the reference series is GDP. Throughout the paper, we focus on the average of the duration, amplitude, and delay.

By applying the turning-point algorithm, we obtain a set of peaks and troughs for the variables analysed. Table 1 presents these and the main features related to the duration, amplitude, and delay. All variables present two complete trough-to-trough cycles.

Table 1. Turning points and cycle features

The average duration of the GDP expansive phases is longer than the duration of the IF and IM, 9 quarters in front of 5 and 4.5, respectively. Instead, during contraction phases, the average duration of immigrant employment, female and male, is greater than that of the GDP (12, 12.7, and 10.7). Analysing the average lag, we can see that, regarding the GDP, immigrant employment leads in the peaks and lags in the troughs. In addition, the greatest amplitude, both in expansion and in contraction (absolute terms), is shown by GDP, followed by males and females.

Some findings can be deducted. First, immigrant employment displays a lower possibility of continued expansion over time than does economic activity, and greater difficulty in breaking down contractions. Second, during upward episodes, the capacity of the economy to generate immigrant employment is lower than its own capacity for growth. Third, in expansion phases, the creation of male employment is greater than that of females. However, the opposite occurs in contraction phases, where females' results are better than males'. Thus, in the upward periods, the Spanish economy is more prone to create male employment than female, but, in the downward periods, females have higher resilience to losing their employment.

Comparing our findings with those of Sala et al. (2016), which referred to the Spanish economy as a whole, some differences can be established. In the Spanish labour market, the females' results are worse than those of the males', in both the expansion and contraction phases. Sala et al. (2016) conclude that Spanish employment seems to be more prone to decrease this level than to increase it, which is especially significant in regard to female employment. Instead, in the case of immigrants, the employment of females is more resistant than that of males.

The presence or absence of asymmetries in the features of the phases affects the synchronization of cycles. Synchronization is defined as the amount of time two series (i, j) are in the same phase. The analysis of cycle synchronization is performed in two ways. First, as expounded by Harding and Pagan (2002), we use the concordance index (I), which for two cycles (i, j) is defined as:

$$I_{ijt} = T^{-1}\left[\sum_{t=1}^{T}(S_{it}\,S_{jt}) + \sum_{t=1}^{T}(1-S_{it})(1-S_{jt})\right]$$

where S_{it} (S_{jt}) is a binary variable that takes the value 1 when i (j) is in expansion and 0 when it is in contraction, and T is the number of observations. The index varies between 1 and 0, where 1 denotes perfect concordance and 0 denotes perfect absence of concordance.

The concordance index is not able to determine whether the co-movements are statistically significant. To overcome this difficulty, the correlation coefficient (ρ) between S_{it} and S_{jt} is estimated using the generalized method of moments (GMM) proposed by Harding and Pagan (2006). The moment condition is:

$$\mathrm{E}\ \left[\left(\sigma s_i^{-1}(S_{it}-\mu s_i)\,\sigma s_j^{-1}(S_{jt}-\mu s_j)\right)-\rho s\right]=0$$

where μ_s and σ_s are, respectively, the mean and the standard deviation of the series S_{it} and S_{jt}. This yields the following estimator:

$$\frac{1}{T}\sum_{t=1}^{T}\ \left[\left(\hat{\sigma}s_i^{-1}(S_{it}-\hat{\mu}s_i)\,\hat{\sigma}s_j^{-1}(S_{jt}-\hat{\mu}s_j)\right)-\hat{\rho}s\right]=0$$

We use the heteroskedastic and autocorrelation consistent (HAC) estimation procedure of Newey and West (1987) with Bartlett weights. The statistical significance can therefore be contrasted using the t-ratio.

The concordance index (I) achieves the values shown in Table 2. The male index is 0.71 and the female one is 0.62. The second indicator, the t-student of the correlation coefficient estimation between S_{ti} and S_{tj} (ρ), shows that only that of the male is statistically significant. This means that, overall, the immigrant employment fluctuations are pro-cyclical, although male employment and the business cycle present stronger pro-cyclical co-movements than female employment and the business cycle. This result agrees with that of the Spanish labour market as a whole[4].

Table 2. Concordance index and t-student

The indexes above provide information on the synchronization over the entire period. In order to make available a disaggregated analysis of synchronization, we calculate an asymmetry index (AI) that quantifies the trend of synchronization along the time (Larsson et al., 2009, citing Hassler, 2003). The asymmetry index between two variables (i, j) in the period t is defined as:

$$AI_{ijt} = \left| c^*_{it} - c^*_{jt} \right|$$

where c* is the cyclical component of the series GDP, IF, and IM, standardized using the standard deviation (σ):

$$c^* = c/\sigma,$$

In the period t, lower values of AI imply higher levels of synchronization, with 0 as the minimum value, which implies that both variables are fully synchronized.

Figure 1 plots the AI and the adjusted linear trend, and below we can find the linear trend estimated equation. Overall, on the one hand, the immigrant female employment's

[4] See Sala et al. (2016).

AI is higher than that of the male. On the other hand, the negative slope of the male lineal trend contrasts with the stability of the female slope. The outcomes reaffirm and widen those related to the synchronization on the whole period: male immigrant employment is more pro-cyclical than female immigrant employment and, over time, draws near to the business cycle, while female immigrant employment keeps its asymmetry level.

Figure 1. Asymmetry index (males and females with respect to GDP)

5. Business cycle and 2007 crisis

We wonder to what extent the crisis initiated in the middle of 2007 modified the cyclical fluctuations of immigrants' employment and whether there are significant differences between female and male employment. We separate the asymmetry index (AI) into two periods, pre- and post-crisis. The pre-crisis period lasts until 2008-1Q because in this quarter the GDP reached the peak previous to the downturn (Table 1).

Figure 2 plots the pre-crisis period, and we can stress that the employment of females and males presents different behaviour. Both have positive slopes; however, that of females is steeper than that of males. Female immigrant employment outcomes display more independence with respect to the business cycle than do male employment outcomes. This situation does not change in the post-crisis period, but it does change the slope of the males' employment. As we can see in Figure 3, it becomes negative, hence, the post-crisis period implies that the employment of male immigrants moves close to the business cycle.

Figure 2. Asymmetry index pre-crisis period (males and females with respect to GDP)

Figure 3. Asymmetry index post-crisis period (males and females with respect to GDP)

These results might mean that an 'added worker effect' is present in immigrant employment behaviour. It is common in the literature covering economic models of family utility maximisation to conclude that, on the one hand, during downturn periods, a temporary increase of the labour market supply can be found because individuals try to compensate the family income losses, due to their partners' job loss, by entering the labour market or by increasing their working hours. This is known as the 'added worker effect' (Woytinsky, 1940; Humphery, 1940; Long, 1958; Mincer, 1962, 1966)[5]. In general, it seems to be a female phenomenon[6], which could explain why females are more counter-cyclical in response to the business cycle (Hotchkiss & Robertson, 2012; Belaire-Franch & Peiró, 2015). Fromentin et al. (2016) state that the employment of immigrant males has been severely hit by the crisis, while it affected women more slightly. The crisis brought out an empowering of working women because for some immigrant families their wages became the main or the only family income (Domínguez-Mújica et al., 2014). This is what our findings show. Immigrant females' employment is less pro-cyclical than males', both in expansion and in contraction phases; that is, its evolution is less synchronized than that of males and tends to move away from the business cycle. This behaviour becomes more evident during the 2007 crisis. Hence, an 'added worker effect' might have been the answer for Spanish

[5] This phenomenon has been widely studied. The crisis of 2007 has reignited the interest in assessing its presence in the labour market. Recent studies, such as those of Gong (2010), Addabbo et al. (2013), Starr (2014), Ayhan (2015), Giannakopoulos (2015), Karaoglan & Okten (2015), Kesselring & Bremmer (2015); Laurie et al. (2015), and Triebe (2015) provide a conceptual framework and/or a review of the literature in these issues.

[6] In fact the literature tends to define the 'added worker effect' as a response of married women's labour supply to their husbands' job loss.

immigrant families whose employed members experienced layoffs or restrictions in work hours.

6. Does the origin matter?

We have found a different behaviour between immigrant females' and males' employment, which has become more acute after the 2007 crisis. We introduce in this section a new variable in the analysis: the origin of the immigrants. We study to what extent origin plays some role in immigrant employment fluctuations both pre- and post-crisis. We carry out a shift-share analysis to find out whether origin matters. We follow the steps below.

1. We divide immigrants into five categories (i), based on their birthplace: Europe, Africa, North America, Central and South America, and Asia[7].

2. We define the pre-crisis amplitude (A) of IF and IM as the percentage of change of these variables between the last GDP peak before the crisis (2008-1Q), and the first GDP trough of the period of study (2004-4Q). In the same way, the post-crisis amplitude (A) of IF and IM is the percentage of change of these variables between the last GDP trough of the crisis period (2013-3Q) and the last GDP peak before the crisis (2008-1Q).

In both cases, we define A as:

$$A_{ij} = \frac{c_{ij}(t+m) - c_{ij}(t)}{c_{ij}(t)} = \frac{\Delta c_{ij}}{c_{ij}(t)}$$

$$\Delta c_{ij} = A_{ij} * c_{ij}(t) \qquad (1); \quad \text{where:}$$

[7] Within the South America category we include the Central America countries, Cuba, and the Dominican Republic. Also, the analysis does not incorporate Oceania because its data are insignificant.

c = the cyclical component of the series IF and IM
t = initial period
t+m = final period
i = origin of the immigrants
j = gender

3. We apply a shift-share analysis to identify if origin determines the evolution of the immigrant employment cyclical components.

The expression (1) can be rewritten as:

$$\Delta c_{ij} = A_n * c_{ij}(t) + (A_{in} - A_n) * c_{ij}(t) + (A_{ij} - A_{in}) * c_{ij}(t)$$

Where:

$A_n * c_{ij}(t)$ is the growth that the cyclical component of the immigrant employment of origin *i* and gender *j* would have observed if it had grown as the immigrant employment as a whole.

$(A_{in} - A_n) * c_{ij}(t)$ indicates which part of the discrepancy between the growth of immigrant employment as a whole and that of c_{ij}, is due to the fact that immigrant employment of origin *i* has grown differently from that of the whole (we named it the Origin-Mix effect: OM_{ij}).

$(A_{ij} - A_{in}) * c_{ij}(t)$ indicates which part of the discrepancy between the growth of immigrant employment as a whole and that of c_{ij} is due to the different growth of the gender *j* in the origin *i* (Gender-Share effect: GS_{ij}).

4. We plot an XY-graph where in the abscissa is represented GS_{ij} and in the ordinate OM_{ij}. In order to show a quick overview of the divergences, we define each quadrant with respect to the shift-share analysis as follows:

Upper-right quadrant: advantages both in origin and in gender

Bottom-right quadrant: advantages in gender and disadvantages in origin

Upper-left quadrant: advantages in origin and disadvantages in gender

Bottom-left quadrant: disadvantages both in origin and in gender[8].

Pre-crisis period results

Figure 4: Pre-crisis shift-share effects

What are the Figure 4 results?

1. In two cases the origin, but not the gender, is the determining variable: North America and Asia. North American immigrants present advantages in their origin, while Asian immigrants show disadvantages.

2. European immigrant males show advantages both in origin and in gender, and European females present advantages in origin and disadvantages in gender.

3. African females reach advantages both in origin and in gender, and African males present advantages in origin and disadvantage in gender.

4. South American males display advantages in gender and disadvantages in origin, and South American females, with disadvantages both in origin and in gender, achieve the worst position.

Post-crisis period results

Figure 5: Post-crisis shift-share effects

What are the Figure 5 results?

1. European immigrants get advantages in origin, but not in gender.

2. North American immigrant females catch advantages in gender but disadvantages in origin, and males present disadvantages both in origin and in gender. In both cases, the gender factor is not very important.

[8] In the post-crisis period, we work in absolute terms to be able to express the advantages and disadvantages in gender and origin in the same way shown for the pre-crisis period.

3. We can see the same result for Asian immigrants. However, the gender advantages of females are more pronounced than those of North American females.

3. African females achieve advantages in gender, and African males disadvantages, although in both cases the effects have little significance.

4. South American males show advantages in origin and a scant disadvantage in gender, and South American females, with advantages both in origin and in gender, achieve the best position.

Figures 4 and 5 indicate that not only gender but also origin matters. Furthermore, over time, all cohorts have undergone changes in their localization. Thus, the post-crisis period has important differences with respect to the pre-crisis period. To detect the categories of people who have improved the most and those who have worsened the most, we calculate, first, the total-shift effect (TS_{ij}), as the sum of the OM_{ij} and GS_{ij}, and second, we compare the TS values pre-crisis and post-crisis (Table 3)[9].

Table 3. Total-shift effect (TS). Comparative pre- and post-crisis

Table 3 shows that in the pre-crisis period female TS levels are worse than those of males; instead, in the post-crisis period they are better. The shift-share analysis confirms our previous results which indicate the greater resilience of females. This outcome agrees with the results of Motellón and López-Bazo (2015), Domínguez-Mújica et al. (2014), and Muñoz (2012), who conclude that the effect of the crisis had lower influence on the lay-off rate among females than among males, and also with those of

[9] Ultimately, TS_{ij} indicates the difference between the growth achieved by the different cohorts and that which they would have had if they had grown at the same rate as the set of the immigrant employment.

Fernández-Huertas (2010), who finds that after the beginning of the crisis, the flows of immigrants decreased but the share of females increased.

Moreover, as we can see in Table 3, on the one hand, the greatest difference between the growth achieved by the different cohorts and that they would have achieved had they grown at the same rate as the set is that of South American and Asian females, which indicates their relative improvement during the downturn. On the other hand, the categories that have seen the worst change in their relative situation are North American and European male immigrants.

To this point, our results agree with those reported in the literature, which state that the crisis hit harder on male immigrant employment. One of the main reasons highlighted is their concentration in sectors highly sensitive to the economic cycle, such as construction or industry, where most workers are men (see, for example, Carrasco & García-Pérez, 2015; Motellón & López-Bazo, 2015; Murillo-Huertas & Simón, 2017). However, activities in which women are more concentrated, as elder care, health care, and domestic work, are less cyclical and act as 'shelter sectors' (Aysa & Cachón, 2012). This fact is especially significant in the Spanish economy, where the construction sector gathered 20% of the male immigrant employment, and where roughly 60% of the female immigrant communities are domestic and care workers, cleaners, and waitresses (CESsVQT, 2011; Iglesias et al., 2015). Furthermore, most of the females from South America and the Philippines have the additional benefit of speaking the same language

and are socially much closer to Spanish culture than other immigrants, which is very important in those kinds of jobs[10].

With respect to European and North American immigrants, it is worth noting that they generally have higher levels of education. Although some studies, such as those by Medina et al. (2010) and Miguélez et al. (2014), state that higher levels of education act as protectors of immigrants' employment, our findings seem not to agree. In our opinion, there are two main factors that might explain why the worst change observed corresponds to European and North American male immigrants. On the one hand, the nature of the 2007 crisis also implied the destruction of a great many high-skill jobs, mostly occupied by men. On the other hand, higher education levels allow people to search longer for alternative employment after becoming unemployed (Xuanren & Sakamoto, 2016). Both facts may be behind the worse situation of those cohorts during the crisis.

7. Conclusions

Our paper contributes to the literature that seeks to analyse the immigrant employment cycle. The study provides evidence on the interaction between Spanish business and immigrant employment cycles using data over the period 1999–2016. The paper works on three main goals. First, we identify and compare the phases of the cycles, pointing out their main features and their synchronization level. Second, the effects of the 2007 crisis are pointed out. Finally, we introduce the role played by the origin of immigrants over our results. The entire inquiry is carried out by distinguishing between female and male immigrants.

[10] In the case of the Philippines, they either speak Spanish or some local language with a strong Spanish influence. In addition, usually, an added value of household caregivers of children is their knowledge of English.

The outcomes suggest that the immigrant employment fluctuations reach their peaks before than the economic activity, and show greater difficulty to break during contraction phases. The amplitude of the expansion phases reveals that the Spanish economy has more capacity for growth than for creation of immigrant employment; also, the improvement achieved by female employment is lower than that of male employment. However, in contraction phases, females show higher resilience to losing their employment. These features drive male immigrant employment to be more synchronized with the business cycle. By including in the analysis the effects of the 2007 crisis, the results indicate that this behaviour continues during the post-crisis period. Female immigrant employment still shows more independence with respect to the business cycle than does male employment, which even comes closer to the business cycle than in the pre-crisis period.

The study also confirms that the origin of immigrants matters. We find different behaviour over the business cycle depending on immigrants' origin. Furthermore, all cohorts have undergone changes over time with respect to their relation with the business cycle. The categories that have experienced the worst changes between the pre- and post-crisis period are North American and European male immigrants. On the other side, South American and Asian females are those who have improved the most.

The Spanish economy and its labour market show that male immigrant workers are highly concentrated in low-skilled jobs within sectors more sensitive to the business cycle; this makes them suffer more intensely the effects of the contractions. Instead, contractions hit female immigrants' employment less because of two factors. First, due

to an 'added worker effect', immigrant women were pushed to apply for jobs when their families' employed members were fired or experienced restrictions in their work hours. Second, they increased their presence over time in certain services related to health care, people care, and domestic work, which have exhibited less sensitivity to the business cycle.

The results regarding gender and origin differentials merit further research. The study of five categories with the same origin seems insufficient to understand the idiosyncrasy of the different subcategories and their relationship with economic activity. For instance, if highly skilled immigrant workers are more important than it could appear (García, 2009; Godenau et al., 2014), the distinction between natives and immigrants is not the best way to discern the linkage between the immigrant labour force and the business cycle. Therefore, in future enquiries, we should explore more thoroughly the nature of the relationship between different subgroups of immigrants, in terms of gender and economic activity.

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Table 1. Turning points and cycle features

	Peaks	Troughs		Peaks	Troughs		Peaks	Troughs
GD	2001-1Q	2004-4Q	**IF**	2002-2Q	2004-4Q	**IM**	2002-2Q	2004-4Q
	2008-1Q	2009-3Q		2005-3Q	2010-4Q		2005-3Q	2009-4Q
	2010-4Q	2013-3Q		2012-1Q	2013-4Q		2011-2Q	2014-1Q

Features of the cycle phases				
Average duration			**Average amplitude**	
	Contraction	**Expansion**	**Contraction**	**Expansion**
GD	10.7	9	-319.07	278.22
IF	12	5	-166.73	106.36
IM	12.7	4.5	-315.97	150.57

Average lag (GDP reference series)		
	Peaks	**Troughs**
IF	-0,7	2,0
IM	-1,0	1,0

Note : *+ (-) denotes a lag (lead) with respect to the reference series*

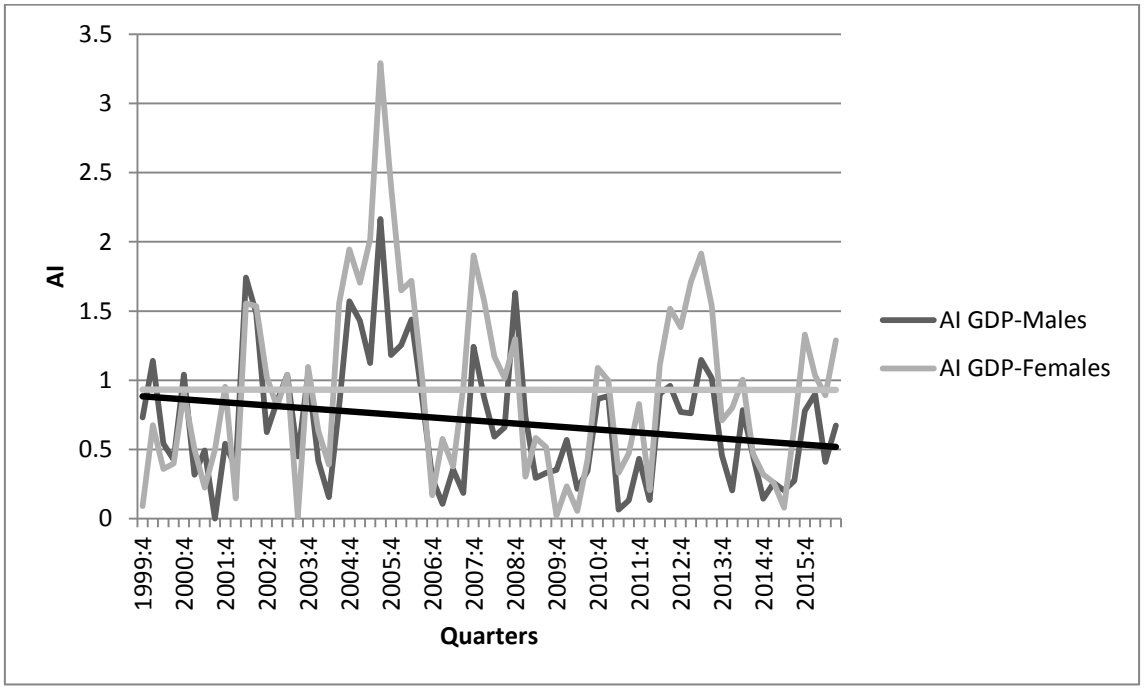
Table 2. Concordance index and t-student

	Concordance index	t-student
GDP-IF	0.618	1.246512
GDP-IM	0.706	2.530672

Table 3. Total-shift effect (TS). Comparative pre- and post-crisis

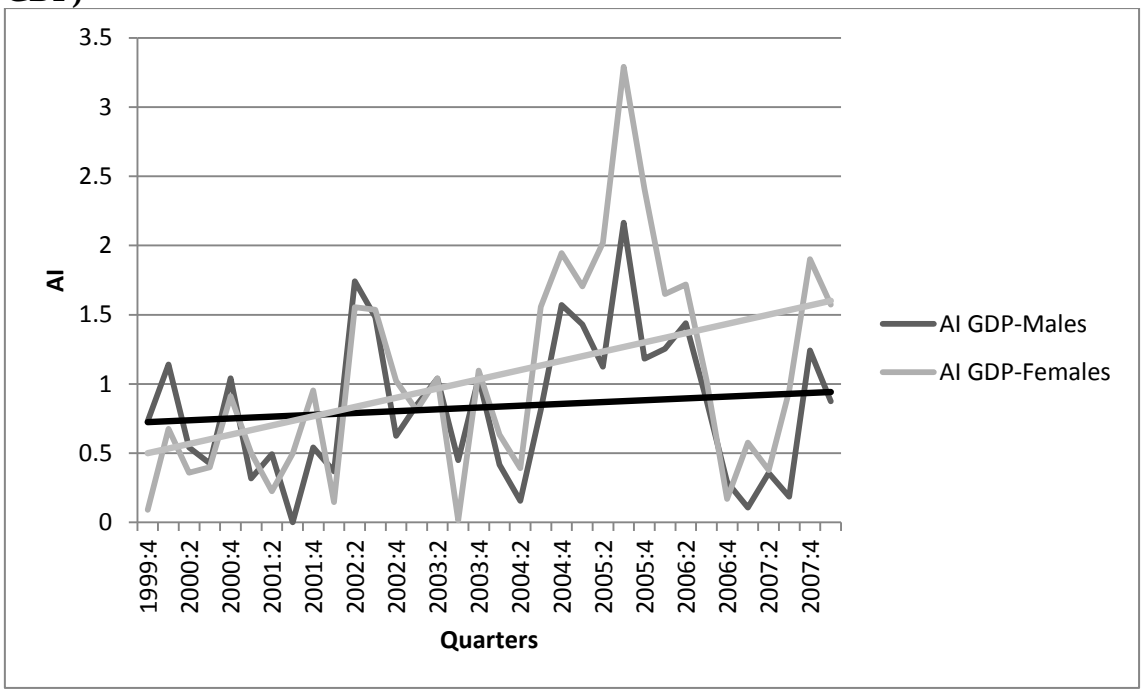
	Europe	Africa	North America	South America	Asia
TS_{ij} pre-crisis					
Females	0.03734352	0.40722425	0.72298941	-0.53830005	-0.43019112
Males	0.60324093	0.17861819	0.73609826	-0.17461405	-0.42734886
TS_{ij} post-crisis					
Females	0.11344491	0.12081338	-0.0160526	2.41659705	1.72084286
Males	0.05297043	-0.16053215	-0.36313654	-0.18710343	-0.72915714
(TS_{ij} post – TS_{ij} pre)					
Females	0.0761014	-0.28641087	-0.73904201	2.9548971	2.15103398
Males	-0.5502705	-0.33915035	-1.0992348	-0.01248937	-0.30180827

Figure 1. Asymmetry index (males and females with respect to GDP)



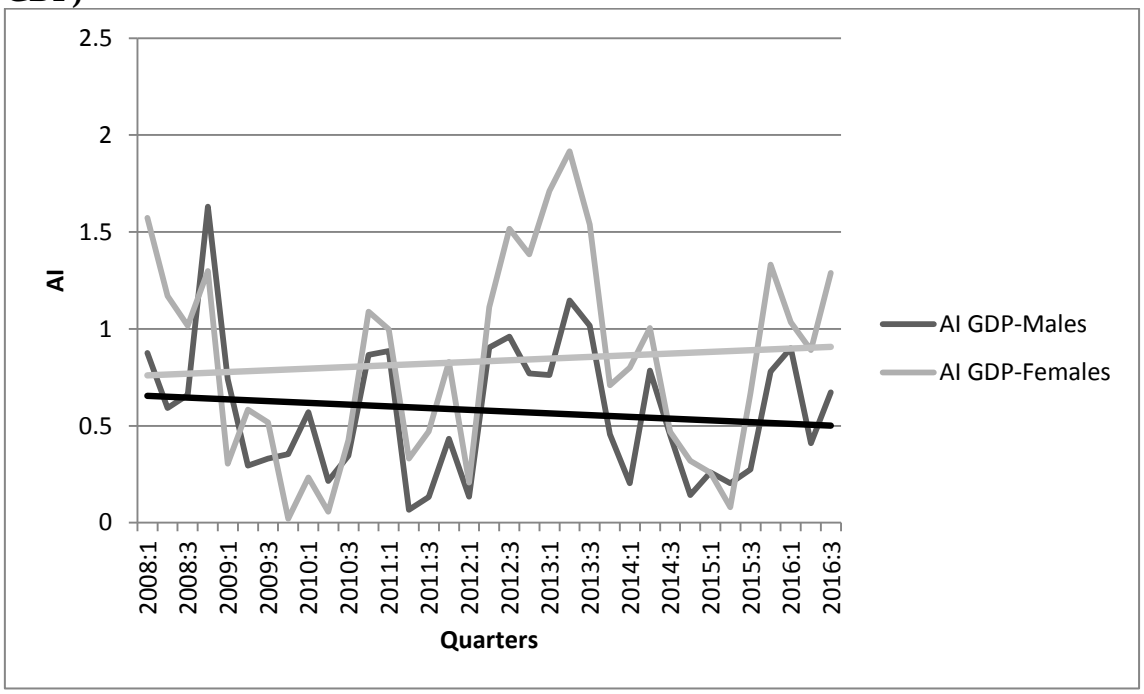
$Y_{IF} = –3E\text{-}05X + 0.9322$ $Y_{IM} = –0.0054X + 0.883$

Figure 2. Asymmetry index pre-crisis period (males and females with respect to GDP)



$Y_{IF} = 0.0333X + 0.4672$ $Y_{IM} = 0.0065X + 0.7187$

Figure 3. Asymmetry index post-crisis period (males and females with respect to GDP)



$Y_{IF} = 0.043X + 0.7551$ $Y_{IM} = -0.0045X + 0.6598$

Figure 4. Pre-crisis shift-share effects

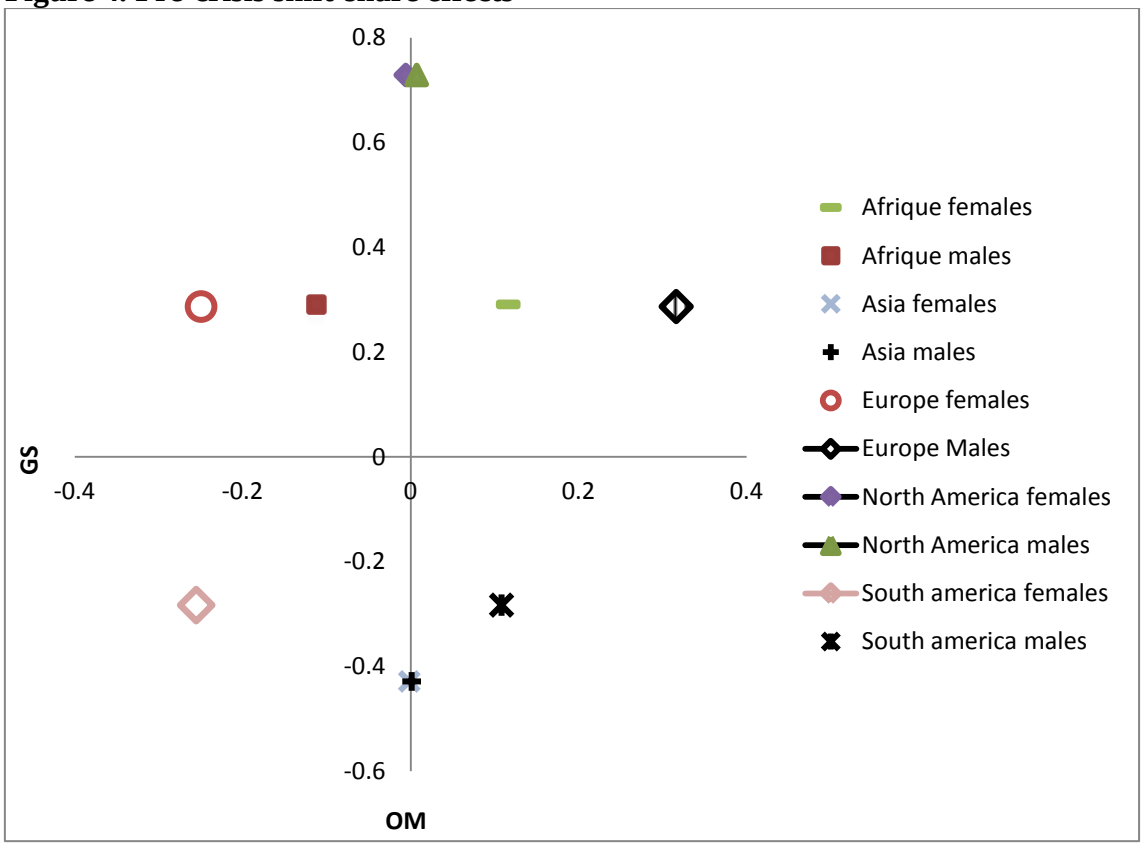


Figure 5. Post-crisis shift-share effects