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Immigrants' assimilation process in a segmented labor market

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Immigrants' Assimilation Process in a Segmented Labor Market

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September 2009

Forschungsinstitut
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of Labor

Immigrants' Assimilation Process in a Segmented Labor Market

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ABSTRACT

Immigrants' Assimilation Process in a Segmented Labor Market*

While much of the literature on immigrants' assimilation has focused on countries with a large tradition of receiving immigrants and with flexible labor markets, very little is known on how immigrants adjust to other types of host economies. With its severe dual labor market, and an unprecedented immigration boom, Spain presents a perfect natural experiment to analyze immigrations' assimilation process. Using data from the 2000 to 2008 Spanish Labor Force Survey, we find that immigrants are more occupationally mobile than natives, and that much of this greater flexibility is explained by immigrants' assimilation process soon after arrival. However, we find little evidence of convergence, especially among women and high skilled immigrants. This suggests that instead of integrating, immigrants are occupationally segregating, implying that there is both imperfect substitutability and underutilization of immigrants' human capital.

JEL Classification: J15, J24, J61, J62

Keywords: immigrants' assimilation effects, cohort effects, occupational distributions and mobility, segmented labor markets

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I. Introduction

Much of the literature on immigrants' assimilation has focused on countries with a long tradition of receiving immigrants, such as Australia (Chiswick and Miller, 1995), Canada (Baker and Benjamin, 1994; and Hum and Simpson, 2000, 2004), Germany (Pischke, 1993; Schmidt, 1992; and Constant and Massey, 2005), Israel (Sabatallo, 1979; Flug, Kasir and Ofer, 1992; Friedberg, 2001; and Eckstein and Weiss, 2004, among others), and the United States (Chiswick, 1978; Borjas, 1985; Friedberg, 1993; LaLonde and Topel, 1992; Borjas, 1995;; Hu, 2000; Lubotsky, 2000; Duleep and Dowhan, 2002; Duleep and Regets, 2002; Card, 2005; and Blau and Kahn, 2007, among others). In addition, despite the well known institutional and labor market differences existing across these countries, these economies represent relatively flexible labor markets, in sharp contrast with the segmented labor markets found in southern European countries, transition economies or developing countries. Most of these studies find that after an initial adaptation period due to lack of knowledge on how to locate job offers (Chiswick, 1986; Manning, 2003; and Frijters *et al.*, 2005) and once offers are located, difficulties in gaining recognition for credentials acquired in the source country (Green, 1995), immigrants' earnings converge towards those of natives. What is still an open debate in this literature is whether and to what extent full-convergence takes place—see Card, 2005; or Fernandez and Ortega, 2008, for a thorough discussion on these issues.

In contrast, not much is known on how immigrants adjust to an economy with little experience as a host country and in which its labor market presents a strong dualism. Understanding immigrants' assimilation process in such circumstances can be of most policy relevance, especially in the midst of the new immigration flows towards the fast growing developing economies.[1] As Hatton and Williamson (2005) highlight

[1] Recent evidence indicates that South-South migration accounts for half of all migration from the South: According to Ratha and Shaw (2007), "s*ome of the largest migration corridors are in the South. After the*

changes in the direction of world-migration trends towards a more South-South direction are likely to create new problems for newly industrial economies. Unfortunately, lack of good data in developing countries (Ratha and Shaw, 2007) makes this analysis difficult to undertake.[2]

In this paper, we propose to use Spain as a "perfect" natural experiment to analyze such issues as the country experienced an unprecedented immigration boom in a short period of time—with immigrants representing from 1% of the population in 1990 to 12% in 2009—,[3] and presents an extreme case of labor market dualism—with at least one third of its labor force in the secondary labor market for the last two decades.[4] While it is true that, currently, the Spanish economy differs in many ways from a developing economy; its social, political and economic situation three decades ago was not that different from the present situation of many Eastern European countries or other developing countries, implying that much can be learned in the developing world from the Spanish experience. In addition, in spite of its spectacular changes, Spain still suffers from serious problems similar to those experienced by emerging countries, such as, a low productivity growth, excessive borrowing, strong rigidities in its labor market and financial and banking systems (Andrés, 2009; Garicano, 2008; de la Rica, 2009).

The contribution of this paper is to provide new evidence on how immigrants adjust to a host country with strongly segmented labor markets. More specifically, we

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Mexico-United States corridor, the next three largest are estimated to be Russia-Ukraine, Ukraine-Russia, and Bangladesh-India. Many of these large migration corridors emerged due to the partitioning of countries. When such corridors are excluded, the largest of the remaining corridors are not all South-North—some are North-North, others South-South. India, Russia, and South Africa are well-known as receiving countries in the South."

[2] To our knowledge Gindling, 2009, is the first one to analyze the impact of immigrants from one developing country (Nicaragua) to another one (Costa Rica). In addition, several studies have studied rural-urban migration in urban China (Wu and Li, 1996; Xiang, 1996; Knight et al., 1999; Meng, 2000; and Meng and Zhang, 2001). Finally, there is some research on the impact of emigration from a developing country on the labor market of the migrant sending country (for example, Aydemir and Borjas, 2007 and Hanson, 2008).

[3] Since early 2000s, the average annual flow of immigrants in Spain has been around 500,000 per year, representing an increase of 75% of he population over that period.

[4] With the current crisis, the proportion of workers with fixed-term contracts has gone down to 25% for the first time since 1989.

use data on the recent immigration wave in Spain to compare the occupational distribution of immigrants to that of native-born Spaniards, and in particular with native-born Spaniards with similar observable characteristics. In addition, we examine how the occupational distribution of immigrants has changed with time spent in Spain. All along, we pay special attention on possible heterogeneity effects, that is, we explore whether and to what extent the assimilation process of immigrants varies by gender, education level, or continent of origin. The paper provides new evidence on the extent the immigrant resource is underutilized in Spain, and improves our understanding of the recent wave of immigrants' adaptation process. The paper concludes with explanations for the empirical results and some policy implications for countries with severe segmented labor markets.

While much of the literature on immigrants' assimilation focuses on earnings assimilation, such an approach offers a limited and one-dimensional view of the adaptation process of the newly arrived, or as Card (2005) puts it: "*On the question of immigrant assimilation, … a narrow focus on immigrant earnings is misplaced*".[5] A richer and alternative measure of assimilation that conveys both labor market adaptation and socioeconomic status attainment is provided by observing the occupational distribution of immigrants relative to that of natives as time in the host country increases. In addition, as Green (1999) explains: "*Information on the occupational distribution of immigrants and how it changes with time in a host economy is central to understanding how immigrants affect economic growth and how they adjust to a host country both in economic and social terms.*"

To conduct our analysis, we estimate separate multinomial logit models of occupational choice for immigrants and native-born individuals pooling cross-sectional

[5] Unfortunately, no earnings data is available in the Spanish Labor Force Survey. While earnings data are available for Spain in alternative data sets, their use for the current analysis is not without problems (as discussed in more detail in the data section).

data from the 2000 to 2008 Spanish Labor Force Survey. Our model of occupational selection relates selection to observable characteristics such as age, sex, education level, and place of residence. In addition, for immigrants the occupational choice is related to region of birth as well as to year of arrival in Spain. We follow the synthetic cohort analysis proposed by Borjas (1985, 1995) in the immigrant earnings literature and track specific immigrant waves across a succession of cross-sections. In this manner, we are able to disentangle the cohort effect from the assimilation effect.[6]

Our analysis highlights three important results. First, we find that immigrants are more occupationally mobile than natives. Most of this greater flexibility is explained by immigrants' assimilation process soon after arrival to the host country: Just after arrival, immigrants enter occupations below their skill level and then move towards higher skilled occupations. However, our second finding indicates that convergence does not occur: Immigrants are underutilized in Spain as they segregate into low-skilled occupations (compared to natives with similar observable characteristics). Third, we find that, among male immigrants, assimilation is strongest the lower the education level.

This paper is more closely related to the following papers in that they also study the assimilation process of the recent wave of immigrants in Spain. To our knowledge, one of the first studies to explore this question is that of Amuedo-Dorantes and de la Rica, 2007. Using 2001 decennial Population Census data, the authors find evidence of immigrants' progressive employment and occupational mobility as their residence in Spain increases. Unfortunately, due to data limitations, their analysis focuses on immigrants who arrived during the second half of the 1990s and, therefore, misses most of the massive recent inflow of immigrants. Moreover, given that they only have a

[6] Green (1999) has applied this framework to analyze immigrants' occupational mobility relative to natives.

single cross-section, they are unable to follow the synthetic cohort analysis proposed by Borjas and used in this paper.[7] When expanding the analysis to the beginning of the 21st century, the evidence on immigrants' assimilation is somewhat mixed. On the one hand, using cross-sectional data from the 1996 to 2005 Spanish Labor Force Survey, Fernandez and Ortega, 2008, find that although the Spanish labor market is able to absorb immigrants within five years after arrival, it does so at the expense of allocating them in temporary jobs for which they are overqualified.[8] On the other hand, using recently available panel data from social security records, Izquierdo *et al.*, 2009, find that, despite a sizeable and significant wage gap reduction between immigrants and natives within the first five years after arrival to Spain, full assimilation of wages does not take place. Finally, as highlighted by Bentolila *et al.*, 2008, the Spanish experience is comparable to the Israeli one in the steady flow of 1.2% per year over the 1992-2000 period. However, it differs in that the immigration to Israel has been heavily subsidized by its government through the offer of vocational training programs or public housing.

The structure of our paper is as follows. Section 2 presents the motivation and several theoretical considerations. Section 3 presents the Spanish institutional background, the data, and descriptive statistics. Section 4 contains the main results. The paper concludes with a discussion in Section 5.

II. Motivation and Theoretical Considerations

To understand immigrants' contribution to a host country, it is key to analyze immigrants' education or skill composition at arrival relative to that of the receiving

[7] Amuedo-Dorantes and de la Rica, 2007, restrict their analysis to immigrants who arrived between 1996 and 2000, and assume that the quality of immigrant cohorts over this 5-year period has remained unchanged.

[8] Fernandez and Ortega, 2008, use the following four measures of immigrants' success in the Spanish labor market: (1) the labor force participation rate, (2) the unemployment rate, (3) a statistical measure of over-education that considers that a worker is overeducated when his/her level of education is above the mean plus one standard deviation of their occupational category, and (4) the incidence of temporary contracts.

economy, and how this immigrants' skill composition varies to that of natives over time. As Dustmann *et al.*'s (2005) discussion of the underlying theoretical analysis of the labor market effects of immigration emphasizes, "*there are no effects of immigration to be expected on labor market outcomes of residents if immigration does not affect the skill composition of the resident labor force and if capital supply is perfectly elastic.*" Only if immigrants' inflows change the skill composition of the native labor force, disequilibrium between supply of and demand for different types of labor at existing wages and output levels will occur and lead to short-run changes on wages and employment of natives as the economy moves to a new equilibrium. The authors highlight that whether the economic theory predicts long-run effects depends on the assumptions being made on the flexibility of the output mix or the closed ness to international trade.

Clearly, immigrants can change the skill composition of the host country's resident labor force through three different mechanisms: (1) by having different skills from those of natives at arrival, (2) by how they assimilate to the host country during the first years after arrival, and (3) by whether they adapt differently to the economy than natives. For instance, even in the hypothetical case in which immigrants had the same skills as natives at arrival to the host country, their lack of knowledge on how to find job offers or the difficulties in getting their credentials recognized could well generate a transitory disequilibrium in which recently arrived highly qualified immigrants would compete for low-skill jobs while building up knowledge of the host country's labor market, so that, with time, they could find jobs that matched their skills. This is the well known assimilation process most immigrants initially go through when they first arrive to a country, and in and by itself such process can generate short-run disequilibrium in certain types of labor markets. Alternatively, even after immigrants have assimilated,

they may well react differently from natives to economic changes. This may occur because immigrants may well be less geographically attached than the native labor force, have different taste or preferences towards work or different types of work, or may care less (or differently) about socio-economic status of certain jobs or occupations.

Clearly, the country's immigration policy plays a key role in determining the occupational distribution of immigrants at arrival. For instance, early research on US immigrants, which used data on immigrants who had mainly entered the US prior to the 1965 Immigration Act, finds that most immigrants were born in Europe and Canada and were more likely to be in managerial and professional, service and laborer jobs relative to native born, and were under-represented in "precision production, craft and repair" jobs and in the agricultural sector. In contrast, research based on more recent immigrants, that is, those arriving by the 1980s and after, were more likely to come from Mexico, Central America and Asia, to have lower average schooling than natives, and to be no longer over-represented in managerial and professional jobs, but instead show a slight over-representation in primary and farming jobs (Chiswick, 1978; Borjas, 1992; Card *et al.*, 2000; and Card, 2005). This shift in the composition of immigrants is to a large extent explained by US immigration policy, which went from establishing national origin quotas with a strong bias in favor of Northern Europeans prior to 1965, to establishing preferences for people with family members already in the country. Similarly, Green (1999) finds that immigrants who arrived in Canada in the 1970s, when Canada's immigration system gave priority to immigrants who entered via the "independent" class and who were assessed based on a point-scoring system whereby potential immigrants were ranked on the basis of skill-related characteristics or wealth, tended to be more concentrated in the higher skilled sectors relative to the native born

and less concentrated in more traditional sectors. However, this over-representation in the skilled occupations declined across subsequent entry cohorts, reflecting Canadian immigration policy's shift away from a selective system towards a system that gives priority to close relatives of those immigrants already in the country and that does not assess immigrants on personal skill-related characteristics. Similarly, Sweden has also seen the ethnic (and skill composition) of its immigrants change with the nature of its immigration (Duvander, 2001). As the Swedish immigration policy changed from focusing on labor market immigration in the 1960s, when labor demand was high, to refugee and family immigration in the 1970s and onward, the ethnic composition of its immigrants has changed from being to a large extent Finnish in the 1960s, to Iranian, Chilean, and Polish. In contrast, in Australia, where immigration policy based on a points system began in the early 1990s and was reinforced in 1996 and later by tightening the selection criteria, the evidence suggests that there was a stronger self-selection among prospective migrants leading to higher quality and better employability for the later waves of migration (Cobb-Clark, 2000, 2003; Richardson *et al*., 2001, 2002; Chiswick and Miller, 2006; and Thapa and Gørgens, 2006). Right after World War II, the UK immigration policy initially favored Commonwealth citizens over others. However, in the early 1970s, the UK shifted its immigration policy towards a preference for European citizens and tightened entry restrictions to citizens of former colonies. This change in immigration policy led to a change in the national-origin mix of immigrants, which had a significant impact on the skill-characteristics of the different cohorts of immigrants, increasing the skill endowment of the successive cohorts of immigrants (Bell, 1997).[9]

[9] The strong link between skill characteristics and country of origin has been highlited by many researchers, Borjas, 1985 and 1995, among others.

Regardless of their initial ethnic-mix and occupational distribution, the evidence shows that immigrants go through a similar assimilation pattern in the first couple of years after arrival in which they initially face a period of non-employment or employment in low skill jobs as they learn how the host country's labor market works. As immigrants spend time in the host country and gradually acquire this country-specific knowledge, their labor market performance may improve relative to that of their native counterparts (for Canada, see Richmon and Kalback, 1980; Boyd, 1985; Green, 1999; for Israel, see Flug *et al.*, 1992; Cohen and Eckstein, 2002; and for the United States, see Chiswick 1978b; Jasso and Rosenzweig, 1988, Borjas, 1992). However, full convergence of immigrants' occupational distribution towards that of natives may not necessarily occur. First, if the country's immigration policy has imposed restrictions on immigrants' entry that match immigrants' skills to host country labor demand needs, new immigrants will have an occupational distribution that reflects the highest demand growth sectors more than will the distribution of the native born. Second, although some convergence may occur over time, complete assimilation is unlikely to take place if native-born new labor market entrants move towards sectors less saturated by immigrants. In addition, once assimilation of immigrants has taken place, it is likely that immigrants end up being more occupationally mobile than natives and that they adapt differently to economic shocks than natives (as found by Green, 1991; Barth *et al.*, 2004 and 2006; and Dustmann *et al.*, 2009).

Alternative theoretical models are useful to understand the channels that explain immigrants' assimilation process after arrival into the host-country. In the remainder of this section, we discuss two alternative theories with distinct predictions: human capital theory and segmented labor markets.

Human Capital Theory. Eckstein and Weiss (2004) develop a human capital model in which different skills are rewarded differently at different occupations, and that describes the investment decisions of immigrants and natives. The added value of this model is that there is an explicit introduction of a time-since-arrival effect on prices of skills that influence the immigrants' investment decision process. The acquisition of new skills requires some sacrifice of current earnings. The investment decisions interact with the changes in the market value of the immigrant's skills and together determine his earnings growth. In particular, rising prices for imported skills provide an added incentive for investment because the sacrifice of current earnings is low relative to the growth in future earnings capacity. In their model, immigrants fully assimilate if the prices of imported skills converge to the same price as that obtained by natives for locally produced skills, because increasing prices on imported human capital imply higher investment by immigrants. However, if imported skills are of lower quality and so their long-run prices falls short of the value of the locally acquired skills, then earnings of immigrants may never catch up with those of natives. Such a model suggests that assimilation or convergence ought to be easier among higher educated immigrants and those coming from countries with higher compatibility of the human capital received abroad with the skill requirements of the host-country labor market as it ought to be easier for those with higher schooling to build up the host country's labor market specific human capital because of the greater complementarity between pre- and post-migration human capital.[10]

Segmented Labor Markets. According to the dualistic view, the labor market is segmented by two types of jobs: those in the *primary* sector, characterized by jobs with high-productivity growth and good benefits and chances of promotion, and those in the

[10] In this model, transitions up the occupational scale occur exogenously and are fully anticipated. Cohen and Eckstein (2002) estimate a structural model in which occupational switches and investment decisions are jointly determined and find similar predictions.

secondary or informal sector, where less productive jobs with little or no benefits are found. Under such view, individuals working in the secondary sector are frequently seen as the disadvantaged segment of the labor force rationed out of salaried employment (Fajnzylber and Montes Rojas, 2006). In other words, workers with little access to the primary labor market enter the secondary sector while queuing for wage and salary jobs. Since more vulnerable groups of native workers, such as low-skilled workers, youth, and women, tend to be concentrated in the secondary labor market (Kahn, 2007), converging towards their occupational distribution ought to be relatively easier for low-skill natives than the convergence process of high-skilled immigrants towards the occupational distribution of high-skill males natives, who are likely to be concentrated in the primary labor market.

In the remainder of the paper, we will first discuss the Spanish institutional background, key to understanding immigrants' assimilation process. Then we will provide descriptive evidence that immigrants are more occupationally mobile than natives. Subsequently, we will analyze how the occupational distributions of immigrants differ to that of observationally equivalent natives as time in the country increases. We shall conclude with a discussion on alternative theoretical explanations for our findings.

III. Background and Data

III.1. Economic and Institutional Background

In mid-1970s Spain had very high firing costs inherited from the Franco regime. To reduce them, fixed-term labor contracts were introduced in 1984, with the objective of adding flexibility and promoting employment in a rigid labor market with stringent employment protection legislation and high levels of unemployment. The policy

backfired, and fixed-term employment soared, promptly reaching one third of the Spanish labor force, and creating a dual labor market with workers with fixed-term contracts holding unstable, low protected and poorly paid jobs, while workers with indefinite contracts enjoyed protection and presumably also higher wages—Segura *et al*., 1991; Bentolila and Dolado, 1994; Jimeno and Toharia, 1993, Hernanz, 2002; and de la Rica, 2004. The reforms of 1994 and 1997 aimed to enhance the use of permanent contracts and reduce its cost. However, both reforms were quite unsuccessful at reducing the share of temporary contracts in the labor force—see Kugler *et al.*, 2005, and Dolado *et al.*, 2002.

In the last decade, the immigrant population in Spain has soared. While, as recently as a decade ago, immigrants made up less than 2% of the population, they are now over 12%. Most of this massive inflow of immigrants has taken place after the turn of the new century. Several factors explain this rapid change. First, Spanish booming economy and the social promotion—in the form of increased education levels and higher labor force participation—of its national (especially female) population generated a demand for foreign workers (Carrasco *et al.*, 2008 a; Domingo *et al.*, 2006; and Gil and Domingo, 2007).[11] Second, its physical proximity to northern Africa and eastern Europe places Spain close to countries that supply immigrants.[12] Third, its shared language and historical pass with Latin Americans facilitates the social and cultural assimilation of immigrants from this continent, as illustrated by the fact that close to 50% of the immigrants are from Latin America. Finally, the progressive culture of post-Franco Spain has also contributed to increase immigrants' social acceptance (New York Times, 2008).

[11] In contrast with northern European countries, the ageing of national working-age population does not explain the arrival of large number of immigrants in Spain (Domingo *et al.*, 2006).
[12] 17% and 34% of the immigrants in Spain come from Africa and Europe, respectively.

Spain has not had an active policy of attracting immigrants. As early as 1985, Spain imposed severe restrictions on non-European Union foreigners who wanted to establish Spanish residency and citizenship.[13] Beginning 1993, further tightening took place with tougher restrictions on work and residency permit renewals and the implementation of immigration quotas system, which limited the entry of foreigners to about 30,000 immigrants per year. At the turn of the century, Spain updated its immigration legislation and assimilated it to that of other European countries.

However, the free-entrance of foreigners as tourists together with a lax implementation of immigration laws and several generous amnesties that have granted legal residence to illegal immigrants (1985, 1991, 1996, 2000, 2001, and 2005) have *de facto* converted Spain in an immigrant friendly country (Dolado and Vázquez, 2007; Izquierdo *et al*., 2009, among others). In fact, the most common way of obtaining legal status in Spain during the past two decades has been through amnesties. Most frequently immigrants arrived in Spain either illegally or as tourists, and they were subsequently granted legal status through the multiple amnesties that have been granted since the mid-1980s—see Amuedo-Dorantes and de la Rica, 2005, 2008, and Dolado and Vazquez, 2007.[14] Between 1985 and 1991, as many as 150,000 immigrants regularized their status; between 1996 and 2001, a total of 400,000 immigrants did the same; and in the last amnesty, that of 2005, as many as 550,000 immigrants got their residence permits.

While it is true that our data may under-represent illegal aliens, the fact that we pool LFS years from 2000 to 2008 minimizes the potential biases that may rise from the

[13] To have the legal status, immigrants were required to acquire a work and residency permit that restricted them to work in a particular activity and geographic area only for a year. In addition, immigrants were not granted any social benefit despite paying social security taxes when employed.

[14] For instance in the 2000 amnesty to become legal aliens, immigrants had to provide proof of one of the following: (i) residence since June 1st, 1999; (ii) having held a work permit any time during the three-year period preceding February 1st, 2000; (iii) being denied asylum before February 2000; (iv) having applied for any type of residence permit before March 30th, 2000; or (v) family ties to legal residents or to individuals in any of the previous categories.

successive amnesties because most undocumented immigrants in our sample with at least one year of residence are likely to have been legalized. Therefore, although amnesties may affect in some ways the estimates of the year prior to the amnesty for the recently arrived immigrants, subsequently these individuals have no reason to misreport their date of arrival once they are legal aliens. For this reason, and given that we focus on year-to-year differences in assimilation rates, we do not think that amnesties ought to be a major concern in our analysis—similar arguments were presented in Amuedo-Dorantes and de la Rica, 2007.

III.2. Data and Descriptive Statistics

Our analysis is based on data from second quarter of the Spanish Labor Force Survey (LFS) from the years 2000 to 2008.[15] The Spanish LFS gathers information on demographic characteristics (such as, age, years of education, marital status, and region of residence), and employment characteristics (such as work status, occupation, and industry).[16] In addition, for immigrants—defined as foreign-born workers who do not have the Spanish nationality, the LFS collects information on the number of years of residence in Spain and the country of birth.

The native-born samples are random samples of males and females aged 20 to 64 at the time of the relevant LFS. The immigrant sample consists of all immigrants in the relevant LFS who entered Spain after January 1, 1990, were aged 20 to 64 at their time of arrival, and are under age 65 at the time of the relevant LFS. Analysis is restricted to immigrants aged 20 to 64 at time of arrival to concentrate on individuals who were likely headed for the labor force in the near future and to avoid issues of non-

[15] As is common practice in the research using this dataset, we only use the second quarter to avoid repeated observations. The LFS is carried out every quarter on a sample of around 60,000 households. Each quarter, one sixth of the sample is renewed. However, the dataset does not include a variable that allows identification of individuals along the six consecutive interviews.
[16] Unfortunately, the EPA does not gather workers' earnings information.

comparability of the experiences of young immigrants who received part of their basic education in Spain and those who arrived at older ages.[17] The samples are restricted to individuals under age 65 in the LFS year to avoid complications involving retirement decisions. The immigrant samples are restricted to those entering in 1990 and after because the vast majority of immigrant flows has taken place from the late mid-nineties onwards.[18]

Table 1 displays personal and demographic descriptive statistics for natives and immigrants for each of the LFS years (descriptive statistics by gender, continent of origin, and cohort of arrival can be found in Tables A.1 and A.2 in the Appendix). The major difference between the two population groups is that immigrants are younger than natives.[19] In addition, we observe that there are education differences across the two groups.[20] Within the native population, there has clearly been an increase of workers' investment in human capital, as the fraction of natives with a college degree, vocational training, or a high-school diploma has increased over the nine years under analysis. Although a similar trend is observed for immigrants with less than a college degree (with the share of those with vocational training increasing the most), the share of immigrants with a college degree has decreased over-time from 22% to 17%. Comparing immigrants and natives in our sample, we observe that immigrants are slightly more educated than natives (especially in the earlier surveys).[21] Finally, it is

[17] This restriction criteria is common in the literature, see Boyd, 1985; Kossoudji, 1989; and Green, 1999, among others.
[18] Again this is a common restriction in the Spanish literature, see Amuedo-Dorantes and de la Rica., 2007, and Gonzalez and Ortega, 2008, among others.
[19] One exception is in the range between 20 and 24 years old, where we observe that there are more natives than immigrants. This is an artifact of how the sample of immigrants was selected as we restricted immigrants to be 20 years old or older at the time of arrival.
[20] Throughout the analysis we consider four education levels: high-school dropouts; individuals with a high-school degree; individuals with some college education or vocational training (they may have a trade certificate, but no college degree); and individuals with completed university studies.
[21] Although much of this result is due to the fact that we restricted the sample of immigrants to those arriving after 1990, we are not the first ones to find that the level of education of immigrants is not that different from that of natives (Dolado and Vázquez, 2007).

noteworthy to highlight the change in the continent of origin of immigrants over the last decade. While in the early 2000s, immigrants came from Europe, Africa and Latin America in similar proportions; by the 2008 LFS, the weight of immigrants from Europe and Africa has been reduced drastically, representing only 12% and 17%, respectively, and giving room to a large inflow of immigrants from Latin America.

Table 2 presents the occupational distributions at each LFS for the native born and for immigrants from each of the entering cohorts. The occupations are grouped into five categories as follows: "Professionals", which include managers, engineers, social scientists, teachers, health occupations, and arts; "Other white-collar" occupations, which include clerical, sales, and service occupations; "Qualified blue-collar" occupations, which cover qualified workers in agriculture and the fishing industry, handcraft workers, mining and construction technical workers; "Non-qualified" occupations, which include jobs such as janitors, or non qualified laborers; and "Not working", which includes both the unemployed and persons out of the labor force.[22] The latter category is included because, as argued by Green 1999, it is an important part of immigrant adaptation and will likely vary between immigrants and native born.

There are at least five striking differences in the amount and type of change within the immigrant and native-born distributions across LFS years. First, while both population groups have shown a clear tendency of moving out of the "not working" category over the 2000-2008 period, the change has been considerably larger for immigrants arriving after 1999, with reductions of 20 to 28 percentage points, versus the—by no means negligible—reduction of 11 percentage points experienced by the native-born cohort.[23] This shift out of the "not working" category for both population

[22] Notice that the self-employed are included in our sample.
[23] Such reductions are not observed for the cohort arriving in 2001 and are considerably smaller for the cohort 2002. This is probably explained by the fact that, due to the 2001 crisis, immigrants entering during 2001 and 2002 did so with favorable job perspective, as reflected by the lower fraction of

groups reflects the Spanish economic growth over the period under analysis. However, the fact that this trend is stronger for some, but not all, cohorts of immigrants, added to the observation that frequently the earlier cohorts show a movement similar or even smaller to that of the native population seems to suggest that part of what is going on is the assimilation of the immigrants. Second, the trend of this movement out of the "not working" category has also differed across the two populations. For the native-born population, the tendency has been gradual over the nine years, while for the immigrants most of the shift out of this category has occurred within the first two to three years after arrival to Spain, reflecting the initial assimilation process that this population experiences.

Third, the destination of these individuals has also differed for the two groups. While the native-born population have seen an increase in the "professional", and, to a lesser extent, the "other white-collar" categories; the immigrant population has mainly moved into the "blue-collar" and, to a lesser extend, "other white-collar" categories. Among immigrants arrived within the last decade, there is a trend out of the "professional" category. Fourth, there is clearly a greater fluidity of the immigrant distribution relative to that of the natives, as several cohorts of immigrants experience changes within an occupational category of up to 17 percentage points over the decade, while no native born category changes by more than 7 percentage points. This greater fluidity of the immigrant distribution may well reflect a greater ability to adjust to economic changes.

Finally, when comparing the occupational distributions for earlier cohort of immigrants with those of the native born, we find that over-time natives have increased

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immigrants from these cohorts "not working" compared to the other cohorts. The reductions are also smaller for the most recent cohorts, that is, those arriving in the last three years. The data suggests that the smaller reductions are most likely a consequence of these immigrants still assimilating to the new country.

their likelihood of being in the "professional" category, and "other white-collar" category compared to immigrants from the 1990s. In contrast, the immigrant population is relatively more concentrated in "blue-collar" and "non-qualified" occupations. This seems to suggest that there has been a shift towards less manual jobs among the native population compared to a shift in the opposite direction for immigrants, providing some evidence that these two populations have become more complementary over time. Several recent papers have highlighted that native and immigrant workers of similar educational attainment specialize in different occupations and therefore do not compete for the same jobs, explaining the small effect the inflows of immigrants on the wages of the less-educated natives in the U.S. (Ottaviano and Peri, 2006) as well as in Spain (Carrasco *et al.*, 2008b). For instance, Peri and Sparber, 2008, find evidence of imperfect substitutability between natives and immigrants of similar educational attainment in the U.S. Dustmann, *et al.* 2008, also show that natives and immigrants in the U.K. of comparable skills do not compete for the same jobs, and Carrasco *et al*., 2008b, and Amuedo and de la Rica, 2009, find evidence of immigrants and natives being imperfect substitutes within skill categories in Spain.[24]

IV. Methodology

Tables 1 and 2 indicate that the immigrants' occupational distribution changes more over time than does the native-born distribution. In what follows, we explore the reasons for these differences. More specifically, it is unclear whether immigrants' relative greater occupational mobility compared to the native born is due to: (1) observable differences between immigrants and natives; (2) immigrants' assimilation

[24]Carrasco *et al*., 2008b, use data from the Spanish Structure of Earnings Survey, of which two waves (1995 and 2002) were available when their paper was written. Only the latter wave has information on worker's nationality. Amuedo and de la Rica, 2009, use the EPA 1999-2007 and focus on low-skilled workers (with at most a high-school degree). Their analysis on substitutability of natives and immigrants is brief and descriptive, and not the focus of their paper.

process to a new economy—the assimilation effect; or (3) differences in occupational skills across successive cohorts of immigrants—the time-invariant cohort effect.[25]

To study the importance of these alternative explanations in the Spanish case of the beginning of the 21st century, we pool data from all LFS surveys and estimate a multinomial logit (MNL) model of occupational selection separately over each of the immigrant and native-born samples. The MNL model permits estimation of the effects of various characteristics of an individual on his choice from among a set of alternatives that do not have a natural ordering, occupations in this case.[26]

The MNL can be rationalized using an index model in which the value of a particular occupational choice is represented by:

$$I_{cti}^{j} = X_{cti}\beta_{ct}^{j} + \varepsilon_{cti}^{j} \qquad (1)$$

where j indexes the alternative, c indexes the entry cohort of the immigrant, t indexes the LFS year, and i indexes the individual, X_{cti} is a vector of person-specific characteristics, β_{ct}^{j} is a parameter vector that varies by alternative and LFS year, ε_{cti}^{j} is an error term. The probability that individual i from cohort c chooses alternative j in period t is the probability that $I_{cti}^{j} > I_{cti}^{k}$ for all $k \neq j$.

Assuming ε_{cti}^{j} follows an independent extreme value distribution, the resulting specification for the choice probabilities will be a MNL model with cohort-specific year

[25] An alternative reason might be differences in reaction to economic change between immigrants and natives after accounting for assimilation and time-invariant cohort effects. Despite the newly received academic attention of this reason (see Barth *et al*., 2004 and 2006, and Dustmann *et al*., 2009), exploring its relevance in the context of this paper proved unfeasible due to data limitations, as we only have LFS data from 2000 to 2008, which barely covers a whole business cycle. Explorative analysis with the data at hand indicated that such differences were negligible in the time period under analysis. Further research exploiting the current crisis is likely to lead to different results. While this is of great interest, it lies beyond the point of this paper.

[26] While the MNL has the disadvantage that the relative odds of choosing any one option over another is unrelated to the introduction of further options, we are unable to estimate the multinomial probit (MNP), which allows relaxation of the independence assumption, because individuals are observed making only one occupational choice, and therefore a correlation matrix cannot be estimated with these data.

of arrival dummies and LFS-year dummies. Estimating the following equation for immigrants,

$$P_{cti}^{j} = X_{cti}\beta_{cti}^{j} + \varepsilon_{cti}^{j} \qquad (2)$$

we obtain estimates of the fitted probabilities of choosing alternative *j* for immigrants:

$$\hat{P}_{cti}^{j} = X_{cti}\hat{\beta}_{cti}^{j} \qquad (3)$$

For native-born individuals, a similar index model is used but omitting the region of birth dummy variables and year of entry cohort-dummy variables, as explained below. Estimating the following equations for native-born individuals,

$$P_{nti}^{j} = X_{ti}\beta_{ti}^{j} + \varepsilon_{ti}^{j} \qquad (4)$$

we obtain estimates of the fitted probabilities of choosing alternative *j* for natives:

$$\hat{P}_{nti}^{j} = X_{ti}\hat{\beta}_{ti}^{j} \qquad (5)$$

The variables used to explain choices among these alternatives include sex, age, education, marital status, and LFS-year dummies. In addition, a set of location dummy variables are included because immigrants tend to exhibit different location patterns from the native born. For immigrants, a second set of variables is also used. These include: (1) a set of dummy variables corresponding to the region of birth to pick up differences in assimilation that might be related to regional characteristics, and (2) year of entry cohort-dummy variables.

Comparison of the fitted probabilities between a representative immigrant (equation 3) and a representative national (equation 5) with similar observable characteristics of choosing alternative *j* at a given LFS survey year *t*—as reflected by equation 6 below—, provides some insight into whether the immigrant resource is being underutilized in the sense of being found in lower skilled jobs for the same education

level than the native born and into the effects of characteristics that are used in immigrant selection.

$$(\hat{P}^{j}_{cti} - \hat{P}^{j}_{nti}) \qquad (6)$$

We shall estimate these differences in fitted probabilities between a representative immigrant and national as time in the country increases for the immigrant, obtaining a ***cross-sectional measure of assimilation.***[27] While these cross-sectional estimates will inform us on the assimilation process of a representative immigrant, they will also reflect the immigrants' time-invariant cohort effect and how this cohort experiences changes in the economy (relative to natives).

To isolate the assimilation effect, we shall compare the same cohort across LFS years (using again the native born as a comparison group to eliminate the effects due to changes in the economy). As such, comparisons of the fitted probabilities for a representative immigrant from cohort *c* of choosing alternative *j* between LFS year *t* and LFS year *(t-k)* normalized by the changes observed in the fitted probabilities experienced by a representative native over the same time period yields:

$$(\hat{P}^{j}_{cti} - \hat{P}^{j}_{c(t-k)i}) - (\hat{P}^{j}_{nti} - \hat{P}^{j}_{n(t-k)i}) \qquad (7)$$

, which is an estimate of the ***net assimilation effect***, assuming that immigrants and natives experience change in the economy in the same way and that X is common vector across time.[28]

[27] Observing how these differences vary as immigrants' time in Spain increases delivers, in essence, the same analysis presented in Amuedo-Dorantes and de la Rica, 2007, where they use the 2001 Census to estimate immigrants' assimilation relative to natives. The authors acknowledge that, because they only have a single cross-section, their estimates will be biased if the quality of immigrants across cohorts changes. However, they argue that the quality of immigrants across cohorts has remained unchanged over their sample period as they only focus on immigrants who have arrived within the last 5 years.

[28] While this may seem a reasonable assumption given that we are only analyzing a period of nine years, several authors have found evidence against this for the UK and Germany (see for instance Dustmann *et al.*, 2009). In our exploratory work, we have examined whether there were trends in unobservable differences across cohorts, by comparing the fitted probabilities for a representative immigrant from different cohorts observed at the same number of years after arrival in Spain, again normalizing for changes experienced by the native born over the same time period. Any observed differences in these

V. Empirical Results

V.1. Are Immigrants Underutilized in Spain?

In this section, we explore whether immigrants are underutilized in Spain by comparing the occupational distribution of immigrants to that of their native counterparts. In addition, we analyze how this native/immigrant differential evolves with immigrants' time in the host country. For simplicity of exposure, we plot differences in fitted probabilities of choosing alternative occupations between natives and immigrants as immigrants' time in Spain increases in Figures 1.A through 1.D. The estimates from these Figures are obtained by subtracting the probability that a native-born worker of a given type chooses a particular occupation from the probability that an immigrant of the same type chooses the same occupation at each LFS survey (as indicated by equation 6 above). Since these estimates are calculated at different years after arrival in Spain, they represent a cross-sectional measure of assimilation. All differences are statistically significant from zero at the 5% level.

The analysis is done for the following types of workers: For native-born individuals, the type 1 person is a male living in Madrid, aged 35 to 39 years old, currently married, without a high-school degree. For immigrants, that person is from Latin America and arrived in Spain in 2002.[29] Type 2 is the same as type 1 but with a high-school degree. Type 3 is the same as type 1 but with vocational training or some college. Type 4 is the same as type 1 but with a university degree. Type 5 is the same as type 4 but comes from the EU15. Type 6 is the same as type 3 but comes from all

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estimates would either reveal that there were unobserved differences across the different cohort of workers or that immigrants and natives reacted differently to economic change. Perhaps not surprisingly, given the short period horizon, we did not find evidence of major differences.

[29] Plots of these differences for all the other cohorts, as well as the fitted probabilities for the different types of natives and immigrants are available from the authors upon request. The overall pattern is similar across different cohorts.

European countries, excluding those from the EU15.[30] And Type 7 is the same as type 1 but comes from Africa.[31] Types 1 through 4 are displayed in Figure 1.A and types 5, 3, 6 and 7 are displayed in Figure 1.C.[32] Figures 1.B and 1.D report results for women. A positive estimate implies that immigrants are over-represented in a given category relative to natives with similar observable characteristics. For instance, in the top LHS panel of Figure 1.A, the first bar height in the "non-qualified" category indicates that immigrant males without a high-school degree who arrived in Spain in 2002 are 15 percentage points more likely to hold a job in a "non-qualified" occupation in 2002 than their natives counterpart. The results are summarized below and clearly show that immigrants are underutilized in Spain and that they seem to segregate into low-skilled occupations.[33]

Compared to natives, immigrants tend to concentrate in the "non-qualified" category, regardless of their education, sex, age, and of time in the country. Compared to natives, immigrants are over-represented in the "non-qualified" category. With the exception of immigrants from EU15—shown in the top LHS chart of Figure 1.C—, this is true across LFS survey years, for all types of workers, and it does not seem to change much with time spent in the country (implying that full assimilation does not occur). Moreover, this relative over-representation of immigrants in "non-qualified" jobs (regardless of their education, sex and age) is large, representing a hefty 10 to 20 percentage-points difference or more for males. It is also quite striking that, for males, the native/immigrant's differential does not change with worker's education

[30] While we would have liked to identify eastern Europeans from other Europeans, this is not possible with the Spanish LFS.
[31] When deciding on the types by continent of origin, we decided to choose types based on the average education level for that group, as opposed to holding education constant across different origins. The reason being that in this paper we focus on how immigrants assimilate in Spain, as opposed to analyzing whether immigrants of different origins with identical observable characteristics assimilate differently.
[32] Note that type 3 is represented twice.
[33] Although not shown, the analysis was also done for an eight type who was the same as type 3 but aged 25 years old instead. Whenever appropriate we include the results in the text. Estimates are available from the authors upon request.

level—as shown in Figure 1.A. For female workers, the difference between immigrants and natives is even larger (between the two and four-digit range) and, in contrast with the findings from males, the gap between natives and immigrants is considerably larger for lower-skilled workers—as shown in Figure 1.B.

Compared to natives, immigrants without a college degree are under-represented in the "not working" category—if not immediately after arrival, within two to three years. Moreover, this under-representation increases at two to three after arrival in Spain. This pattern is observed both for males and females, and clearly suggests that low-skilled immigrants come to Spain to work. For high-school dropout immigrants, there is an initial under-representation in the "not working" category relative to their native counterparts, and this under-representation increases after two or three years in the country. The only exception to this pattern is for African immigrants, for which we observe that right after arrival they are heavily over-represented in the "non working" category (as shown in the bottom RHS chart of Figure 1.C). This sizeable difference of about 10 percentage points decreases considerable after African immigrants have been in the country for three to four years. For immigrants with a high-school degree or trade certificate, an under-representation in the "not working" category relative to their native counterparts arises two to three years after arriving in the country. In contrast, for immigrants with a college degree, we observe an initial over-representation in the "not-working" category compared to their native counterparts hovering 5 percentage points for males and 10 percentage points for females. Two or three years after arrival this over-representation of college immigrants in the "not working" category looses relevance.

There is some evidence of convergence between low-skilled male immigrants and natives in "blue-collar" occupations around three to five years after arrival in

Spain. For low-skilled male immigrants (that is, those with a high-school degree or less), there is an initial under-representation in the "blue-collar" category relative to their native counterparts that decreases with time in the host country, and seems to disappear three (five) years after arrival for high-school graduates (high-school dropouts)—as shown in the top charts of Figure 1.A. Moreover, for high-school graduates, after five years in Spain, they are over-represented in this category relative to their native counterparts, suggesting that there may be some convergence between low-skilled immigrants and natives around three to five years after arrival in Spain. There is again a clear exception to this pattern for immigrants from Africa—bottom RHS chart of Figure 1.C. In this case, although the under-representation of African immigrants in this category decreases with time in the host country, it does not vanish even after 6 years in the country.[34]

High-skilled male immigrants seem to segregate into "qualified blue-collar" jobs and "non-qualified" jobs—shown in bottom two chars of Figure 1.A. Relative to natives, male immigrants with a trade certificate are over-represented in the "blue-collar" and "non-qualified" categories and under-represented in the "professional" and "other white-collar" categories. There is no apparent trend suggesting some convergence over time. The findings for young male workers with a trade certificate (not shown) or male immigrants with a college degree are very similar. The major difference is the relative concentration in the different categories for the most educated type. For instance, compared to natives they are under-represented in the "professional" category and slightly over-represented in the "other white-collar" category. The fact that the relative differences between immigrants and natives are not reduced over time seems to suggest that there is little convergence within this group.

[34] This non-convergence holds for cohorts who have been longer in the country.

Female immigrants seem to segregate into "non-qualified" jobs—as shown in Figure 1.B. Relative to natives, immigrant women with a trade certificate or less are over-represented in the "non-qualified" category and under-represented in the "professional" and "other white-collar" categories. In the case of women with a college degree, they seem to segregate into "non-qualified" jobs and "other white-collar" occupations relative to their native counterparts. Again there does not seem to be an apparent trend suggesting some convergence over time.

Coming from (mainly) Spanish speaking countries facilitates the convergence between female immigrants and natives. For males, the language advantage has only a marginal effect on the type of occupational choice. While the charts in Figure 1.D show that coming from Latin America reduces the females' fitted probabilities of being in "non-qualified" and "other white-collar" categories relative to immigrants from Europe (excluding the EU15), suggesting that coming from Spanish speaking countries facilitates the assimilation process women, no such improvement is observed among males. Figure 1.C shows that the differences in the native/immigrants occupational fitted distribution between Latino immigrants and their European counterparts (excluding the EU15 members) is merely a shift in the distribution between "other white-collar" and "blue-collar" occupations. Latino male immigrants are less under-represented in the former category, whereas European immigrants are more over-represented in the latter category.

V.2. What Is the Net Assimilation Effect of Immigrants in Spain?

In what follows, we address the following question: For a given cohort, how does the occupational distribution change with time since arrival in Spain? In essence, this is equivalent to analyze the net assimilation effect, which compares the change

observed in the fitted probabilities experienced by same cohort of immigrants at different points after arrival to the host country (net of the changes observed in the native population over the same time period)—as shown by equation 7 above. Figures 2.A through 2.D show the change in occupational distribution for the different types, as their time in Spain increases. In this case, a positive estimate implies that there is an over-representation for a particular cohort of immigrants in a given occupation category compared to that same cohort *t* years earlier (net of the changes that have occurred within that same period among the natives). For instance, in the top LHS panel of Figure 2.A, the sixth bar height in the "blue-collar" category indicates that male immigrants without a college degree who arrived in Spain in 2002 are 13 percentage points more likely to hold a job in a "blue-collar" occupation in 2008 than in 2002 when they first arrived, relative to the change observed over the same period in the same occupational category among their natives counterparts. The findings are summarized below:

For male immigrants without high-school degree, the patterns observed in the "non-qualified" and "blue-collar" categories clearly suggest an assimilation effect as recently arrived immigrants adjust to the new economy. Within the first few years after arrival, they first move to "non-qualified" jobs (as shown by the positive estimates for the "non-qualified" category). However, within a couple of years after arrival, they begin to shift out of "non-qualified" jobs and "not working" category towards "blue-collar" occupations. Notice that the move into "blue-collar" occupations occurs around the second and third year after arrival in Spain. This pattern is also observed for the case of African male immigrants for whom there is a clear movement out of the "not working" category into the "non-qualified" category over the first year after arrival and

the "qualified blue-collar" category thereafter (as shown in the RHS bottom chart of Figure 2.C).

Perhaps surprisingly, a very similar assimilation pattern is observed for male workers with a high-school degree (as shown in the top RHS chart of Figure 2.A). The differences across these two education groups are practically inexistent, suggesting that having a high-school degree does not give immigrants an advantage in terms of the process of assimilation in Spain nor the occupations where they end up working in. Moreover, given that the odds of being in the "professional" and "other white-collar" categories increases with the possession of a high-school degree for natives,[35] this finding suggest that ***the assimilation process is strongest the lower the education level of immigrants, as those with a higher skills segregate in the same occupations as those with lower skills.***

This finding is confirmed when observing the change in the predicted occupational distribution of immigrants with vocational training or a college degree (bottom charts of Figure 2.A). In contrast with the results found for high-school dropouts, no such assimilation seems to take place among high-skilled male immigrants. College male immigrants move from the "professional" category to "blue-collar" and "non-qualified" categories within the first couple of years after arrival and into "blue-collar" occupations thereafter. Notice that the flow out of the "professional" category most likely reflects some returned migration. Similarly, for male immigrants with vocational training, we observe a shift from "professional" and "other white collar" occupations into "non-qualified" during the first few years after arrival and into "qualified blue-collar" occupations thereafter.

[35] While high-school dropout natives have a fitted probability of being in either category of about 8% and 9%, respectively; for high-school graduates these fitted probabilities increase to 13% and 16%, respectively.

The assimilation pattern of low-skilled female immigrants reveals that they are in a more vulnerable situation than their male counterparts, as no catching up seems to take place. The top two charts of Figure 2.B show that low-skilled female immigrants move from the "not working" and "other white-collar" categories into the "non-qualified" category during the first years after arrival. However, in contrast with the "catching up" observed among low-skilled male immigrants in the "qualified blue-collar" category, no "catching up" takes place for low-skilled women in the "other white-collar" category. The pattern for African female immigrants is similar, although intensified as the shift is merely from the "not working" category into the "non-qualified" category (as shown in the bottom RHS chart of Figure 2.D).

While education among high-skilled female immigrants seems to help their assimilation process a bit, they are far from converging to their native counterparts, as observed earlier for skilled male immigrants. Right after arrival, female immigrants with a trade certificate or a college degree shift out of the "professional" and "other white collar" categories into "non-qualified" occupations. However, very soon thereafter, the flow goes from "not working" and "professional" categories into "non-qualified" occupations and (within three years after arrival) into "other white-collar" occupations.

VI. Discussion and Further Research

From our empirical investigation the following three findings stand out: First, immigrants in Spain are more occupationally mobile than natives. Most of this greater flexibility is explained by immigrants' assimilation process soon after arrival to the host country: Just after arrival, immigrants enter occupations below their skill level and then move towards higher skilled occupations. However, our second finding indicates that

convergence does not occur: Immigrants are underutilized in Spain as they segregate into low-skilled occupations (compared to natives with similar observable characteristics). Third, we find that, among male immigrants, assimilation is strongest the lower the education level.

The first two findings imply that, within the same skill group, immigrants and natives may not be perfect substitutes, as recently found by others—see Ottaviano and Peri, 2006, and Card and Shleifer, 2009 for the US; Manacorda *et al.*, 2006, and Dustmann *et al.*, 2009, for the UK; D'Amuri *et al.*, 2008, for Germany; and Carrasco *et al*., 2008b, and Amuedo and de la Rica, 2009, for Spain. In addition, our finding that assimilation is strongest the lower the education level for male immigrants provides evidence consistent with segmented labor markets, and rejects the human capital theory. In an economy with a dual labor market, immigrants assimilate better if they are low-skilled. This occurs because native low-skilled workers are more likely to work in the secondary market, which is of easier access to immigrants, facilitating the convergence between immigrants and their native counterparts. Should we interpret the lack of this finding among female immigrants as evidence against the dual labor market theory? Not necessarily. The fact that immigrant women are further marginalized seems to indicate that in a segmented labor market, new "underclasses" of workers may appear among the most vulnerable individuals—Fernández-Kranz and Rodríguez-Planas, 2009, also find that the dual structure of the Spanish labor market further aggravates the situation of the most vulnerable workers in the secondary labor market.

Much of this imperfect substitutability between natives and immigrants in Spain might be explained by the segmentation of the labor market, which, if true, leads to major concerns on potential efficiency losses for the Spanish economy.[36] Important

[36] Amuedo and de la Rica, 2009, explore the reasons for this imperfect substitution among low-skilled workers and find evidence that low-skilled natives relocate to jobs with a lower content of manual tasks.

topics for further research include the following two questions: What are the consequences for the Spanish economic growth of underutilizing this large inflow of high-skilled immigrants? And second, now that a major recession is taking place, what are the social, economic, and welfare consequences of having so many immigrants in the most vulnerable jobs, and therefore those most likely to suffer from job destruction? Policy proposals aiming at adding labor market flexibility and eliminating rigid and dual labor market structures will most likely enhance an efficient allocation of labor.

However, what seems more policy concerning is to understand the reasons for the imperfect substitution among high-skilled workers as these may be the source of economic inefficiencies.

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Table 1
Descriptive Statistics

	NATIVES										FOREIGNERS									
	LFS Year																			
	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Males	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.50	0.48	0.48	0.51	0.49	0.50	0.51	0.50	0.50	0.50	0.51
Married	0.64	0.63	0.63	0.62	0.62	0.62	0.61	0.60	0.60	0.60	0.69	0.66	0.63	0.56	0.61	0.63	0.61	0.59	0.59	0.60
Household head	0.37	0.37	0.37	0.38	0.38	0.39	0.40	0.42	0.43	0.43	0.38	0.43	0.40	0.42	0.41	0.44	0.43	0.43	0.43	0.44
Number of years in the country											4.30	4.00	3.07	3.20	3.24	3.73	4.38	4.60	4.88	5.29
College degree	0.15	0.16	0.16	0.17	0.17	0.18	0.20	0.20	0.20	0.21	0.26	0.22	0.24	0.23	0.21	0.21	0.20	0.18	0.17	0.17
Some college (vocational training)	0.25	0.26	0.27	0.27	0.27	0.28	0.30	0.30	0.31	0.31	0.25	0.29	0.33	0.34	0.35	0.37	0.40	0.42	0.42	0.41
High-school graduate	0.24	0.22	0.23	0.24	0.25	0.25	0.25	0.26	0.26	0.26	0.17	0.14	0.17	0.16	0.15	0.15	0.15	0.15	0.16	0.17
High-school dropout	0.36	0.36	0.34	0.32	0.30	0.29	0.26	0.25	0.23	0.23	0.32	0.35	0.26	0.27	0.30	0.26	0.26	0.25	0.26	0.26
Employed	0.58	0.60	0.62	0.62	0.63	0.64	0.66	0.68	0.69	0.69	0.63	0.62	0.69	0.71	0.69	0.71	0.75	0.75	0.73	0.71
20-24 YEARS	0.13	0.13	0.13	0.12	0.12	0.11	0.10	0.10	0.10	0.09	0.03	0.04	0.08	0.07	0.05	0.04	0.03	0.04	0.04	0.04
25-29 YEARS	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.12	0.12	0.11	0.20	0.18	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.18
30-34 YEARS	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.24	0.23	0.21	0.21	0.25	0.23	0.22	0.23	0.24	0.25
35-39 YEARS	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.19	0.17	0.18	0.19	0.17	0.20	0.20	0.20	0.19	0.19
40-44 YEARS	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.09	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14
45-49 YEARS	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.09	0.09	0.08	0.08	0.08	0.07	0.10	0.09	0.08	0.09
50-54 YEARS	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06
55-59 YEARS	0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
60-64 YEARS	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.07	0.05	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02
Number of observations	116119	107616	103173	101808	103277	102625	89925	93037	95077	95013	609	773	1147	1579	2252	2838	2931	3968	4968	5544
Population (in thousands)	23890	24041	24151	24316	24432	24500	24586	24659	24712	24730	266	445	733	1038	1438	1906	2197	2603	3065	3408

Table 1 (*Continued*)
Descriptive Statistics

	LFS Year									
	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Continent of origin										
From EU15	0.29	0.28	0.21	0.17	0.14	0.13	0.11	0.11	0.11	0.10
From Europe (excluding EU15)	0.06	0.08	0.14	0.16	0.20	0.20	0.23	0.21	0.23	0.24
From AFRICA	0.25	0.27	0.21	0.16	0.18	0.16	0.15	0.17	0.17	0.17
From Latin America	0.31	0.31	0.39	0.47	0.46	0.47	0.47	0.48	0.46	0.44
Other origin	0.09	0.05	0.05	0.03	0.03	0.03	0.03	0.02	0.03	0.04
Year of arrival										
1990-94	0.46	0.30	0.17	0.14	0.10	0.09	0.07	0.05	0.05	0.04
1995-98	0.45	0.40	0.24	0.19	0.14	0.09	0.10	0.09	0.07	0.05
1999	0.09	0.12	0.14	0.11	0.08	0.08	0.08	0.04	0.04	0.04
2000		0.18	0.18	0.17	0.16	0.15	0.15	0.13	0.09	0.09
2001			0.27	0.14	0.20	0.18	0.16	0.15	0.13	0.09
2002				0.25	0.14	0.17	0.16	0.14	0.14	0.14
2003					0.18	0.12	0.13	0.13	0.11	0.10
2004						0.11	0.11	0.10	0.11	0.11
2005							0.05	0.10	0.09	0.10
2006								0.07	0.10	0.08
2007									0.07	0.10
2008										0.06
Number of observations	609	773	1147	1579	2252	2838	2931	3968	4968	5544
Population (in thousands)	266	445	733	1038	1438	1906	2197	2603	3065	3408

Table 2.A
Natives occupational distribution, by LFS

EPA year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Not working	0,40	0,38	0,38	0,37	0,36	0,34	0,32	0,31	0,31
Professional	0,18	0,19	0,19	0,20	0,21	0,22	0,23	0,25	0,25
Other White-collar	0,15	0,15	0,15	0,16	0,15	0,16	0,17	0,17	0,17
Blue-collar	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,19	0,19
Non Qualified	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08

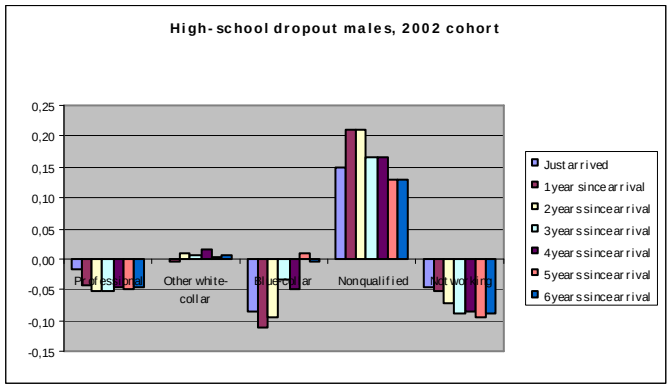
Table 2.B
Immigrants occupational distribution, by LFS

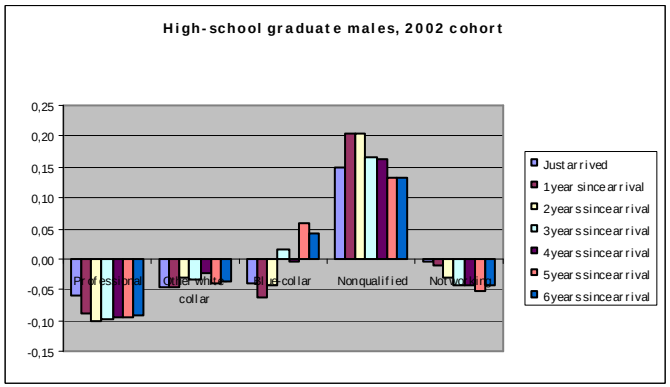
EPA year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Year of arrival: 1990-1994									
Not working	0,38	0,31	0,27	0,30	0,29	0,27	0,26	0.34	0,32
Professional	0,20	0,23	0,23	0,21	0,22	0,24	0,15	0.22	0,23
Other White	0,15	0,14	0,16	0,12	0,09	0,09	0,12	0.12	0,11
Blue Collar	0,13	0,17	0,18	0,23	0,24	0,19	0,27	0.19	0,20
Non Qualified	0,14	0,16	0,16	0,14	0,15	0,21	0,19	0.13	0,14
Year of arrival: 1995-1998									
Not working	0,33	0,30	0,32	0,29	0,32	0,31	0,30	0,26	0,32
Professional	0,10	0,17	0,14	0,09	0,20	0,17	0,15	0,16	0,14
Other White	0,18	0,19	0,23	0,14	0,12	0,16	0,17	0,12	0,13
Blue Collar	0,18	0,15	0,12	0,20	0,15	0,17	0,18	0,20	0,20
Non Qualified	0,21	0,19	0,20	0,27	0,21	0,18	0,21	0,25	0,22
Year of arrival: 1999									
Not working	0,35	0,39	0,28	0,28	0,26	0,25	0,23	0,25	0,30
Professional	0,18	0,11	0,05	0,07	0,09	0,08	0,08	0,08	0,14
Other White	0,16	0,09	0,16	0,09	0,09	0,14	0,19	0,18	0,16
Blue Collar	0,05	0,19	0,26	0,21	0,22	0,26	0,25	0,26	0,22
Non Qualified	0,26	0,22	0,26	0,34	0,34	0,27	0,25	0,23	0,18
Year of arrival: 2000									
Not working	0,51	0,32	0,23	0,21	0,22	0,20	0,19	0,20	0,27
Professional	0,09	0,07	0,05	0,11	0,07	0,04	0,06	0,08	0,08
Other White	0,12	0,15	0,18	0,17	0,16	0,18	0,19	0,17	0,17
Blue Collar	0,08	0,13	0,23	0,18	0,23	0,28	0,27	0,27	0,29
Non Qualified	0,20	0,34	0,31	0,33	0,32	0,29	0,28	0,27	0,20
Year of arrival: 2001									
Not working		0,26	0,27	0,25	0,20	0,19	0,19	0,24	0,24
Professional		0,14	0,09	0,08	0,07	0,07	0,08	0,07	0,07
Other White		0,12	0,14	0,16	0,15	0,22	0,17	0,16	0,16
Blue Collar		0,16	0,12	0,20	0,27	0,21	0,27	0,24	0,26
Non Qualified		0,32	0,39	0,32	0,32	0,31	0,28	0,29	0,26
Year of arrival: 2002									
Not working			0,35	0,30	0,27	0,25	0,23	0,18	0,23
Professional			0,12	0,04	0,06	0,06	0,06	0,06	0,07
Other White			0,16	0,16	0,16	0,16	0,17	0,18	0,15
Blue Collar			0,11	0,17	0,18	0,19	0,22	0,27	0,27
Non Qualified			0,26	0,33	0,32	0,33	0,32	0,32	0,27

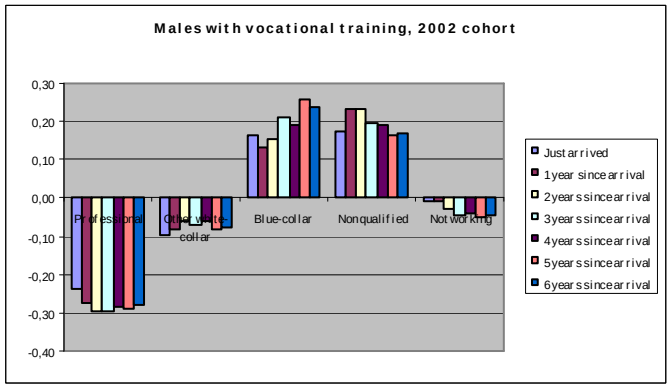
Table 2.B (*Continued*)
Immigrants occupational distribution, by LFS

EPA year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Year of arrival: 2003									
Not working				0,49	0,41	0,21	0,23	0,24	0,26
Professional				0,08	0,10	0,08	0,07	0,07	0,07
Other White				0,08	0,10	0,15	0,18	0,16	0,17
Blue Collar				0,12	0,15	0,17	0,20	0,24	0,25
Non Qualified				0,23	0,23	0,38	0,32	0,28	0,26
Year of arrival: 2004									
Not working					0,43	0,31	0,23	0,25	0,25
Professional					0,13	0,10	0,07	0,07	0,07
Other White					0,08	0,14	0,18	0,19	0,21
Blue Collar					0,11	0,17	0,20	0,21	0,21
Non Qualified					0,25	0,29	0,32	0,27	0,25
Year of arrival: 2005									
Not working						0,37	0,32	0,30	0,26
Professional						0,07	0,07	0,06	0,05
Other White						0,13	0,15	0,19	0,19
Blue Collar						0,18	0,12	0,14	0,23
Non Qualified						0,25	0,34	0,31	0,26
Year of arrival: 2006									
Not working							0,42	0,34	0,35
Professional							0,07	0,05	0,06
Other White							0,13	0,14	0,13
Blue Collar							0,16	0,16	0,22
Non Qualified							0,23	0,31	0,24
Year of arrival: 2007									
Not working								0,43	0,38
Professional								0,05	0,07
Other White								0,11	0,15
Blue Collar								0,14	0,16
Non Qualified								0,28	0,24
Year of arrival: 2008									
Not working									0,45
Professional									0,06
Other White									0,13
Blue Collar									0,10
Non Qualified									0,26

Figure 1.A : Differences in Occupational Predicted Probabilities between Immigrants and Natives, by Time in Spain Males by Level of Schooling







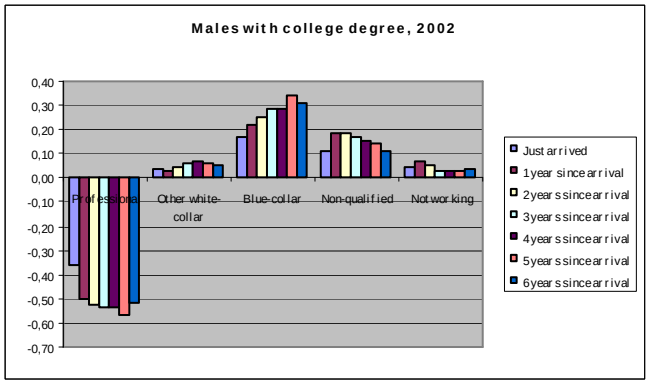
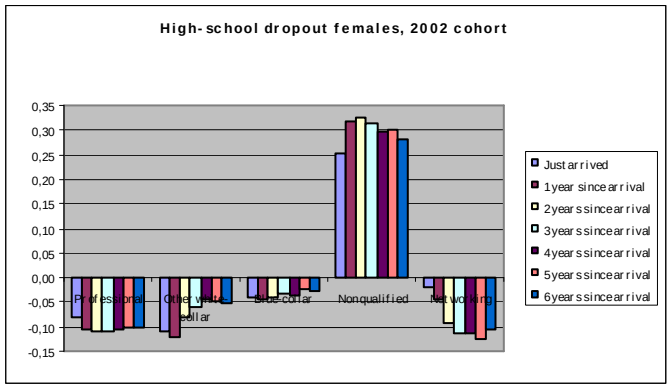
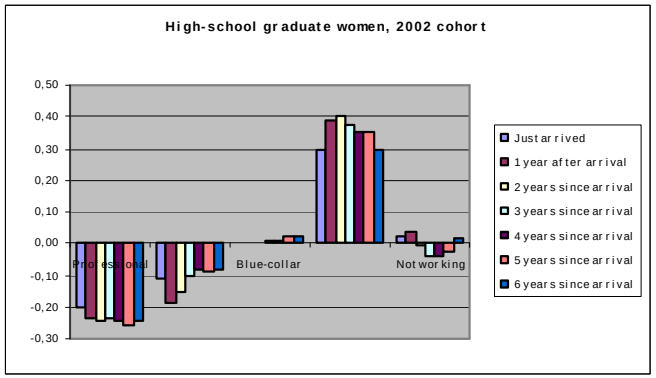
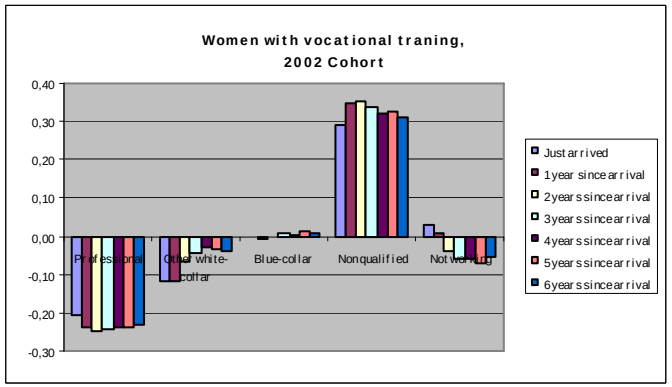


Figure 1.B : Differences in Occupational Predicted Probabilities between Immigrants and Natives, by Time in Spain Females by Level of Schooling







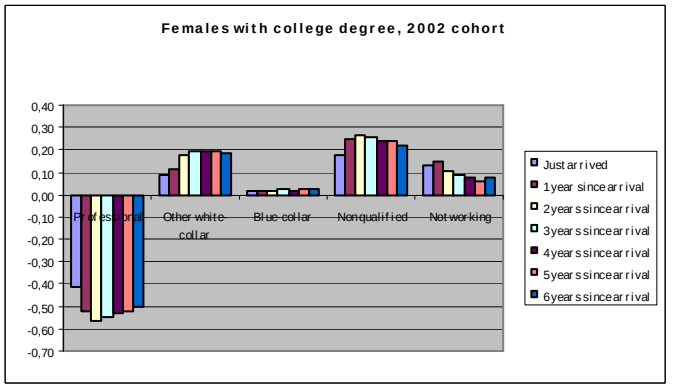
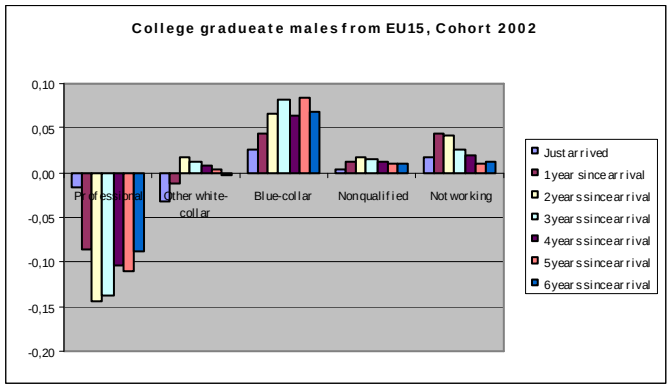
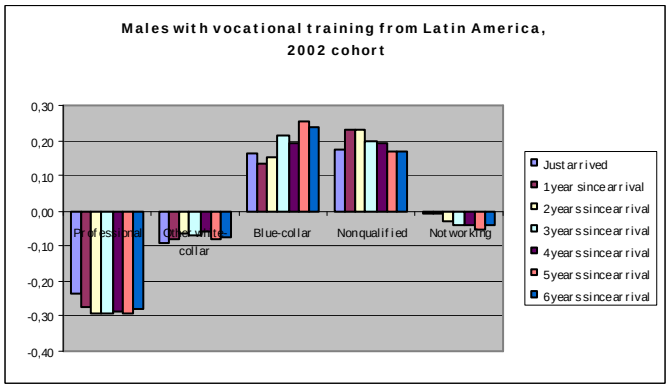
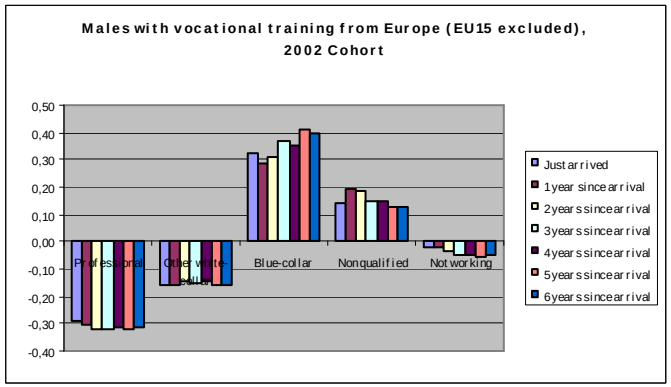


Figure 1.C : Differences in Occupational Predicted Probabilities between Immigrants and Natives, by Time in Spain Males by Continent of Origin







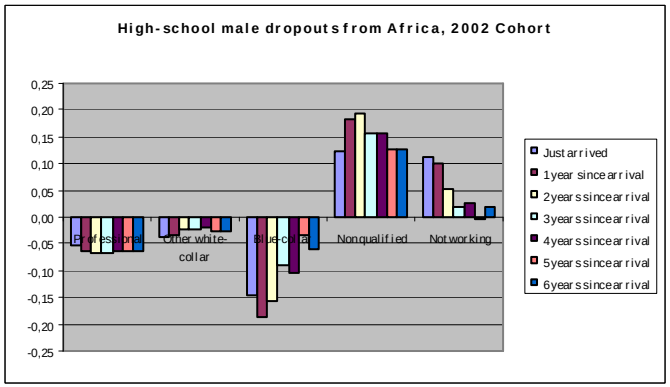
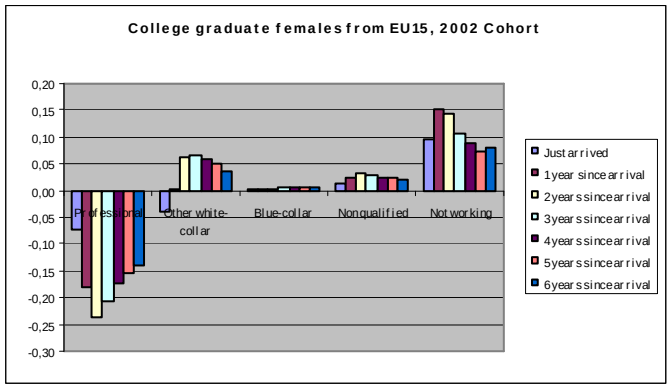
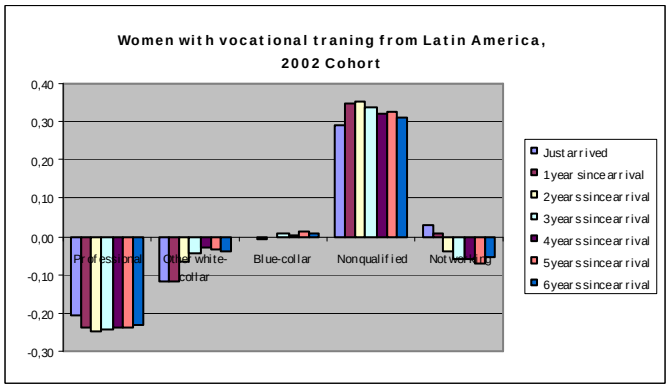
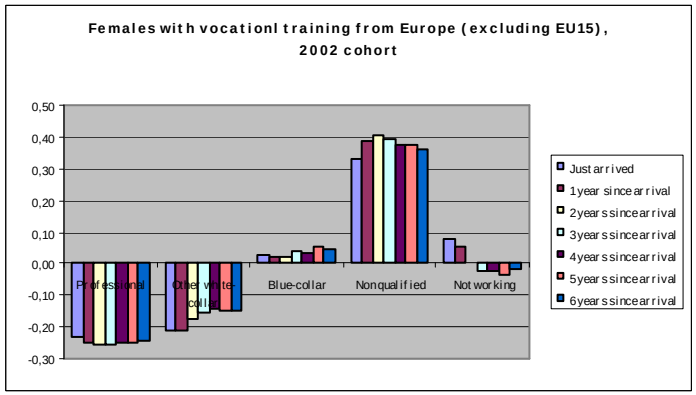


Figure 1.D : Differences in Occupational Predicted Probabilities between Immigrants and Natives, by Time in Spain Females by Continent of Origin







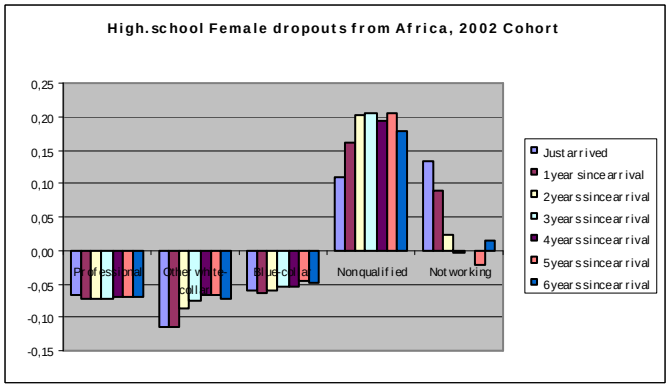
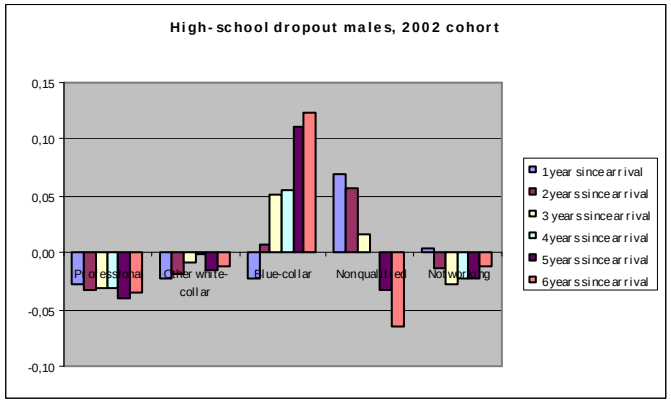
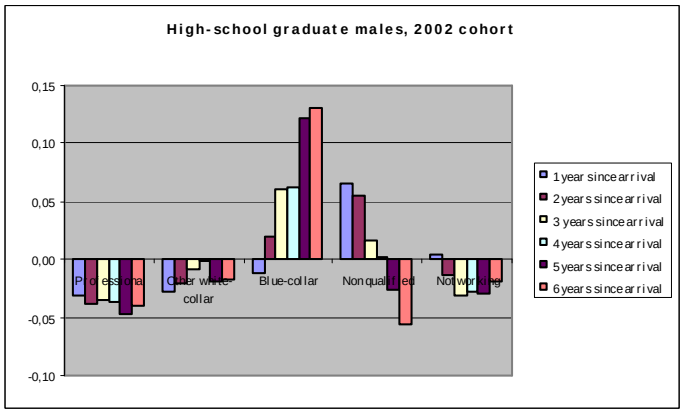
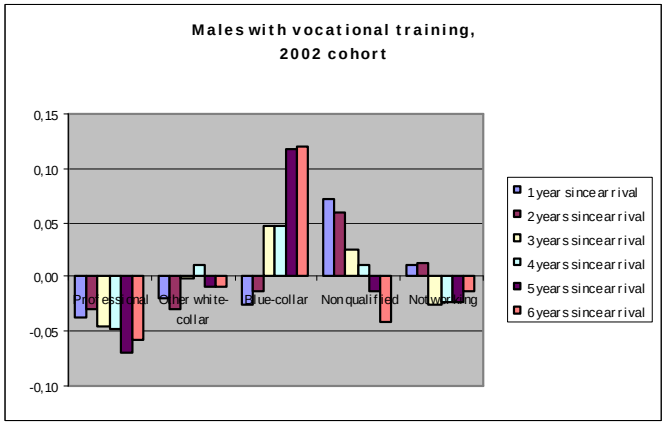


Figure 2.A : Change in Occupational Predicted Probabilities with Time in Spain (Net of Changes Observed in Native Population) Males by Level of Schooling







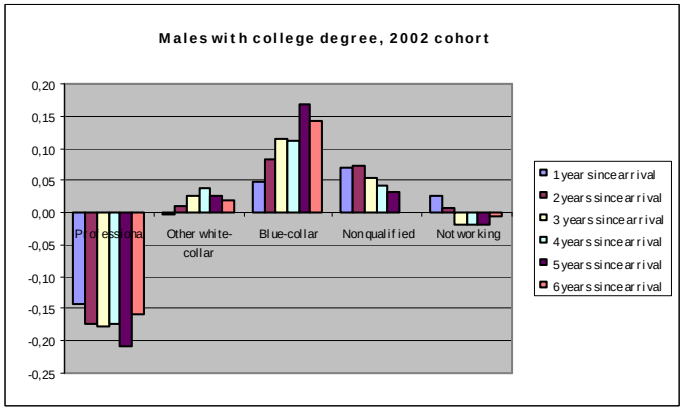
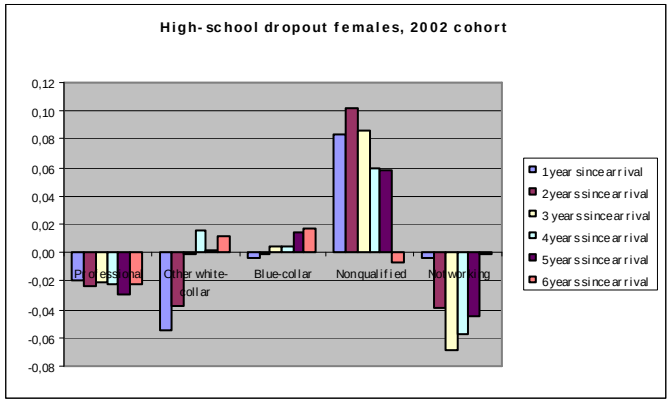
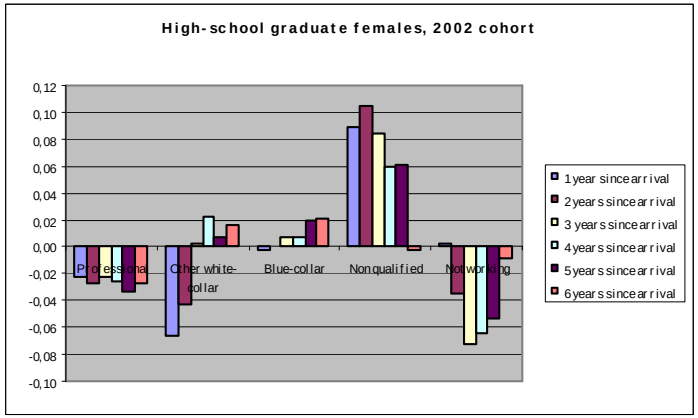
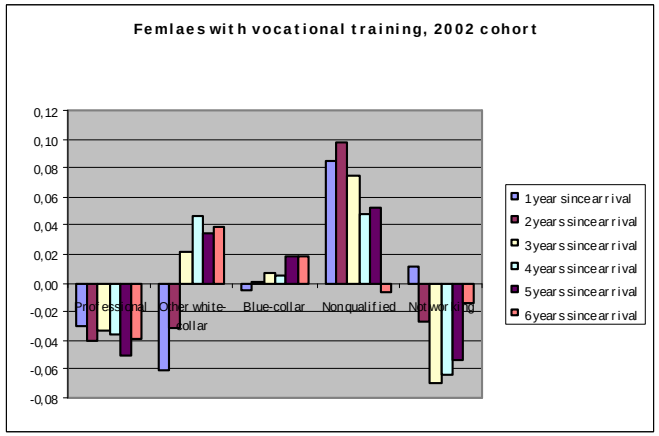


Figure 2.B : Change in Occupational Predicted Probabilities with Time in Spain (Net of Changes Observed in Native Population) Females by Level of Schooling







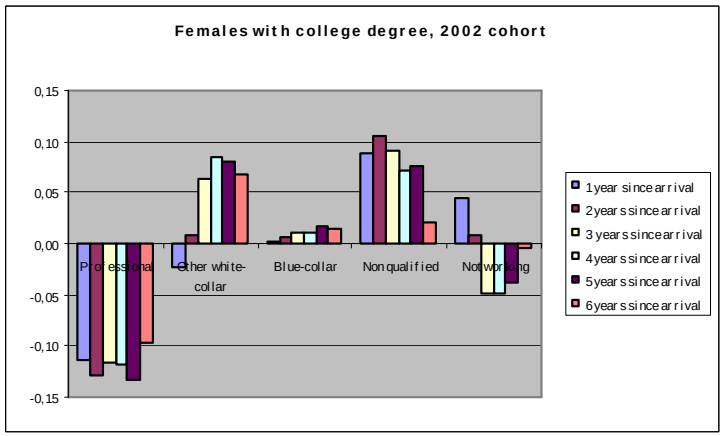
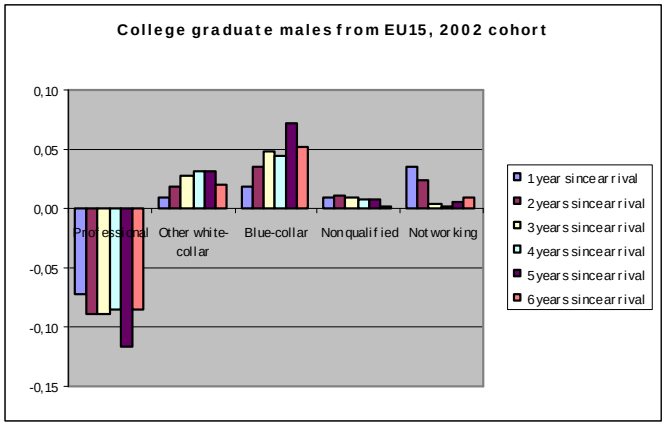
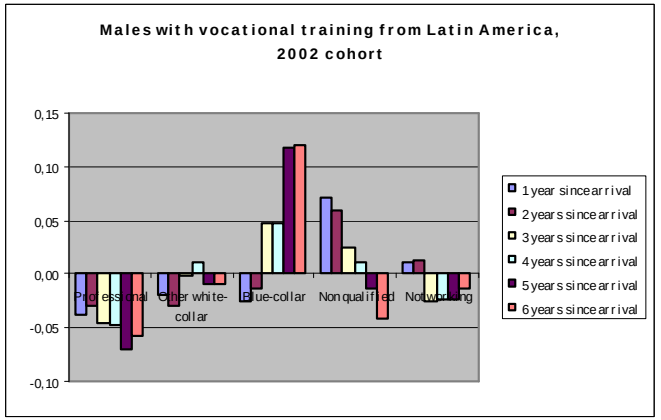
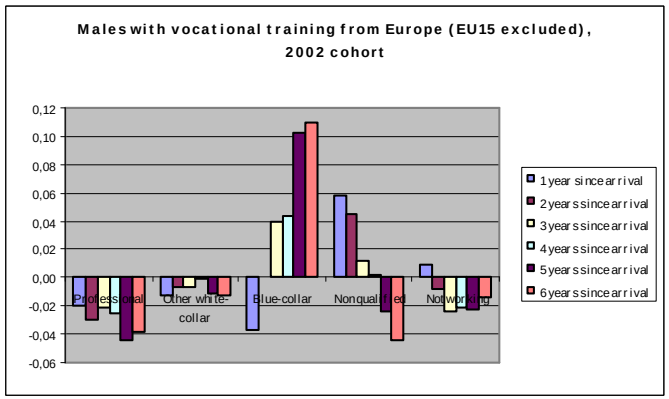


Figure 2.C : Change in Occupational Predicted Probabilities with Time in Spain (Net of Changes Observed in Native Population) Males by Continent of Origin







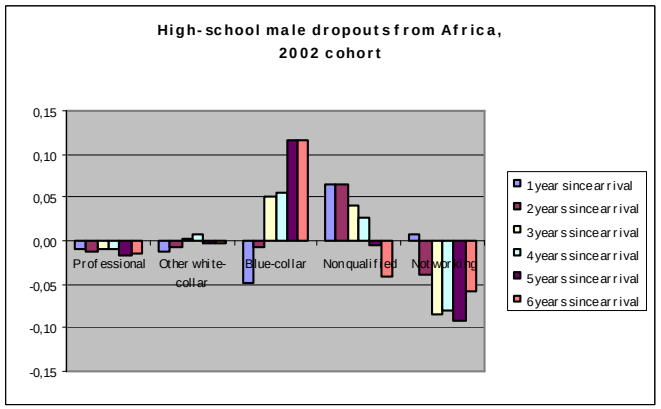
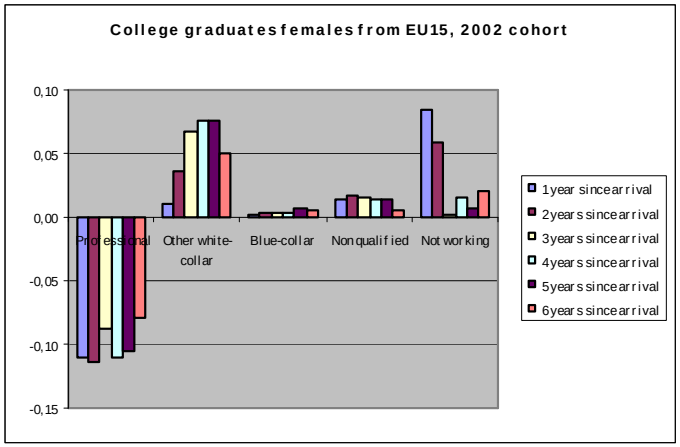
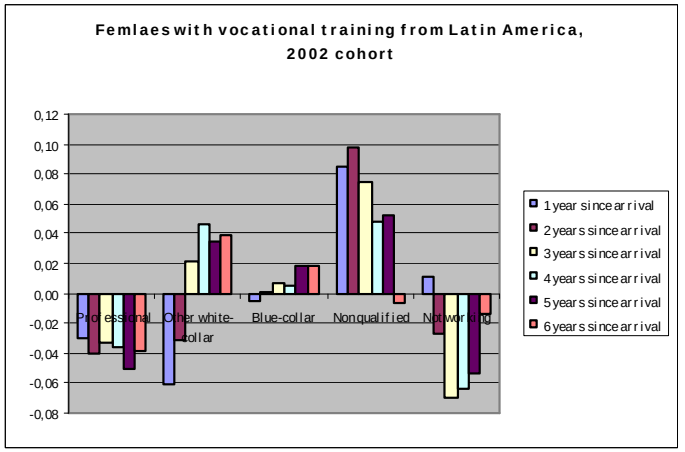
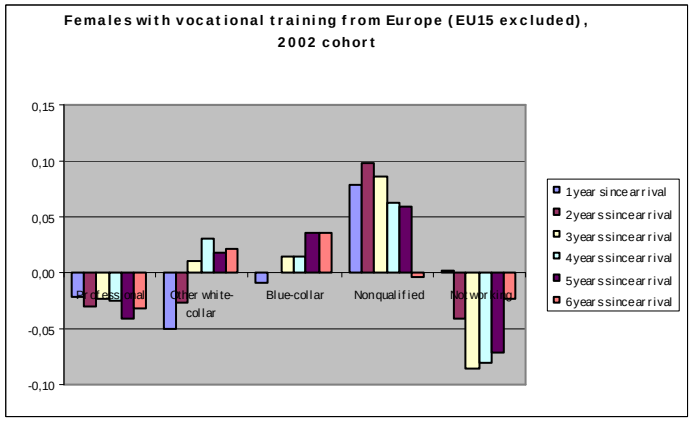
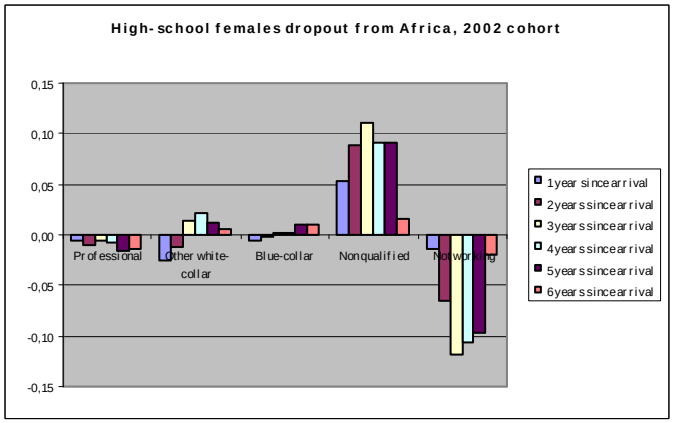


Figure 2.D : Change in Occupational Predicted Probabilities with Time in Spain (Net of Changes Observed in Native Population) Females by Continent of Origin









APPENDIX TABLES

Table A.1
Educational Attainment of Natives and Immigrants in the 1999-2008 LFS

			Immigrants			
	All	**Natives**	**All**	**In Spain**		
Highest education				**Since 1990-1995**	**Since 1996-2001**	**Since 2002**
High-school dropouts	29.02	29.19	26.59	33.12	18.83	24.28
High-school graduates	24.08	24.67	15.64	13.34	37.65	15.91
Some college (including vocational training)	28.89	28.19	38.77	30.14	15.89	41.61
College degree or more	18.02	17.95	18.99	23.40	27.63	18.2
Sample sizes	1.0e+06	1.0e+06	2.7e+04	2862	1.1e+04	1.3e+04
			Men			
High-school dropouts	28.06	28.02	28.71	36.68	29.85	25.60
High-school graduates	25.40	26.08	15.69	14.30	15.85	15.89
Some college (including vocational training)	29.81	29.21	38.27	26.98	37.02	42.32
College degree or more	16.73	16.69	17.32	22.05	17.28	16.19
Sample sizes	5.1e+05	4.9e+05	1.3e+04	1581	5595	5749
			Women			
High-school dropouts	29.98	30.36	24.45	28.67	25.19	23.09
High-school graduates	22.76	23.26	15.59	12.13	15.94	15.93
Some college (including vocational training)	27.96	27.17	39.28	34.09	38.34	40.96
College degree or more	19.31	19.21	20.68	25.10	20.52	20.01
Sample sizes	5.3e+05	5.1e+05	1.4e+04	1281	5421	6982

Table A.2
Educational Attainment of Natives and Immigrants in the 1999-2008 LFS, by Origin

Highest education	EU15			
	All	In Spain		
		Since 1990-1995	Since 1996-2001	Since 2002
High-school dropouts	.1086	.123	.1016	.1072
High-school graduates	.1539	.1673	.1518	.1476
Some college (including vocational training)	.3519	.3486	.3408	.3664
College degree or more	.3856	.3611	.4059	.3788
Sample sizes	3287	878	1328	1081
		Latin America		
High-school dropouts	.2214	.2208	.2186	.2238
High-school graduates	.1807	.1406	.1858	.1799
Some college (including vocational training)	.4275	.3835	.4331	.4266
College degree or more	.1703	.2552	.1624	.1697
Sample sizes	1.2e+04	558	5069	6217
		Eastern Europe		
High-school dropouts	.1528	.0735	.1345	.1701
High-school graduates	.1228	.0585	.1092	.1362
Some college (including vocational training)	.5251	.5749	.5173	.5258
College degree or more	.1993	.2931	.239	.1679
Sample sizes	5794	245	2003	3546
		Africa		
High-school dropouts	.6213	.6723	.6352	.5718
High-school graduates	.1373	.1118	.1498	.1339
Some college (including vocational training)	.1725	.1555	.1523	.2114
College degree or more	.069	.0605	.0628	.0829
Sample sizes	4911	984	2292	1635