

Into the Abyss: Occupational Segregation of Immigrant Workers and the Spanish Crisis 2006-2012

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Abstract

Spain became one of the world's top immigration destinations in the 21st century, with the share of migrants in employment climbing to a peak of 17% just as the crisis hit the country. How did these immigrants fare in a rigid labour market as the housing bubble burst and recession brought soaring unemployment? Our paper explores the occupational segregation of Spain's immigrants and finds that it declined in the wake of the crisis. The improvement, however, obscures massive job destruction in temporary jobs and in the low-skilled sectors where foreigners were concentrated. The results point to the need for better skills and training and measures to tackle the deep permanent/temporary contract divide in Spain, to protect migrant workers as well as unskilled Spaniards.

Keywords

occupational segregation, (im)migration, temporary contracts, rigid labour markets

1. Introduction

Immigration, which has doubled worldwide since 1965, is perhaps the most visible evidence of globalization and a phenomenon with great potential benefits for the immigrant as well as both sending and receiving countries. It poses daunting challenges, however, the most important being for the host country to integrate immigrants into its labour market and eventually its society.

Often, this integration is not fully successful. Both in good and in bad times, the labour market outcomes of immigrants tend to lag behind those of native workers, even when their backgrounds are similar. Foreign workers are often concentrated in certain jobs and industries, which may be especially sensitive to the business cycle, and they usually work under more precarious contractual conditions. Immigrant businesses also tend to be smaller and have less access to credit (OECD, 2009). In times of crisis, immigrants are usually the hardest hit, and may continue to experience poorer labour market outcomes once the recovery is underway. Since work is the main avenue of integration into society, achieving higher-quality work outcomes for immigrants should be a key objective for countries seeking fuller integration.

Spain, a country which experienced both rapid immigration (Note 1) flows and one of the most protracted recessionary gaps in the OECD following the financial crisis, is a good case study of these challenges. A country with heavy outward migration in its past, Spain began to receive the largest flow of inward migration in Europe starting around 1998 and accelerating after 2000. The number of immigrants rose by double digits every year before the crisis, and they represented more than 15% of the population by 2011 (Note 2) (see Table 1 below). Spain's immigrants were concentrated in household employment, agriculture, construction and other services, especially restaurants and hotels.

Table 1. Migrant Population in Spain and Rate of Change, 1998-2012

Year	Migrant population	% Change over previous year
1998	637,085	
1999	748,954	17.6%
2000	923,879	23.4%
2001	1,370,657	48.4%
2002	1,977,946	44.3%
2003	2,664,168	34.7%
2004	3,034,326	13.9%
2005	3,730,610	22.9%
2006	4,144,166	11.1%
2007	4,519,554	9.1%
2008	5,268,762	16.6%
2009	5,648,671	7.2%
2010	5,747,734	1.8%
2011	5,242,930	-0.9%
2012	5,130,841	-2.14%

Source: Instituto Nacional de Estadística, 2016a.

When the financial crisis hit in 2008 and Spanish unemployment began to soar, the migration flow at first continued. Figures from the National Statistics Institute (INE) showed that the number of migrants continued to rise every year, albeit at a lower rate, up to 2011. Unemployment rates for non-European immigrants were substantially higher than for the native population, as Table 2 below shows. The steady fall in outward workers' remittances registered by the Bank of Spain after 2008 reflected a declining earnings profile for the immigrant population since the crisis began.

Table 2. Unemployment Rates in Spain, by Nationality (%)

Year	Overall	Spanish	Double	Foreign	EU	Non-EU	Latin	Other
	8.7	8.5	9.2	10.2	8.5	9.6	9.2	14.2
2006	8.3	7.7	8.8	12.0	10.0	10.3	11.4	16.2
2007	8.6	7.9	10.5	12.4	11.4	17.1	10.8	17.1
2008	13.9	12.5	15.8	21.3	18.0	21.4	19.4	30.4
2009	18.8	16.6	27.0	29.7	24.0	29.4	27.7	42.4
2010	20.3	18.3	26.5	30.4	29.0	25.5	25.7	43.0
2011	22.9	19.5	26.5	36	28.9	29	29.5	45.1
2012	26.0	22.9	30.9	36	30.6	34.4	34.4	46.1

Source: Instituto Nacional de Estadística, 2016b. Figures for 4th quarter of each year. Own elaboration.

The crisis had profound effects on Spain's immigrant population. Their unemployment rate climbed until one in every five jobless workers in Spain was an immigrant in 2012. Many of these workers received unemployment benefits: the number of immigrants eligible for benefits in Spain doubled, although the coverage ratio in mid-crisis (2011) was only 31.4% for immigrants, down from 42.2% in 2009. Those who kept their jobs often found their hours and pay reduced, and some moved onto the informal economy. Beginning in 2012, aggregate data showed that many migrants were leaving Spain to return home.

Farber and Allard (2012) studied the occupational segregation of immigrants in Spain before the crisis and found that immigrants were disproportionately concentrated in a few low-skilled occupations, which tend to be the jobs that the OECD calls “3-D jobs” (dangerous, difficult and dirty, OECD, 2009). This paper will analyze the situation just before the end of the recession, and determine whether and how occupational segregation changed due to the economic and financial crisis, and what characteristics helped immigrants to keep their jobs. The outline of the paper will be as follows: after the introduction, we review the theory on occupational segregation and offer our hypotheses; then we describe how the situation evolved between 2006 and 2012 (Note 3) and review the results. Finally, we provide some explanations, policy recommendations and conclusions.

2. Theory and Hypotheses

When certain groups of people-defined by race, nationality or sex-are compressed into particular occupational categories and are disproportionately concentrated there, they are said to suffer from *occupational segregation*. Occupational segregation may take two forms: *vertical* segregation, which refers to the underrepresentation of this group in high-status occupations; or *horizontal* segregation, which refers to their over- or underrepresentation in certain jobs across the economy. Focusing the analysis on occupations rather than sectors can reveal “crowding” in certain jobs that might be masked by more macro-level data. The concern over occupational segregation is that particular groups of people may be denied a choice of occupations because of systematic barriers arising from economic, political or social forces, institutions or attitudes. This in turn affects their relative earnings, and may delay their full integration into society. When immigrants are concentrated into specific occupational types, this may imply the creation and reinforcement of stereotypes, which are often negative.

Researchers on occupational segregation frequently focus on the over- or underrepresentation of women and sometimes minority groups in certain jobs across the economy. Research on the job segregation of immigrants as a special case of occupational segregation has been less common (for some studies, see Simón, Ramos, & Sanromá, 2011; Del Río & Alonso-Villar, 2011; Catanzarite, 2000; Liu, Zhang, & Chong, 2004). Whatever the reason for the segregation, extensive research in sociology and in economics has found that it is pervasive in different realms and can be quite persistent.

While many studies have demonstrated that occupational segregation exists for different ethnic and gender groups within given countries, fewer have studied how business cycle fluctuations may drive or change occupational segregation over time. Those that have analysed trends in segregation generally focus on differential treatment or broader segregation or employment outcomes for women or ethnic or racial minorities. Only a few have tracked changes in occupational segregation during unusual periods, like those of economic crisis.

The literature on segregation at times of economic crisis proposes three different theories for how the outcomes for segregated workers will evolve. The first, the “buffer” theory, states that white, male employees have a monopoly power in the labour market that is responsible for the differential outcomes for minorities and women (Becker, 1971). Race, ethnic and gender prejudice relegate minorities and women to peripheral sectors of the economy, where wages are lower and jobs less secure, and these groups constitute a “reserve army” that is incorporated during expansions and expelled during crisis (Mandel, 1968). White male workers are given employment preference in downturns and are hence more insulated. While no predictions about occupational segregation are made by these theorists, the implication is that it would decline in crisis, as women and/or minorities

were replaced across the economy by white men, who would displace them even in the sectors and jobs where they were most highly concentrated.

One of the authors who test this theory is Cummings (1987), who analysed the vulnerability of female and minority workers in the U.S. recession of 1974-1975. He found that female workers reported rates of labour market disruption that were consistent with workers in general during the crisis, but for minority workers these disruptions were significantly higher. He attributed the fate of minority workers to both institutional factors-minority workers had acquired less seniority and were thus more vulnerable to layoffs in the monopoly sectors most affected by the recession-and to simple prejudice. In South Korea, Kim and Voos (2007) found that women were a “buffer” during the 1997-2002 economic downturn that followed the East Asian financial crisis: they were the first to be laid off and were “encouraged” to withdraw from the labour market to allow employment of male workers. Occupational segregation by sex in this case declined substantially.

The second theory is the job segmentation hypothesis, which is consistent with rising occupational segregation at times of crisis. Neo-Marxist and dual economy theorists contend that large, monopoly firms tend to be more susceptible to economic downturns than firms in more competitive sectors (Mandel, 1978). Monopoly-dominated sectors are highly unionised and highly mechanised, and the workers in these sectors, who are better paid, tend to be white males. Females and minorities, in contrast, tend to work in more competitive sectors that are less vulnerable to the instability that accompanies crises of overproduction. This may cause occupational segregation, but when the crisis comes the segregation may actually insulate the less privileged workers from its worst effects. Milkman (1976) proposed this theory to explain her findings that occupational segregation for American women rose between 1930 and 1940, during the Great Depression. She argued against the reserve army theory and postulated that sex segregation of occupations “creates inflexibility in the labour market which prevents [women’s] expulsion during a crisis of contraction”. Blackwelder (1984) also concluded from her study of women and minorities during the Depression that economic crisis reinforces occupational segregation by both sex and race. Lim (2000) did not measure occupational segregation, but he found that male unemployment worsened more than female unemployment in the Philippines during the East Asian crisis because of the bigger decline in the tradable and industrial sectors where most men were employed. The female-intensive service sector (community, social and personal services, and wholesale and trade sectors) was not as hard hit.

Finally, theorists have also proposed the substitution hypothesis, which predicts that during recession employers will substitute lower-cost (women) workers for higher-cost (men) workers (Humphries, 1988), or will substitute unstable jobs (women) for stable jobs (men). If this were to occur, occupational segregation would also decline during a crisis, as the segregated group spreads out into a wider range of jobs than before. While this results in greater labour market participation by women, it also may be accompanied by deteriorating economic status and a decline in female welfare (Cagatay, 1996).

Sometimes researchers have found that one outcome is observed for women and a different one for racial minorities. Such was the case for Cummings (1987) and Helmbold (1988), who also studied women in the Great Depression in the United States. Helmbold found that sex segregation of occupations initially protected women, since they were much less likely to work in the industries immediately affected by the downturn (production and construction). However, as the crisis spread to other sectors and occupations, women used downward occupational mobility as their survival strategy, moving down the job “ladder” into less desirable work (e.g., housekeeping) to defend themselves

against unemployment. This worked for white women but not for black women, who were “pushed off” the bottom rungs of the ladder into unemployment. Similarly, crisis may cause segregated workers to be expelled into informal markets (Beneria & Roldan, 1987; Sen, 1991; Moser, 1992).

At times of economic expansion and changing social and cultural attitudes, some researchers have found that occupational segregation declines. This was the case in Britain in 1979-1990, when Hakim (1992) found that during the long expansion, occupational segregation fell sharply in 550 occupational groups. She predicted a similar decline for the 1990s, with a consequential impact on the male-female earnings gap, thanks to growth of integrated occupations and changing patterns of vertical segregation. Farber and Allard (2012) studied the occupational segregation of immigrants in Spain just as the financial and economic crisis began in 2008, and found that foreign workers were in fact more segregated by occupation than their Spanish counterparts. Even though foreign workers represented only 22% of total employment in occupations 5 to 9 in the ISCO (Note 4) classification, they contributed 78% to overall occupational segregation. According to the data in the third trimester of 2008, 35.4% of workers (Spanish or foreign), or approximately 4.2 million people, would have had to change occupations at that time in order to achieve complete equality between national and foreign workers. The occupations into which foreign workers were concentrated were those employing skilled and unskilled workers for the construction sector, in particular, but also for industry; and service workers in restaurants, commerce and personal and security services. Occupational segregation was especially severe for immigrant women and for illiterate foreigners. The segregation of immigrants into these jobs made it reasonable to predict that when the country was hit by the bursting of the real-estate bubble and the global downturn, foreign workers would be disproportionately affected, since they were overrepresented in the most vulnerable sectors (construction and other low-skilled services). The message was consistent with the findings of Amuedo-Dorantes and De La Rica (2007), who found that occupational attainment for immigrants to Spain was lower in 1997-2001, although it tended to improve over time, especially for Europeans and the highly educated.

In this paper, we approach the situation during the period 2006 to 2012 to see whether the crisis and very high unemployment rates intensified or reduced the level of occupational segregation of immigrants in Spain. Our source is Spain’s labour market survey (*Encuesta de Población Activa*, or EPA), which does not follow individuals through their working lives (some authors like Malo and Garrido (2010) have used the *Muestra Continua de Vidas Laborales* for longitudinal analysis). Some factors could lead us to expect that occupational segregation would rise in the context of economic crisis. The scramble for jobs could actually aggravate the skills mismatch; and the difficulty of finding work might lead immigrants to lean more heavily on social networks, intensifying “inbreeding bias” (Arrow, 1998) and causing occupational segregation to remain at least stable, if not worsen. Additionally, Spain’s rigid labour market might continue to lock most of them out of jobs requiring firm-specific skills and training, since most immigrants are new arrivals and on temporary contracts. This would leave both vertical and horizontal segregation either the same or worse. Human capital and skill-atrophy factors would continue to work against immigrants, who are perceived as temporary and lacking in experience, and are not provided with the firm-specific training that permanent workers receive.

However, the very high unemployment rate for foreign workers in Spain makes it more likely that they were pushed off the bottom rungs of the occupational ladder, like American blacks in the Great Depression, into unemployment or informal work. Additionally, the sector hardest hit in Spain was not a monopoly sector that employed high-wage white males, but rather the construction sector, where

immigrants were already highly concentrated. All of these factors lead us to believe that occupational segregation of immigrants in Spain declined between 2006 and 2012. Hence we posit the following hypothesis:

H1: The persistence of cultural and institutional factors and the occupational segregation of foreigners into vulnerable, low-skilled sectors will have caused the level of occupational segregation of immigrants to fall in Spain between 2006 and 2012.

3. Data and Methodology

For our analysis, we use data from the second quarters of 2006, 2009 and 2012 from the labour force survey (*Encuesta de Población Activa* or EPA) conducted by the National Statistics Institute (INE) following Eurostat guidelines. This quarterly survey offers labour market information from a representative sample of households. We disaggregate the occupations using the ISCO classification at a three-digit level to allow a more detailed analysis of the occupational segregation indexes, and at a one-digit level for the descriptive analysis. This permits us to discern whether very aggregate data obscure some segregation (e.g., immigrants and natives may work in different sub-sectors of the same broad occupational categories). We also refer to the one-digit level for descriptive purposes. We select these years in order to capture the situation of immigrants just before the crisis, during its first year, and near the end (Spain's economic recovery began at the end of 2013). The time period also enables us to isolate a phase between major labour market reforms (Spain enacted a minor reform in 2006 and a very significant one in 2012, whose effects would take some time to be observed).

The ISCO-88 occupational classification is divided into nine major groups at its most aggregate level (one digit) and the numbers imply a skill hierarchy, ranging from 1 for jobs with higher skill content to 9 for lower-skilled jobs, as shown in Table 3 below:

Table 3. ISCO Occupational Classification and Skill Contents

Major occupational groups	Skills
1. Legislators, senior officials and managers	1. Large range of skills not specified but higher qualifications
2. Professionals	2. Tertiary education (begun at ages 17-18 and lasting 3-6 years and leading to university degree or equivalent)
3. Technicians and associate professionals	3. Tertiary education (begun at ages 17-18 and lasting 3-4 years, but not giving equivalent of university degree)
4. Clerks	4. Secondary education (begun at ages 11-12 and lasting 5-7 years)
5. Service workers and shop and market sales workers	5. Secondary education (begun at ages 11-12 and lasting 5-7 years)
6. Skilled agricultural and fishery workers	6. Secondary education (begun at ages 11-12 and lasting 5-7 years)
7. Craft and related workers	7. Secondary education (begun at ages 11-12 and lasting 5-7 years), low skill type of occupation
8. Plant and machine operators and assemblers	8. Secondary education (begun at ages 11-12 and lasting 5-7 years) but higher specialization than occupation 7
9. Elementary occupations	9. Primary education (begun at ages 5-7 and lasting approximately 5 years)

Source: International Labour Office (1990).

Our tool to measure occupational segregation is the Marginal Matching (MM) index presented by Blackburn, Siltanen and Jarman (1993, 1995). The symbols in the equations below represent the number of foreign workers in foreign-dominated occupations (Fg_{fg}), the number of Spanish workers in Spanish-dominated occupations (Sp_{sp}), the number of foreign workers in Spanish-dominated occupations (Fg_{sp}) and the number of Spanish workers in foreign-dominated occupations (Sp_{fg}). Fg and Sp are the total workers in foreign- and Spanish-dominated occupations.

$$MM = (Fg_{fg} * Sp_{sp} - Fg_{sp} * Sp_{fg}) / Fg * Sp \quad (1)$$

The Marginal Matching (MM) index is not sensitive to changes in the occupational structure of the labour force, so it is especially well suited to our analysis of the period 2006-2012. It measures the changes in occupational segregation by national status that result exclusively from changes in the nationality compositions of the occupations in the data.

The MM index ranges from 0 to 100, with the numerical value indicating the percentage of Spanish or foreign workers that would need to shift occupations in order for the two distributions to equalize. An MM of 0 means nationalities are represented equally, while a value of 100 denotes complete occupational segregation. We complement the MM index with the Mutual Information (MI) index characterized by Frankel and Volij (2007) (Note 5). Rather than confirming the existence of occupational segregation, this new index of *local segregation* explores the situation of several subgroups taken separately. We analyse whether nationality, gender and type of contract affect the distributions of foreign and Spanish workers across occupations in the same way.

Consider an economy with $J > 1$ occupations among which total population, denoted by T , is distributed according to distribution $t \equiv (t_1, t_2, \dots, t_J)$ where $t_j > 0$ represents the number of individuals in occupation j ($j = 1, \dots, J$) and $T = \sum_j t_j$. Let us denote by $c^g \equiv (c_1^g, c_2^g, \dots, c_J^g)$ the distribution of the target group g in which we are interested ($g = 1, \dots, G$), where $c_t^g \leq t_j$. Distribution

c^g could represent, for example, foreign women or any other group of interest. Note that the total number of individuals in occupation j is $t_j = \sum_j c_j^g$ and the total number of individuals in target group g is $C^g = \sum_j c_j^g$.

The mutual information index

$$MI = \sum_g \frac{C^g}{T} \log \left(\frac{T}{C^g} \right) - \sum_j \frac{t_j}{T} \left[\sum_g \frac{c_j^g}{t_j} \log \left(\frac{t_j}{c_j^g} \right) \right] \quad (2)$$

Can be rewritten as

$$MI = \sum_g \frac{C^g}{T} \phi_1(c^g, t) \quad (3)$$

Where

$$\phi_1 = \sum_j \frac{c_j^g}{C^g} \ln \left(\frac{c_j^g / C^g}{t_j / T} \right) \quad (4)$$

This overall segregation measurement is constructed by aggregating a local index: each target group is weighted by its proportion in the overall population, which allows us to find the contribution of the target group to overall segregation.

To give further insight into occupational segregation in Spain, we provide a decomposition of the Lorenz curve for local segregation partitioned by subgroups (Spanish and foreign workers) as proposed by Bishop, Chow and Zeager (2003). This decomposition allows us to visualize the degree of occupational domination by each subgroup. We use a segregation curve (Note 6) for each target demographic group by comparing the distribution of that group with the distribution of total

employment. Thus, to calculate the segregation curve, denoted by S^g for group g , we plot the cumulative proportion of employment $\sum_{i \leq j} \frac{t_j}{T}$ on the horizontal axis and the cumulative proportion of individuals of the target group $\sum_{i \leq j} \frac{c_j^g}{C^g}$ on the vertical axis, once the occupations are lined up in ascending order according to the ratio $\frac{c_j^g / C^g}{t_j / T}$. The advantage of this methodology is that it benchmarks a general distribution (total employment), so it does not depend on which target group is considered. As with Lorenz curves, $(c^g; t) \in D$ dominates in occupational segregation $(c^g; t) \in D$ if the segregation curve of the former does not lie below the latter, which can be denominated as $S_{(c^g; t)}^g > S_{(c^g; t'')}^g$.

4. Results

4.1 Occupational Segregation by Nationality

The overall segregation results (MM) show that foreign workers were segregated in Spain, but segregation improved (i.e., MM declined) between 2006 and 2012. More than 39% of workers would have needed to switch jobs in 2012 in order to achieve equality, down from 41% in 2006 and 44% in 2009. According to the data, 7,955,607 workers in 2006, 6,982,762 in 2009 and 5,815,236 in 2012 would have had to change occupations to achieve complete equality between national and foreign workers.

Table 4. Marginal Matching, Mutual Information Indexes and Employment Shares in 2006, 2009 and 2012 by Nationality

Year	Local	$\Phi 1$	M1	Contribution	Employment	MM
2006	Spanish Workers	0.009	0.056	14.00%	89.00%	
	Foreign Workers	0.439		86.00%	11.00%	
2009	Spanish Workers	0.01	0.059	15.00%	88.00%	0.414
	Foreign Workers	0.425		85.00%	12.00%	
2012	Spanish Workers	0.009	0.039	15.50%	88.90%	0.386
	Foreign Workers	0.401		84.50%	11.10%	

Source: Own calculations.

Table 4 shows that ϕ_1 for foreign workers has a higher value, allowing us to conclude that foreign workers were more segregated than their Spanish counterparts in all the years in this study. Even though foreign workers represented only 11%, 12% and 11.1% of total employment in 2006, 2009 and 2012, respectively, they contributed 86%, 85% and 84.5% to overall occupational segregation in these years.

The Lorenz curves shown in Figure 1 complement the MM index results, since they show that the distribution of Spanish workers clearly dominates that of foreign workers for all of the years studied. The Spanish workers' curve is above that of the foreign workers and lies close to it, indicating that the occupational segregation of foreign workers is higher than that of Spanish workers.

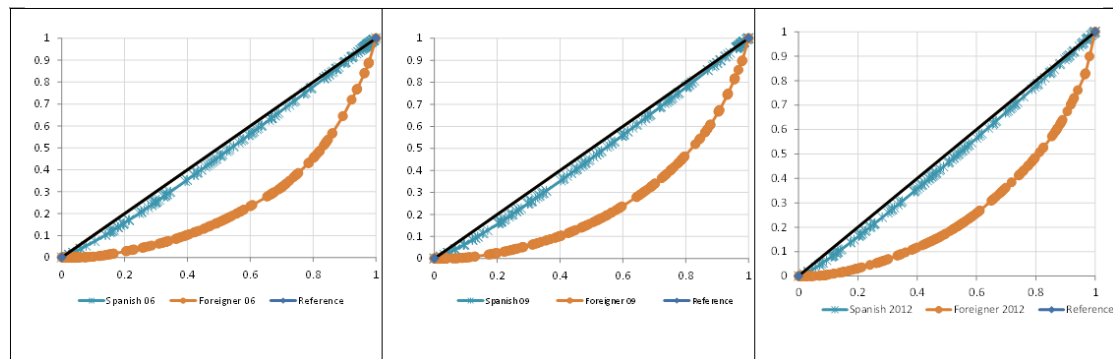


Figure 1. Lorenz Curve by Nationality in Years 2006, 2009 and 2012

Source: Own calculations.

4. 2 Occupations by Nationality 2006-2012

Spanish workers represented more than 80% of total employment throughout the period under study. It is interesting to note that between 2006 and 2009, the first year of the recession, the number of employed Spanish workers decreased, while the number of foreign workers increased. Foreign workers represented almost 17% of the employed in 2009, which was the peak for the period studied. In contrast, once the crisis began the process reversed and foreigners dropped to only 11.35% of total employment by 2012.

Table 5. Spanish and Foreign Employment

	Total Sp 06	Total Fg 06	Total Sp 09	Total Fg 09	Total Sp 12	Total Fg 12
Population	12,956,243	1,799,819	12,082,308	2,469,394	10,891,508	1,394,412
Population	87.80%	12.20%	83.03%	16.97%	88.65%	11.35%

Data at the one-digit level reveals which occupations are Spanish-dominated and which are foreign-dominated. Foreigners represented more than their population shares in occupations 5, 6, 7 and 9 (service workers and shop and market sales workers, skilled agricultural and fishery workers, craft and related workers, and elementary occupations). The occupations in which skill or experience content tends to be higher (and salaries are also higher) were Spanish-dominated.

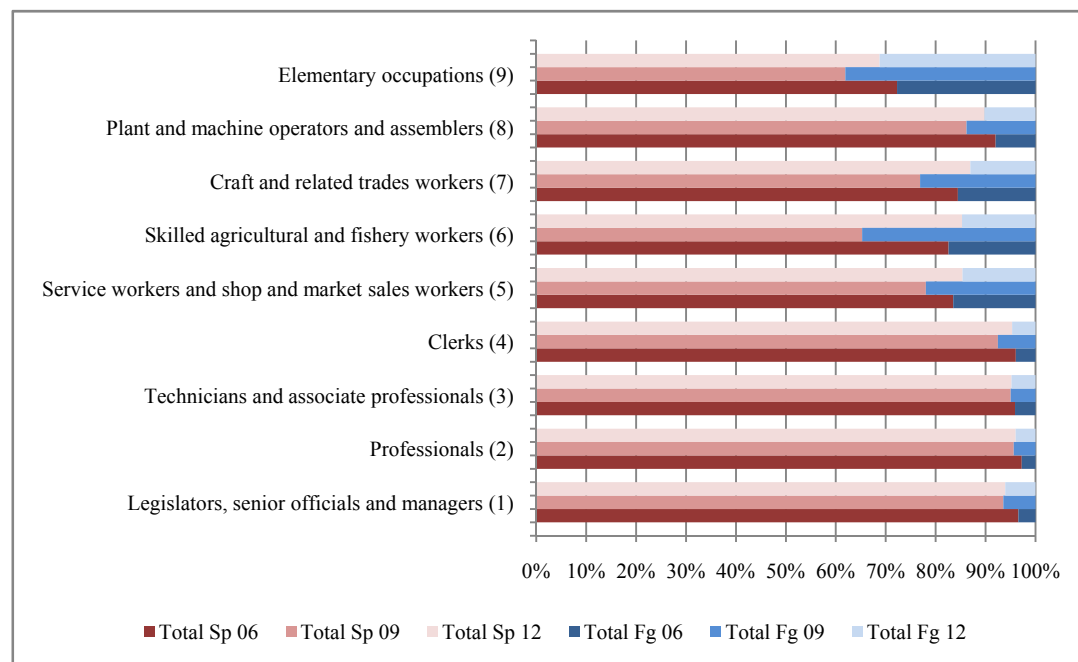


Figure 2. Employment Share of Spanish and Foreign Workers in Nine Occupational Categories, 2006, 2009 and 2012

Source: Own calculations.

The crisis destroyed jobs across most occupations. Only occupations 1 and 2 created jobs, as can be seen in Figure 3. Spain's labour market dynamics made this pattern predictable: Allard and Farber (2011) forecast that the crisis would lead to job creation in high-skill occupations and job destruction in occupations 7, 8 and 9, which is what in fact occurred.

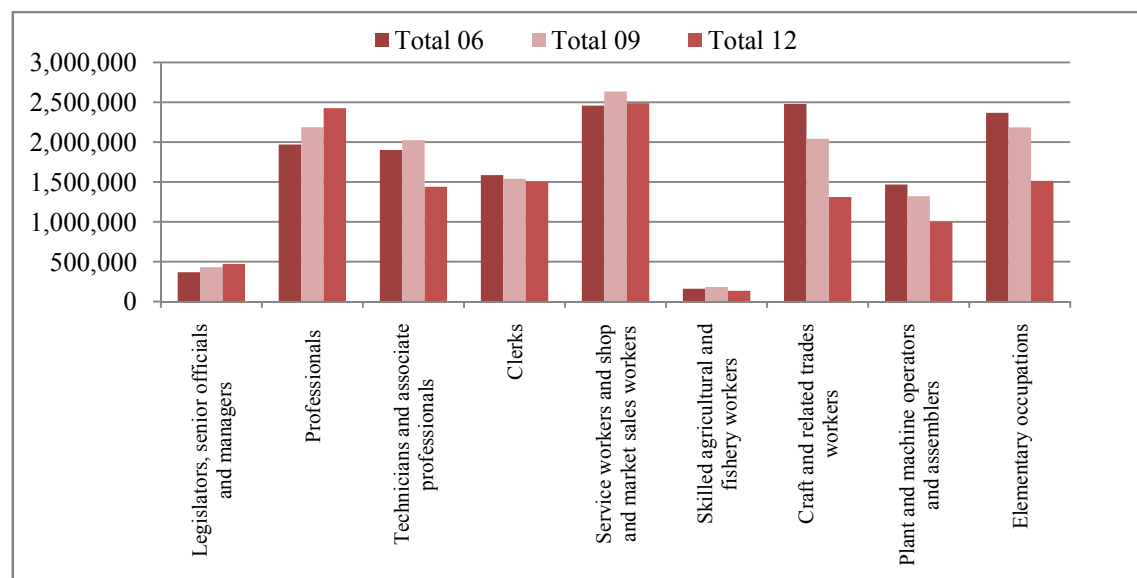


Figure 3. Evolution of Employment by Occupation in 2006, 2009 and 2012

Source: Own calculations.

The impact of job losses on foreign workers was disproportionately large. In the 2006-2012 period, 16% of Spanish workers lost their jobs compared to 22.5% of their foreign counterparts. Job destruction was

most severe for both Spaniards and foreigners in occupations 7 and 9, which were foreign-dominated even before the crisis. This explains why immigrants were so severely affected by the mass layoffs that followed the bursting of the real estate bubble.

Table 6 below gives little evidence of the “buffer theory”, or of priority given to Spanish jobs while foreign workers were expelled. Only in occupation 5 is there a net job gain with losses for foreign workers; and in occupations 6 and 7, job destruction for foreigners is more severe than for Spaniards, suggesting that they were laid off first. There is much more evidence for the opposite: that Spanish workers were replaced by foreigners or that Spaniards suffered proportionally larger job losses. In the only two sectors where there was a large net creation of jobs (1 and 2), foreign employment grew more than Spanish employment, which could indicate either some substitution to hold costs down, or more integration of the skilled immigrants over time into the higher skilled, more prestigious occupations. Occupations 3 and 4 show signs of a similar process: Spaniards may have been replaced by foreigners in occupation 4, and in occupations 3 and 8 the layoff rate was higher for Spaniards than for foreigners once the crisis began. Overall, however, since foreigners were crowded into occupations 7 and 9, where job destruction was so aggressive, their total job losses were greater than those of Spanish workers.

Table 6. Job Destruction in 2006-2012 by One-Digit Occupation and Nationality

Occupation	Description	Change Spanish	Change Foreigner	Total Change
OCCUP 1	Legislators, senior officials and	25.05%	126.29%	28.53%
OCCUP 2	Professionals	21.67%	76.92%	23.20%
OCCUP 3	Technicians and associate	-24.82%	-11.09%	-24.26%
OCCUP 4	Clerks	-5.88%	12.97%	-5.14%
OCCUP 5	Service workers and shop and	3.47%	-10.20%	1.21%
OCCUP 6	Skilled agricultural and fishery	-13.36%	-29.13%	-16.10%
OCCUP 7	Craft and related trades workers	-45.59%	-55.63%	-47.15%
OCCUP 8	Plant and machine operators and	-33.72%	-13.25%	-32.08%
OCCUP 9	Elementary occupations	-39.16%	-27.93%	-36.04%
Population		-15.94%	-22.52%	-16.74%

Source: Own calculations.

Construction-related jobs, concentrated in occupation 7, exemplify the dangers of occupational segregation and how the adverse shock to the construction sector fell especially hard on low-skilled foreign male workers. In 2006, 35% of the foreign males employed were working in occupations 71, 72 and 96. This percentage dropped to 15% in 2012. A total of 309,453 foreign males lost their jobs in the period 2006-2012, of which approximately 285,000 came from occupations 71, 72 and 96.

Table 7. Job Losses in Construction-Related Occupations for Foreign Male Workers in 2006-2012

Occupation	Description	2006	2012	Jobs
71	Workers on construction sites and related trades	198,794	85,202	-113,592
72	Construction workers in finishing, painting and other related	77,552	23,756	-53,796
96	Construction labourers	139,069	21,502	-117,567
Total foreign male workers all occupations		1,179,959	870,506	-309,453

Source: Own calculations.

4.3 Nationality and Gender

Occupational segregation can yield an overly simplified “snapshot” of the situation. To take our analysis to a deeper level, we explore segregation in terms of different observed characteristics, partitioning individuals by nationality and gender and by nationality and type of contract (indefinite or temporary).

Adding gender to the analysis shows that occupational segregation is a doubly onerous burden for foreign women. Even though occupational segregation improved between 2006 and 2012—the MM declined from 0.559 in 2006 to 0.536 in 2009 and 0.503 in 2012—7.58 million women, or more than 50% of employed females, still would have to change jobs to achieve equality in the distribution of occupations by nationality and gender.

Table 8. Marginal Matching, Mutual Information Indexes and Employment Shares for 2006, 2009 and 2012 by Nationality and Gender

Year	Local Segregation	$\phi 1$	M1	Contribution	Employment	MM
2006	Spanish Male Workers	0.154	0.295	28.22%	54.05%	0.559 (10,176,622)
	Spanish Female Workers	0.360		42.71%	34.92%	
	Foreign Male Workers	0.575		12.64%	6.48%	
	Foreign Female Workers	1.063		16.43%	4.55%	
2009	Spanish Male Workers	0.163	0.287	28.86%	50.81%	0.536 (9,040,484)
	Spanish Female Workers	0.309		40.30%	37.34%	
	Foreign Male Workers	0.556		12.99%	6.70%	
	Foreign Female Workers	0.992		17.86%	5.16%	
2012	Spanish Male Workers	0.166	0.261	31.73%	50.01%	0.503 (7,577,886)
	Spanish Female Workers	0.269		39.99%	38.89%	
	Foreign Male Workers	0.517		11.44%	5.78%	
	Foreign Female Workers	0.826		16.83%	5.32%	

Source: Own calculations.

Table 8 shows how the employment share of Spanish male and foreign male workers (column 6) has decreased during the period studied, as it has in the U.S. economy and in some other developed countries. Spanish men’s share of employment falls from 54.05% in 2006 to 50.81% in 2009 and 50.01% in 2012. The share for foreign male workers initially rises, from 6.48% of the employed in 2006 to 6.7% in 2009, and then drops to 5.78% in 2012. The flip side of this coin is the feminization of employment, with Spanish and foreign female workers representing a larger employment share as the crisis progresses. From 2006 to 2012 Spanish female workers increased from 34.92% to 38.89% of all employment, and foreign female workers’ share rose from 4.55% to 5.32%.

Table 8 gives evidence of occupational segregation in all subgroups in Spain, but Spanish male workers contributed more to the segregation index than their employment share. Spanish female workers in 2006 contributed 1.2 times their employment share, foreign male workers contributed 2 times and foreign female workers 3.6 times in 2006. The situation improved marginally from 2006 to 2012, leaving the contribution of Spanish female workers similar to their population share at the end of the period, while foreign male and female workers continued contributing to segregation 2 and 3.2 times their population share, respectively.

The Lorenz curve presented in Figure 4 verifies this finding, showing clearly how the curves for Spanish workers, male and female, dominate those of foreign workers, male and female. We can also see that the curves for male workers, Spanish and foreign, dominate the curve for female workers, indicating double discrimination against foreign female workers in the period studied. Even though in aggregate numbers segregation improved, the contribution to segregation was still mostly coming from foreigners and females. The crisis appears to have had little impact on this situation.

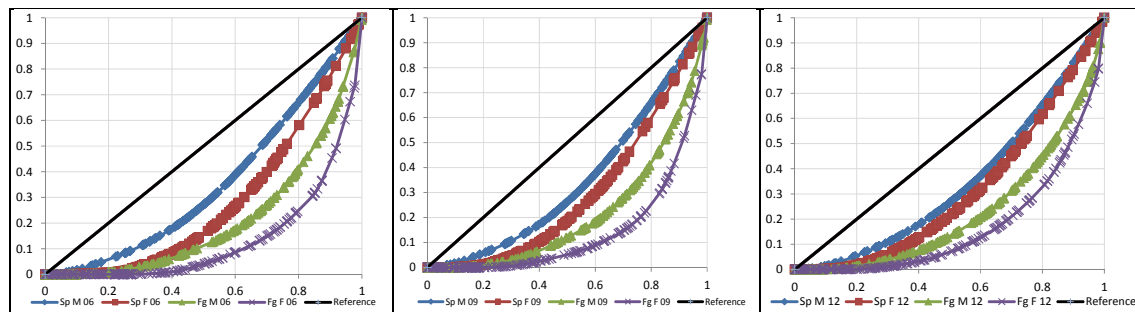


Figure 4. Lorenz Curve by Nationality and Gender in 2006, 2009 and 2012

Source: Own calculations.

The economic crisis had its origin in male-dominated sectors like construction. Hence even though women were more segregated than men in Spain, they suffered a proportionally smaller job loss in 2006-2012. While male workers' job losses represented 24.19% of the employed in 2006, females only lost 6.21% (Instituto Nacional de Estadística, 2016b). The only occupation where females lost more jobs than males was in occupation 3 (technicians and associate professionals). In 2006, 12% of all employed females were technicians and associate professionals, while by 2012 this share had dropped to 9%. The fact that this category includes health and education workers and real estate agents helps to explain why the decline was so pronounced, in the wake of the bursting of the property bubble and the public spending cuts in sectors like health and education. The bulk of job losses came from occupations 7 to 9 where most foreign women are employed. Still, female workers in occupations 7 to 9 lost proportionally fewer jobs than males.

Table 9. Job Destruction between 2006 and 2012 by One-Digit Occupation and Gender

Occupation	Description	Change	Male	Change	Female	Total	Change
OCCUP 1	Legislators, senior officials and	20.77%		51.64%		28.53%	
OCCUP 2	Professionals	16.05%		29.45%		23.20%	
OCCUP 3	Technicians and associate	-15.88%		-34.96%		-24.26%	
OCCUP 4	Clerks	-5.82%		-4.78%		-5.14%	
OCCUP 5	Service workers and shop and market	0.78%		1.49%		1.21%	
OCCUP 6	Skilled agricultural and fishery workers	-18.97%		9.85%		-16.10%	
OCCUP 7	Craft and related trades workers	-48.03%		-34.79%		-47.15%	
OCCUP 8	Plant and machine operators and	-32.78%		-27.40%		-32.08%	
OCCUP 9	Elementary occupations	-47.55%		-25.26%		-36.04%	
Population		-24.19%		-6.21%		-16.74%	

Source: Own calculations.

Employment trends in the period 2006-2012 clearly reflect the gender map of Spain's labour market. Occupations 1, 6, 7 and 8 are male dominated, and together they lost 1.5 million male jobs. Occupations 4, 5 and 9 are female dominated and the loss of female's jobs in these occupations was around 340,000. Only occupations 2 and 3, with their higher skill levels, are gender balanced. From 2006 to 2012 male jobs were destroyed five times faster than female jobs (2,000,000 male and 400,000 female). It is evident that the crisis had an asymmetrically powerful impact on male employment.

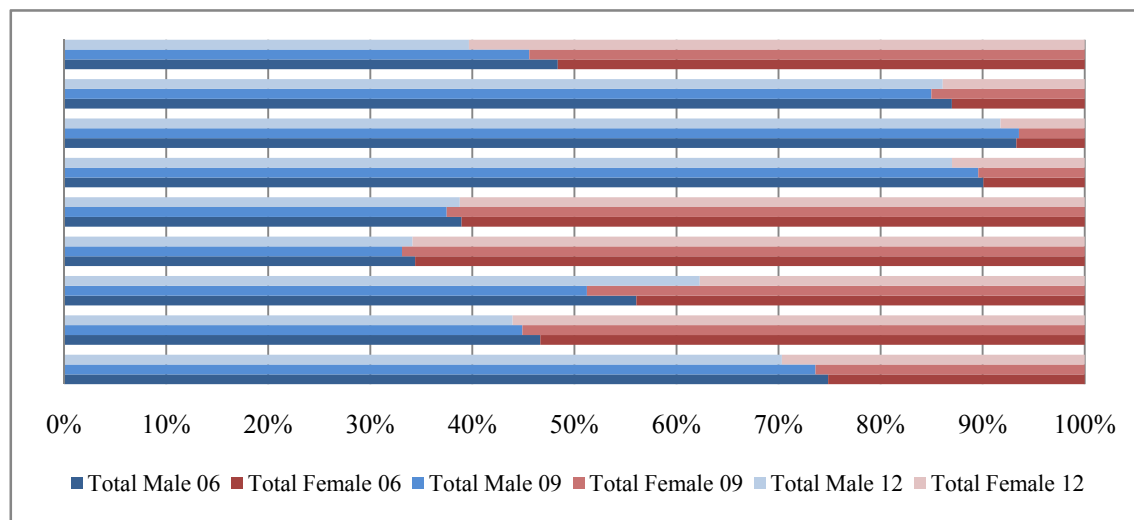


Figure 5. Employment Share of Male and Female Workers in Nine Occupational Categories, 2006, 2009 and 2012

Source: Own calculations

5. Nationality, Gender and Type of Contract

The Spanish labour market before the 2012 reform was known for being both rigid and dual, divided between highly protected workers on indefinite or permanent contracts, and precarious, lower-paid workers on temporary contracts. Many scholars have blamed the rigid Spanish labour market for the severe job destruction that occurs in recessionary periods and for the volatility of hiring and firing in general (García-Serrano & Jimeno, 1998), as well as the low productivity that has characterised its economy (Allard & Lindert, 2006). Authors like De la Rica (2004) argue that this duality contributes to occupational segregation.

A look at the data on Spanish contracts before and after the recession confirms these diagnoses and shows how a segmented labour market discriminates between workers on different types of contracts at a moment of crisis. In every occupation there was a surge in temporary hiring's of foreigners in 2009. It seems that companies faced with an impending financial crisis still hoped that demand would continue to grow, and hired the least costly workers who would be easiest to lay off if the crisis were to last (i.e., temporary migrant workers).

Once the recession deepened, jobs began to be destroyed, and companies' preference was to lay off temporary workers whose dismissal costs were close to zero. The number of indefinite/permanent contracts in the Spanish economy declined by 5% in 2009-2012, but the number of temporary contracts was nearly halved (-41%), showing how companies in a dual labour market shed first the workers who are cheaper and easier to fire. For foreign workers, the effect of this job shedding was especially severe. While the number of Spaniards on temporary contracts dropped by 18%, the number of foreigners on

temporary contracts plummeted by almost 72% from 2009 to 2012. Since foreigners were much more likely than Spaniards to have temporary contracts (almost 72% in 2009, as opposed to less than 20% for Spaniards), this job destruction process hit them with particular aggressiveness.

To determine whether this division by type of contract has any bearing on the occupational segregation of foreign workers in Spain, we added this layer to our analysis. Figure 6 shows clearly that the proportion of temporary jobs increases for lower-skilled occupations like 6, 7 and 9. We can also see that as the crisis progressed, temporary jobs represented a smaller proportion of all employment in all occupations, since temporary workers were easier and cheaper to fire and hence were eliminated first.

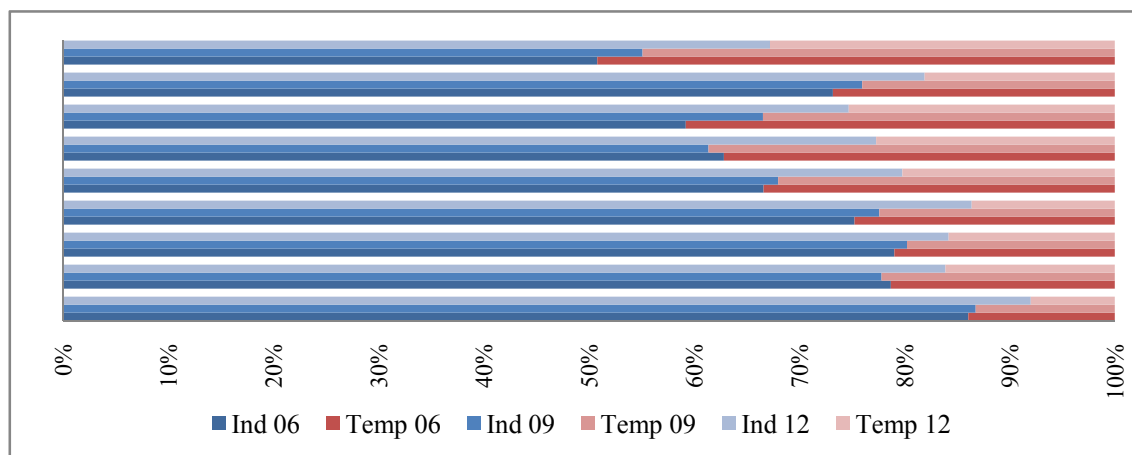


Figure 6. Employment Share by Type of Contract in Nine Occupational Categories, 2006, 2009 and 2012

Source: Own calculations.

Table 10 depicts the story from a macro level. Jobs were destroyed from 2009 to 2012 across the economy regardless of the type of contract, although the job destruction of temporary contracts was much more aggressive. This boosted the share of indefinite contracts from approximately 72% in 2006 to 82% in 2012 for Spanish workers.

For foreign workers, the situation was different. In the 2006-2009 period, even though the economy had begun to experience some job destruction, temporary jobs for foreign workers rose by 68.2%. Once the economy began shedding jobs, temporary foreign workers were massively affected: in the 2009-2012 period they dropped by 71.7%. Indefinite contracts of foreign workers rose from 41.6% in 2006 to 64.1% in 2012. It is worth noting that in 2009, when the crisis was starting, 700,000 temporary jobs were created for immigrant workers. This probably lends support to the idea of substitution between Spanish and foreign workers and indefinite and temporary contracts. By 2012, the fourth year of the crisis, more than 1.2 million foreigners lost their temporary jobs, high lighting the fragility of temporary contracts and the asymmetrical impact of the crisis.

Table 10. Distribution by Nationality and Type of Contract, 2006, 2009 and 2012

Year	Spanish		Foreigner		Population	
	Indefinite	Temporary	Indefinite	Temporary	Indefinite	Temporary
2006	9,279,972	3,676,271	749,184	1,050,635	10,029,156	4,726,906
2009	9,696,383	2,385,925	702,590	1,766,804	10,398,973	4,152,729
2012	8,957,348	1,934,161	893,868	500,545	9,851,216	2,434,706

Year	Spanish		Foreigner		Population	
	Indefinite	Temporary	Indefinite	Temporary	Indefinite	Temporary
2006	71.63%	28.37%	41.63%	58.37%	67.96%	32.03%
2009	80.25%	19.75%	28.45%	71.55%	71.45%	28.53%
2012	82.24%	17.76%	64.10%	35.90%	80.17%	19.81%
Year	Spanish		Foreigner		Population	
	Indefinite	Temporary	Indefinite	Temporary	Indefinite	Temporary
2006	92.53%	7.47%	77.77%	22.23%	87.79%	12.20%
2009	93.24%	6.76%	57.45%	42.55%	83.02%	16.97%
2012	90.93%	9.07%	79.44%	20.56%	88.64%	11.35%

Source: Own calculations.

Table 11 shows the rates of temporary work and the changes in the numbers of temporary contracts for foreigners for the periods under study, across the nine occupational categories. They provide stark evidence of the roller-coaster ride experienced by foreign workers in Spain before and after the crisis hit. Even though the percent changes in the table are massive for occupations 1-4, the number of jobs affected was quite small, since foreigners account for a small proportion of workers in those occupations. For example, 1,119.5% growth in occupation 1 for foreign temporary workers is an increase from 2,219 to 27,061 employed foreigners, and the 71.7% fall represents only 1,833 foreign temporary workers in this occupation by 2012. In the foreign-dominated occupations (5, 6, 7 and 9), however, the rise in temporary work for migrants is remarkable, especially in occupations 6 and 8; and the subsequent job destruction across sectors in 2009-2012 is staggering. In 2006, 12,155 foreign temporary workers were employed in occupation 6. By 2009 the number increased to 43,410 and in 2012 the foreign temporary employed workers left were only 10,908, a number below 2006 levels. A similar pattern can be found in occupation 8, where in 2006, 61,015 foreign temporary workers were employed. In 2009 the number increased to 134,915 only to drastically drop by 2012 to only 33,387 (representing only 55% of those employed in this occupation in 2006).

Table 11. Rates, Changes Temporary Employment 2006-2012 by One-Digit Occupation

Occu-pation	Rate	Rate	Rate	temporary jobs migrants 2006-2009	All jobs (native and foreign) 2006-2009	temporary jobs migrants 2009-2012	All jobs (native and foreign) 2009-2012
	temporary	temporary	temporary				
	contracts	contracts	contracts				
	migrants	migrants	migrants				
	2006	2009	2012				
	58.4%	71.6%	35.9%	68.2%	-1.4%	-71.7%	-15.6%
OCC 1	17.6%	96.9%	6.4%	1119.5%	17.9%	-93.2%	9.0%
OCC 2	28.1%	76.1%	32.2%	375.4%	11.0%	-57.3%	10.9%
OCC 3	35.0%	79.1%	25.5%	551.4%	142.7%	-90.0%	-68.8%

OCC 4	50.4%	80.9%	18.2%	197.9%	-2.9%	-86.3%	-2.3%
OCC 5	55.5%	72.3%	29.8%	86.1%	7.2%	-74.1%	-5.6%
OCC 6	43.7%	68.3%	55.4%	257.1%	14.5%	-74.9%	-26.7%
OCC 7	68.6%	66.6%	43.7%	18.9%	-17.6%	-76.2%	-35.8%
OCC 8	52.0%	74.0%	32.8%	121.1%	-9.9%	-75.3%	-24.6%
OCC 9	62.7%	70.2%	44.3%	42.0%	-7.6%	-64.1%	-30.7%

Source: Own calculations.

Table 12 shows the same trends discussed above, with the occupational segregation index improving over the period studied. The MM index decreased from 0.507 in 2006 to 0.506 in 2009 and 0.504 in 2012. Once again, foreigners contributed more than their employment share to segregation. In 2006 foreign females with indefinite contracts and foreign females with temporary contracts contributed to segregation 3 times their share, showing that gender segregation outweighed type of contract for foreign females. For Spanish females, segregation seemed to be slightly worse for those with indefinite contracts (1.1 times their employment share). Spanish male workers with indefinite contracts were the only group clearly in a privileged situation (a segregation contribution below its employment share). Foreign workers with indefinite contracts were more segregated in occupations than foreigners with temporary contracts.

Table 12. Marginal Matching, Mutual Information Indexes and Employment Shares during 2006, 2009 and 2012 by Nationality, Gender and Type of Contract

Year	Local Segregation	Φ 1	M 1	Contribution	Employment Share	MM (# should change occupations)
2006	Spanish Indef M Workers	0.20	0.388	19.49%	37.91%	0.507 (7,481,323)
	Spanish Indef F Workers	0.42		26.97%	24.98%	
	SpanishTemp M Workers	0.39		13.69%	13.64%	
	Spanish Temp F Workers	0.39		11.20%	11.28%	
	Foreign Indef M	0.50		3.51%	2.74%	

Workers						
Foreign Indef F						
Workers	1.15			6.93%	2.34%	
Foreign Temp M						
Workers	0.90			9.93%	4.28%	
Foreign Temp F						
Workers	1.13			8.28%	2.84%	
Year	Local Segregation	Φ 1	M 1	Contribution	Employment Share	MM
2009	2009	Spanish Indef M				0.506 (7,363,161)
		Workers		0.386	21.42%	
	SpanishTemp M	Spanish Indef F		13.69%	26.36%	
	Workers	Workers				
	Spanish Temp F	SpanishTemp M	0.22	11.20%	8.10%	
	Workers	Workers				
	Foreign Indef M	Spanish Temp F	0.35	3.51%	8.37%	
	Workers	Workers	0.38			
	Foreign Indef F	Foreign Indef M	0.40	6.93%	7.01%	
	Workers	Workers				
	Foreign Temp M	Foreign Indef F	0.96	9.93%	5.15%	
	Workers	Workers	1.00			
		Foreign Temp M				
		Workers	0.58		10.06%	
Year	Local Segregation	Φ 1	M 1	Contribution	Employment Share	MM
2012	Spanish Indef M					
	Workers	0.209980165		24.74%	39.83%	
			0.338			0.504 (6,192,104)
	Spanish Indef F					
	Workers	0.290109749		28.40%	33.08%	

SpanishTemp M			
Workers	0.382358463	8.86%	7.83%
Spanish Temp F			
Workers	0.332089734	7.78%	7.92%
Foreign Indef M			
Workers	0.549061662	5.43%	3.34%
Foreign Indef F			
Workers	0.939445581	10.93%	3.93%
Foreign Temp M			
Workers	1.204760706	8.28%	2.32%
Foreign Temp F			
Workers	1.077836446	5.59%	1.75%

Source: Own calculations.

Occupational segregation in 2009 and 2012 came clearly from foreigners regardless of type of contract. They contributed 2.5 times their population share to segregation in 2009 and more than 3 times in 2012. Female foreign workers were more segregated during these years. Foreign male workers with temporary contracts in 2012 contributed 3.6 times their population share (compared to 2.3 in 2006 and 1.5 in 2009).

The Lorenz curves depicted in Figures 7 and 8 show that in 2006 and 2012 the least segregated group was clearly Spanish male workers with indefinite contracts. Foreign male workers with indefinite contracts, Spanish female workers with both types of contracts (indefinite and temporary) and Spanish males with temporary contracts were in an intermediate situation. The most occupationally segregated were foreign male workers with temporary contracts and foreign female workers with indefinite and temporary contracts.

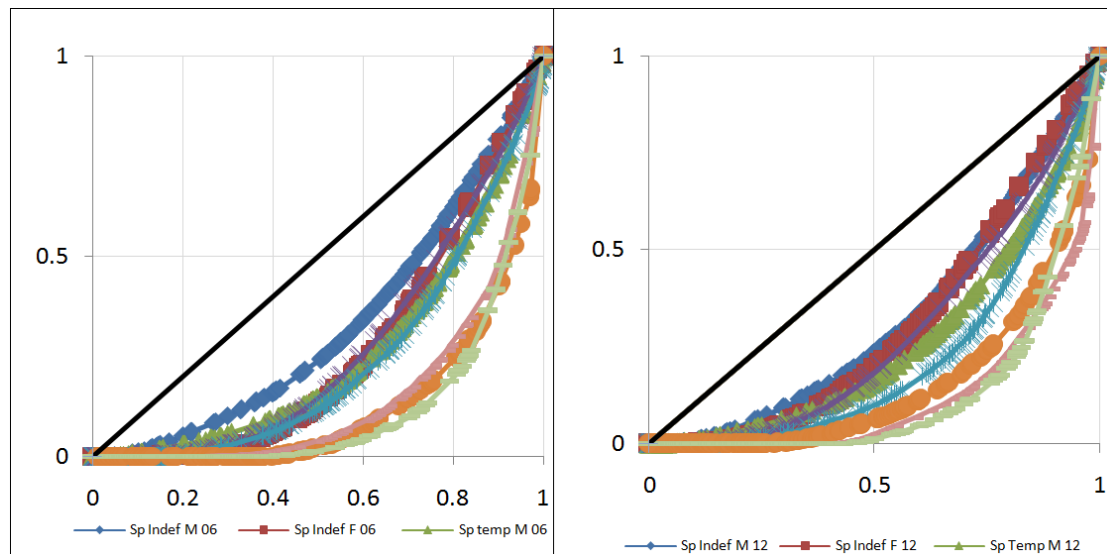


Figure 7. Lorenz Curves in Years 2006 and 2012 by Nationality, Gender and Type of Contract
Source: Own calculations.

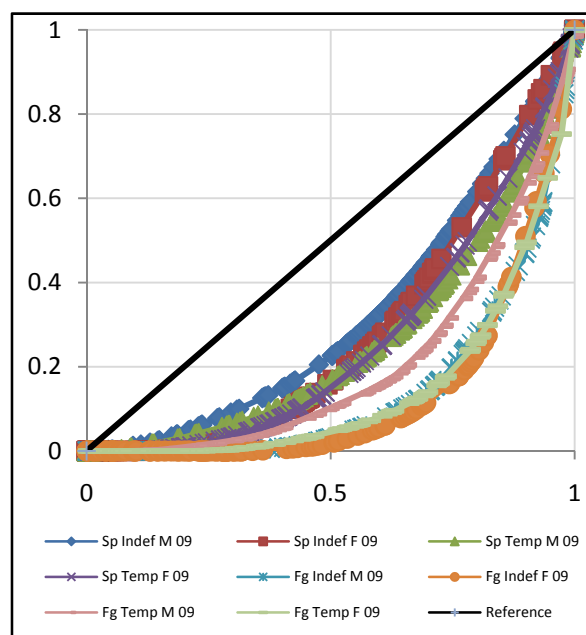


Figure 8. Lorenz Curve in 2009 by Nationality, Gender and Type of Contract
Source: Own calculations.

As Figures 7 and 8 show, only in 2009 did the situation of foreign male workers on indefinite contracts deteriorate, while those on temporary contracts seemed to be marginally better off, even though they still contributed to segregation more than their employment share as seen in Table 12. As we have seen, temporary jobs for foreigners grew in 2009, improving the index. The rest of the groups are fairly similar to what they were in the 2006 distribution.

6. Discussion, Policy Implications and Conclusions

Our analysis shows that occupational segregation of immigrants in Spain improved between 2006 and 2012, before and after the crisis that began in 2008. This confirms our hypothesis, but still leaves open the question of why this improvement occurred and whether it is actually good news for a country like Spain. An improvement in occupational segregation could occur because migrant workers without Spanish nationality are moving into new sectors of the economy, overcoming the barriers that crowded them into certain jobs. There is some evidence for this positive type of improvement in Spain. When looked at occupation by occupation, on a one-digit level, it seems that what occurred resembles more closely the substitution hypothesis (foreigners replacing Spanish workers) than the buffer hypothesis (foreigners being expelled in favor of Spaniards). This would actually be very good news for foreign workers, because it indicates that the cultural norms that might have led Spaniards to regard certain jobs as appropriate for immigrants, causing occupational segregation (Rubery, J., Fagan, C., & Maier, F., 1996), were being overcome in Spain even as unemployment soared. This shows that a door is open for their deeper integration into the Spanish labour market.

However, there is also a negative reading for the declining segregation in Spain as the recession proceeded. In a crisis like Spain's, which ravaged the construction sector, hundreds of thousands of the jobs created there for immigrant males were destroyed, and this reduced the MM index since their crowding into this sector was extreme. Lower occupational segregation may not mean that new employment avenues were opened up for low-skilled migrants; it may simply reflect the fact that they were expelled massively from an inflated sector when the bubble burst. The crowding of foreigners into the construction sector before the crisis highlights the risks implicit in a segregated labour market whose growth rests on low-skilled labour. It was, in fact, the lowest-skilled sectors that shed thousands of jobs. The higher-skilled sectors (occupations 1, 2) actually created jobs between 2009 and 2012 or shed a relatively small proportion of employment compared to the economy as a whole.

There are nuances that are important to keep in mind while evaluating these results. Immigrants to Spain are younger than the general population, which means that their experience level is probably lower. Additionally, their educational attainment is less than for natives (Miyar & Garrido, 2010). These characteristics may be partly responsible for holding them in lower-skilled and more poorly paid jobs. However, there is also evidence that legal immigrants find it easier to get permanent contracts than Spaniards (Malo & Garrido, 2010).

Keeping in mind these considerations, beneath the macro data lies a story linked to the need for both immigrants and nationals to seek more education and training in order to protect themselves in a difficult job market. In a global survey in early 2012, Man Power reported that despite an unemployment rate at the time of nearly 23%, 9% of Spanish respondents had difficulty finding workers due to lack of skills. For Spanish employers, the hardest jobs to fill were for engineers, followed by technicians and skilled trades (Man Power Group, 2012).

The one-digit review of occupations conducted above gives clear evidence that higher skills did enable many of Spain's immigrants to defend their jobs in the crisis. In an occupational hierarchy where lower numbers indicate higher skill content, foreign workers in the higher-skilled occupations (1-4 in Table 6) either expanded their presence or suffered less job loss than their Spanish counterparts. In occupation 8, where job loss was 32% overall, only 13.25% of foreign workers lost their jobs. The reason appears to be that even though occupation 8 does not require a secondary education, machine operators do have specific skills that distinguish them from the unskilled workers in occupations 7 and 9. In other words, foreign workers with education or specific skills and experience actually gained positions against

Spanish workers in a very difficult job market. This delivers a powerful message both to immigrants aware of their vulnerability in host markets, and to immigrant-receiving countries that face the challenge of integrating foreign workers more fully into society. Education and training is a key policy change that can improve the situation of immigrants.

For workers without skills, this study showcases the dangers for the migrant and for the economy implicit in the occupational segregation of immigrants. The low-skilled workers who crowded into the booming Spanish construction sector were more vulnerable than any other workers in the economy after Spain's property bubble burst. Construction workers are nearly all included in occupations 7, 8 and 9. Even though foreign workers managed to gain a foothold because of their lower wages in the higher skilled sectors, their overrepresentation in the lowest-skilled brackets caused them to be expelled massively from the job market. A detailed look at the data shows that 92% (more than 309,000) of the jobs lost by foreign males were in the construction sector (occupations 71, 72 and 96). Segregation had dramatic consequences on foreign employment in cities, according to Dickerson and Johnson (2010). For foreign women, the story told by our data is less dramatic but not less worrisome. Female immigrants are more tightly crowded into a few occupations than foreign men, namely the elementary occupations in categories 5 (waitresses, cooks, other restaurant workers) and 9 (cleaners, domestic workers), which do not require even a secondary education. Occupation 9 destroyed 25% of the jobs for females of 2006 while occupation 5 created 1.49% more female jobs than in 2006.

Faced with this situation, what can countries do to provide security to the immigrants who are needed to cover vacancies even in a depressed labour market, and to retain their tax payments to finance social services at a time of tight fiscal constraints? The advances made by immigrants in Spain's higher-skilled occupations despite the crisis show that education and training may help protect foreign workers. Foreigners in sectors that required some type of certificate or specialised experience were more successful at holding on to their jobs. This indicates that job- or industry-specific skills or certifications help immigrant workers to defend themselves even in a vertically segregated economy. In this regard, it is worrying to observe that only a small proportion (10%) of immigrant children in the crisis years continued in the Spanish school system past the required school-leaving age, and the proportion of early school leavers is more than 53%, compared to 31.6% for Spaniards (López-Pelaez, 2006; Ministerio de Educación, Cultura y Deporte, 2015).

The employment collapse in Spain also illustrates the devastating ripple effects of bubbles, particularly when the "bubble" sector employs workers with low skill levels. Integrating these workers into other sectors is very difficult, and mounting unemployment rates of poor immigrants pose a serious social problem for a country.

Finally, the evidence on extreme segregation by type of contract shows the profound unfairness of the permanent/temporary worker divide in "dual" labour markets. Since foreigners are the last to arrive on the labour market, they have a disproportionately large share of temporary contracts, which not only means lower wages and less job training, but that they are the first to be expelled when the crisis hits. The dramatic 72% fall in temporary jobs for foreigners between 2009 and 2012 points toward the need for a country like Spain to move from its 2012 reform toward a labour market with a single contract and similar conditions for all. The asymmetry of the employment adjustments reflected here show that these changes are essential for a society that values security and equity. Will the 2012 reform yield a lower degree of occupational segregation between Spanish nationals and immigrant workers? This will be an interesting direction for future research.

Although the Spanish government has made an effort to meet the needs of immigrants and help them integrate into Spanish society, most proposals since the crisis began did not focus on better training or access to permanent work. Instead, government policy encouraged them to return home. The voluntary return program called APRE (*Plande Abono Anticipado de Prestación a Extranjeros*), enacted after the onset of the recession, enabled legal immigrants who qualified for unemployment benefits to receive free transportation home, along with a lump-sum payment of their accumulated benefits in two installments: 40% before leaving and the remainder once they returned home. They surrendered their Spanish work permits upon collecting the first payment, and were barred for three years from working in Spain. The take up of the program was in the thousands, with most applicants coming from Latin America (Pajares, 2010).

Most immigrants, however, have chosen to stay. There are many possible reasons: many brought families and bought homes, which makes return costly; many do not want to lose their Spanish/EU working permits by leaving the country; and often the situation in the home country is not better, particularly regarding access to free quality health care. Hence the ability of these migrants to earn a living, and the need for their fuller integration into the Spanish job market, remain a challenge even as the economy recovers. Further labour market reform and better access to training should become high policy priorities for Spain in order to further integrate its migrant population and to prevent future employment debacles like that witnessed in the wake of the global financial crisis.

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Notes

Note 1. “Immigrants” here refers to those individuals included in labour force statistics who lack Spanish nationality. We acknowledge that when immigrants become eligible for Spanish nationality, their category changes, potentially distorting the analysis. However, since most immigrants, except refugees and those from Spanish America, can only become nationals after 10 years, we believe that the newly nationalized group is not dominant in the period under study, and the immigrant/Spanish division remains relevant. It should also be noted that some immigrants are from other developed European countries (the British are one of the largest immigrant groups), and we do not distinguish among these regions or income levels in our data. A further complication is that the self-employed may not be included in these figures. This is a growing group in Spain made up of mainly Asian immigrants, but they were less relevant in the period under study and hence their potential exclusion does not distort the analysis.

Note 2. World Bank.

Note 3. Our analysis captures the time period between a relatively minor labour market reform in 2006, which influenced.

Note 4. International Standard Classification of Occupations.

Note 5. See this paper for a detailed analysis of the good properties of the MI index.

Note 6. As in Del Río and Alonso-Villar (2011).