

## LABOUR MARKET ADJUSTMENTS TO LARGE IMMIGRATION INFLUX

### HOW DO OPEN ECONOMIES ADJUST TO LARGE IMMIGRATION FLOWS? SECTORAL SPECIALIZATION, HOUSEHOLD SERVICES, AND OTHER MECHANISMS

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#### Introduction

Several countries have received large-scale population inflows over the last few decades. Besides altering the social fabric of the host country, large immigration episodes present an interesting case study for analyzing how economies absorb sudden increases in labor supply. In particular, they generate useful data for testing economic theories that are widely used to interpret economic data and formulate policies with implications for the labor market.

Several recent large immigration episodes have received attention in the literature on this topic. Between 1990 and 2001, over a million people arrived in Israel from the former Soviet Union.<sup>3</sup> More recently, Spain experienced a large, decade-long immigration wave starting in the late 1990s. Between 1998 and 2008, the foreign-born population in Spain increased by almost five million.<sup>4</sup> As a result, the foreign-born share of the working-age population increased from four to 14 percent.

One of the main challenges in the immigration literature is to estimate the effect of immigration on the wages (and employment opportunities) of native workers with skills similar to those of immigrants. Perhaps

surprisingly, most studies in the United States and elsewhere have found negligible effects (for example, Card 2005). This “wage puzzle” has prompted researchers to go beyond the standard one-good, closed-economy model of the economy, and explore additional mechanisms that may mediate how immigrants are absorbed by the labor market of the host economy.

This paper focuses on one such channel, namely, adjustments to the industry composition of production in the context of economies that trade goods and services with each other. It particularly analyzes regions within a country that are highly interconnected by trade. Specifically, it focuses on the Rybczynski (1955) theorem. According to this celebrated result, under some conditions, an exogenous increase in the supply of a factor of production (such as unskilled labor) in a small, open economy will not affect the equilibrium factor prices (unskilled wages), but only the composition of production.<sup>5</sup> Output and employment tend to expand in sectors that use that factor intensively. This can lead to an aggregate increase in the demand for the factor that has now become more abundant, while leaving its relative price unchanged, thus providing a solution to the wage puzzle.

The pioneering empirical exploration of this result is Hanson and Slaughter (2002), on the basis of an accounting decomposition. However, their approach is not well-suited to formally test the response to an immigration shock. We therefore follow the more recent approach developed by Lewis (2003), which uses spatial correlations methodology to provide a more formal econometric test of the Rybczynski hypothesis.<sup>6</sup> Our second goal is to evaluate the merits of an additional mechanism that may also help account for the wage puzzle: cross-skill effects arising from an increase in the availability and affordability of domestic help and its effect on the labor supply of skilled native women.



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<sup>3</sup> Friedberg (2001), Cohen-Goldner and Paserman (2011), and Paserman (2013) have studied the labor market effects of Israel's immigration episode.

<sup>4</sup> The largest annual inflow in Spain was in 2008, with an increase in the foreign-born population of almost 800,000 relative to the previous year, amounting to 1.7 percent of the population (Spanish National Statistical Institute).

<sup>5</sup> A small open economy is one that takes the prices of final goods as given, determined by world markets. The endogenous variables in this economy are local factor prices and the allocation of local resources across industries.

<sup>6</sup> A number of other mechanisms have also been proposed to account for the insensitivity of wages to immigration shocks. They are discussed in detail in section *Alternative explanations*.

Our paper is related to several strands of literature. Primarily, it relates to the studies that evaluate the Rybczynski hypothesis empirically. Gandall, Hanson and Slaughter (2004) provide one of the first analyses, based on a between-within industry decomposition using data for Israel. More closely related to our work, Lewis (2003) is the first study to formally test the hypothesis. Our work is also closely connected to the studies that have examined the effects of immigration on the domestic help sector and its implications for the work decisions of skilled native females, as in Cortés and Tessada (2011) or Barone and Mocetti (2011). Finally, our study is also part of the growing body of immigration literature that analyzes the economic effects of Spain's recent immigration wave that includes Bentolila, Dolado and Jimeno (2008), Carrasco, Jimeno and Ortega (2008), as well as Amuedo-Dorantes and de la Rica (2013), among many others.

### Methods and data

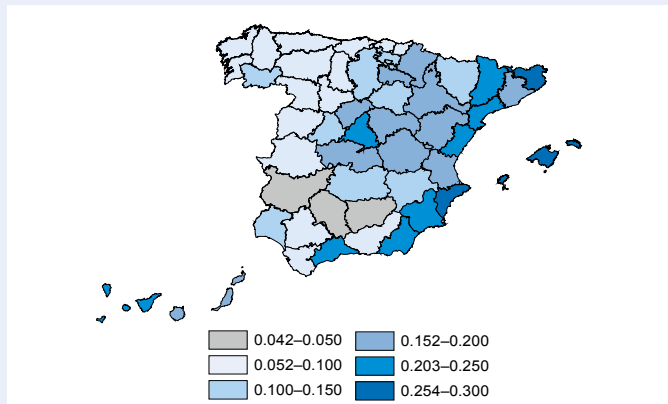
What are the labor market effects of immigration? This is a hard question to answer at the national level. In order to understand the causal effect of immigration, the actual evolution of the economy during the period of interest would have to be compared with an estimate of how it would have evolved in a hypothetical absence of immigrants. This “counterfactual” estimate is not easy to construct.

An alternative approach to the question, and the one that we follow, is to study the impact of immigration at the regional level. Between 1998 and 2008, some Spanish regions received very high immigration inflows as a percentage of the total population, while other regions were much less affected. The evolution of the economy in the “less affected” regions can be used as a starting point to estimate what would have happened in the “most affected” ones in the absence of immigration.<sup>7</sup> The

<sup>7</sup> Of course, the empirical analysis needs to take into account that the immigrant-receiving areas are potentially different from the less affected ones in other dimensions. This is attained by means of instrumental-variables estimation, where we exploit the regional patterns of settlement of immigrants by country of origin in the 1980's to build a predictor for the location of immigrants in the 2000's that is uncorrelated with current labor demand at the regional level. This type of instrument is common in immigration literature.

Figure

### Foreign-born population as a fraction of the working-age population by provinces (Spain), 2008



Source: Farré, González and Ortega (2011).

comparison between the two groups of regions would give us an approximation of the causal effect of immigration. This approach is usually referred to as “spatial correlations” (Altonji and Card 1991).<sup>8</sup> Our discussion draws heavily on two recently published research articles (González and Ortega 2011; Farré, González and Ortega 2011) that apply this methodology to Spanish data.

Some authors have criticized the spatial correlations approach as ineffective, arguing that, in practice, it is subject to significant measurement error given the usual sample sizes employed in the literature, biasing the estimated effect of immigration on wages towards zero (Aydemir and Borjas 2011). However, several recent studies employing this methodology have been able to uncover large and statistically significant effects of immigration on prices and quantities in some labor markets (Cortés 2008; Frattini 2010; Cortés and Pan 2013a; González and Ortega 2013).

Naturally, substantial variation in the size of immigration flows, relative to population, across Spanish regions must exist so that the spatial correlations approach can identify the effects of interest. Figure 1 plots the foreign-born share (among the working-age population) across Spanish regions in 2008.<sup>9</sup> While some provinces barely received any immigration (foreign-born share below five percent), in others the immigrant population accounted for over 25 percent of the total.<sup>10</sup> This is the variation that we exploit in our analysis in order to obtain our estimates of the effects of interest.

<sup>8</sup> For a more detailed discussion of this methodology and a review of recent studies that adopt it, see de la Rica, Glitz and Ortega (2013).

<sup>9</sup> Our regional units of analysis are the 52 Spanish provinces.

<sup>10</sup> In all regions, the baseline scenario was of little immigration only ten years before (less than five percent in 1998).

Table 1

Effects of immigration on employment and wages			
Dependent variable	1	2	3
Change in the employment rate	0.0435	0.0884	0.0848
Change in the daily wage (in %)	-0.0599	0.0331	-0.0095

Note: The table summarizes the results of instrumental variables regressions estimated using Labor Force Survey data for employment and social security data for wages. The coefficients shown are those for the main explanatory variable: the percent change in the working-age population (by provinces and education level) between 2001 and 2006 (constructed from local registry data). The number of observations is 156 (52 provinces, times 3 educational categories). Each regression includes as control variables binary indicators for each education level and for each province (i.e. province and education fixed-effects). None of the coefficients shown are statistically significant at the 90% confidence level. The first column includes all 52 provinces, the second one excludes Ceuta and Melilla (located in North Africa), and the third one weighs each province by population.

Source: González and Ortega (2011).

### Main findings

In this section we describe the estimated effects of immigration on the Spanish labor market. The first subsection (*Effect on employment and wages*) focuses on the effects of immigration on native employment and wages. The next section discusses the impact on the production structure of the different provinces. The section *Effect on composition of the workforce at the industry level* examines the extent to which immigration affected the skill composition of the workforce at the industry level.

#### *Effect on employment and wages*

Immigration led to a large increase in the size of the Spanish labor force. We begin by analyzing the effects on employment. In González and Ortega (2011), using Labor Force Survey data for 2000–2006, we found that the regions that received more immigration also experienced large increases in total employment, while unemployment and inactivity rates were hardly affected. Specifically, we found that about 85 percent of the immigrant inflows were absorbed via increases in employment, with only the remaining 15 percent absorbed via higher unemployment or non-participation.

We also examine whether immigrants displaced native workers with similar skills. Our regional analysis reveals that this was not the case. We compare the evolution of the employment rate (defined as the number of employed people divided by the total working-age population) across provinces, separately for workers with different levels of educational attainment (low, medi-

um and high). If immigration had harmed native employment, we would expect the employment rate to have fallen (or increased less) in regions of higher immigration, and for the education groups with higher immigrant density. This does not seem to be the case, as shown by the positive (non-significant) coefficients in the first row of Table 1.

Native workers could also have been affected by immigration via wages. A standard one-good, closed-economy model implies that immigration will lower the

wages of domestic workers with similar skills to those of the new immigrants. To answer this question, we compared the evolution of wages by province and education level. We found that immigration had no significant effects on wages (second row of Table 1). That is, the evolution of wages over time (for each education category) is similar between regions of high and low immigration.

To summarize, despite substantially increasing the working-age population, we found no evidence of significant effects on the employment or wages of native workers in regions with more immigration and among workers with similar education levels to immigrants. While this goes against the predictions of the standard one-sector model, it may be entirely consistent with the adjustments in sectoral specialization prescribed by the Rybczynski theorem.

#### *Effects on specialization*

Immigration led to an increase in the supply of workers with low and medium education (for short, unskilled) in Spain.<sup>11</sup> The Rybczynski hypothesis implies that regions that experienced increases in unskilled immigration could have responded by increasing production and employment in those industries that employed unskilled workers more intensively. These regions would thus increase their production and exports (to other regions or countries) of these unskilled-labor-intensive goods.

We also evaluated this hypothesis empirically in González and Ortega (2011). Our results, summarized

<sup>11</sup> The immigrant population had on average a level of educational attainment somewhat lower than the average (young) native worker.

Table 2

Effects of immigration on the regional structure of production and the composition of the workforce by industries			
Adjustment via sector composition	1	2	3
All sectors	-0.0183	0.2049	0.0668
Tradeable sectors only	0.0335	0.0511	0.0203
Adjustment via workforce composition			
All sectors	0.7481*	0.4518*	0.6035*

Note: The data sources, specification and estimation details are as in Table 1. The dependent variable in the first panel is the change in the employment of workers with a given education level between 2001 and 2006 in a province due to the change in the scale of certain sectors (between-industry adjustment). In the second panel, the dependent variable is the change in the employment of workers with a given education level due to all sectors in the province changing the composition of their workforce in favor of that education category (within-industry adjustment). The coefficients shown are those for the main explanatory variable: the percent change in the working-age population (by provinces and education level) between 2001 and 2006. An asterisk indicates that the coefficient is significant at the 99% confidence level.

Source: González and Ortega (2011).

in the first panel of Table 2, suggest that the role of this channel of adjustment was fairly limited. Of the total increase in employment as a result of immigration, only a small fraction (between zero and 20 percent, depending on the specification) can be attributed to the type of between-industry adjustment described in the Rybczynski theorem. Production and employment did increase in regions that received higher immigration, but not disproportionately in industries that tended to employ workers of the “type” that was becoming more abundant.

#### *Effect on composition of the workforce at the industry level*

How did regional economies adapt to the increase in the number of immigrant workers with a low-medium level of education? If sectoral specialization was not affected much, then the typical sector must have adjusted its production techniques to the changing skills of the local workforce, as would be the case in the standard one-sector model. González and Ortega (2011) found that, indeed, this appears to have been the main channel of adjustment, as shown in the second panel of Table 2. That is, in the provinces of increased immigration, the typical sector increased its intensity of use of the kind of skills that were now locally more abundant. The results suggest that somewhere between 45 and 75 percent of the increase in the labor force at the regional level was absorbed through this channel.

To be more specific about this channel, in the period of interest the educational attainment of Spanish workers

was increasing rapidly. Since immigrants were on average less educated than native workers in the same age group, the overall educational upgrading of the workforce was slower in high immigration regions. This effect seems to have been especially pronounced in the sectors of hotels and restaurants, retail trade, construction and domestic service, where the average educational level fell significantly in regions of high immigration. What is puzzling is that we could not detect a negative effect on the unskilled wage, despite the increase in the relative supply of unskilled labor.

#### **Alternative explanations**

The previous findings reject the Rybczynski hypothesis. The wage puzzle therefore remains. How is it possible that sectors, and presumably firms within those sectors, were willing to use unskilled labor more intensively in production unless unskilled wages fell relative to the wages of more skilled workers? This section sketches a number of explanations, with particular emphasis on one that has played an important role in the Spanish experience, as well as in other countries, but has not been connected to the wage puzzle in the literature to date.

#### *Other adjustment mechanisms*

A number of mechanisms have been proposed to account for the insensitivity of wages to immigration shocks that do not rely on changes in sectoral specialization. Lewis (2013) provides an up-to-date review of several of these mechanisms. Chiefly among these, the author argues that when immigration alters the skill composition of the labor force in a local economy, firms adjust by reorganizing their production processes accordingly, switching to technologies that make a more intensive use of the more abundant skills.<sup>12</sup> Thus the resulting increase in the demand for unskilled labor can then match the increased supply without putting downward pressure on its price (unskilled wages).

<sup>12</sup> Dustmann and Glitz (2014) provide additional evidence for this adjustment using German data.

Focusing on the consequences of immigration for the wages of native workers, Manacorda et al. (2012) and Ottaviano and Peri (2012) have argued that natives and immigrants with the same observable skills are nevertheless imperfect substitutes in production, which substantially attenuates the degree of face-to-face competition and, as a result, the effect of immigration on the wages of natives with similar education and experience. At a more micro level, Peri and Sparber (2010), as well as Amuedo-Dorantes and de la Rica (2013) in the case of Spain, have provided evidence that immigration strengthens worker specialization across occupations on the basis of their relative communication skills.

#### ***The domestic work sector and the labor supply of native women***

Inspired by the work of Cortés and Tessada (2011), Farré et al. (2011) analyzed the effects of immigration on the domestic help sector in Spain. This is potentially relevant for two reasons. Firstly, a large share of recent immigrants in Spain were female, and almost 50 percent of them were employed in this sector (particularly, cleaning and personal care). Secondly, the increased availability and affordability of home help might allow skilled native women to increase their market labor supply. Thus, there might be a cross-skill effect, whereby unskilled immigration might lead to an increase in the supply of skilled labor, which would mitigate changes in the skilled-unskilled relative wage.

Using a methodology similar to that described in previous sections, Farré et al. (2011) found that immigration had a large impact on the domestic services sector in Spain (Table 3). For every 100 female immigrants in a province, we estimated that employment in the domestic service sector increased by about nine workers in the period 1999–2008. In addition, we found that the hourly wage in domestic services increased much less

in regions of high immigration, compared to low-immigration ones. Not surprisingly, we found that the reduction in the cost of hiring a domestic worker in high-immigration regions led, in turn, to a significant increase in the employment rates of university-educated native women with family responsibilities (young children or elderly dependents). Specifically, it appears that immigration allowed skilled native females to return to work earlier after childbirth, and to continue working (retire later) while caring for elderly dependents. The magnitude of this effect is important, as shown in Table 4. A ten percent increase in the fraction of immigrant women in the province leads to a rise in the employment rate of university-educated native women with family responsibilities of 2.2 percentage points. This implies that the employment rate of the affected native women increased

**Table 3**

Effects of immigration on the domestic services sector		
	Coefficient	Number of observations
Employment	0.086*	520
Wages	-5.87*	126

Note: The table summarizes the results of instrumental variables regressions estimated using Labor Force Survey and Household Budget Survey data. The dependent variable is, in the first row, employment in the domestic services sector in a province and year (between 1999 and 2008) as a fraction of total employment, and, in the second row, the average hourly wage in a region (composed of several provinces) and year (between 1999 and 2005) for domestic service workers. The coefficients shown are those for the main explanatory variable: the fraction of immigrant women over the total number of working-age women in the region. Each regression includes as control variables binary indicators for each year and for each province (first row) or region (second row). An asterisk indicates that the coefficient is significant at the 99% confidence level.

Source: Farré et al. (2011).

**Table 4**

Effects of immigration on the employment of skilled native women		
	Employment	Hours of work
College graduates	-0.128	-1.08
College graduates with family responsibilities	0.222*	2.578
High school graduates	-0.256*	-5.039
High school graduates with family responsibilities	0.147**	2.888*

Note: Sources as in Table 3. The sample includes native working-age women with the education level specified in the row header, during the period 1999–2008. The number of observations is about 128,000 for the sample of college graduates, and about 360,000 in the sample of high school graduates. The dependent variable is, in the first column, a binary employment indicator, and, in the second, the number of hours worked a week (including zeros). The coefficients shown are those for the main explanatory variable: the fraction of immigrant women over the total number of working-age women in the region, and (in rows 2 and 4) its interaction with an indicator for women with small children or elderly relatives in the household. Each regression includes as control variables binary indicators for each year and for each province, as well as individual-level demographic controls (age, marital status, and number and ages of the children). One asterisk indicates that the coefficient is significant at the 95% confidence level; two asterisks indicate 99% significance.

Source: Farré et al. (2011).

by three percentage points overall between 1999 and 2008 as a result of immigration.

These results are consistent with those obtained in other recent studies using data from other immigration countries such as the USA (Cortés and Tessada 2011), Italy (Barone and Mocetti 2011), and Hong Kong (Cortés and Pan 2013b). They suggest that unskilled immigration may have lowered the wages of unskilled workers (in the domestic service sector), but they also led to an increase in the labor supply of skilled (female) workers, which may have moderated the wages of skilled workers at the same time.<sup>13</sup>

The finding of a strong cross-skill complementarity helps account for the puzzle described earlier, namely, the lack of response of relative (skilled-unskilled) wages to changes in the relative supply of skilled workers due to immigration. When an economy exhibits an inflow of unskilled workers, the relative supply of unskilled labor increases, putting downward pressure on the relative unskilled wage. However, our findings reveal that a large fraction of female unskilled immigrants were employed in the domestic help sector. The increased availability (and lower price) of domestic services allowed a number of native skilled women to make use of domestic service workers to help them carry out their family responsibilities. As a result, the supply of skilled (female) labor increased, partially offsetting the increase in the relative supply of unskilled labor driven by immigration and thus potentially mitigating the downward pressure on unskilled wages.

## Conclusions

We have analyzed the channels through which the Spanish economy absorbed the large immigration wave that arrived between the late 1990s and the late 2000s. Our analysis delivered a number of findings that are largely in line with those documented for other countries. Specifically, we found that immigrants were absorbed by the regional economies without much of an effect on the aggregate employment rate or on wages. In this process, Rybczynski-type adjustments to sectoral specialization did not seem to play much of a role either. In contrast, cross-skill effects driven by an expansion of the domestic-service sector and an increased supply of skilled labor by native women appear to have been

<sup>13</sup> We did not analyze directly the effect of (low-skilled, female) immigration on the wages of skilled native (female) workers, but this would be a useful avenue for future research.

important. Other studies have also documented the major effects of immigration on the wages paid in some non-traded sectors like food preparation and personal services (Cortés 2008; Frattini 2010).

While openness to inter-regional or inter-national flows of goods and services did not appear to play a major role in the pattern of adjustment described here, some recent studies suggest that cross-country differences in trade openness may lead to differences in the economic effects of immigration across countries. Iranzo and Peri (2009) as well as di Giovanni, Levchenko and Ortega (2012) show that the effects of immigration on firm entry and exit, average productivity, and product variety depend importantly on the barriers to export for firms in the immigrant-receiving economy. In a nutshell, it seems plausible that the degree of openness to trade can significantly mitigate the effects of immigration on the domestic economy.

Going forward, what is needed in order to improve our understanding of the economic effects of immigration is a richer theory of the labor market that incorporates the channels that have been consistently supported by empirical evidence. The standard textbook model is a straightjacket that can lead to misleading policies.

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