Understanding the Effects of Legalizing Undocumented Immigrants*

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Abstract

This paper investigates the consequences of the legalization of around 600,000 immigrants by the unexpectedly elected Spanish government of Zapatero following the terrorist attacks of March 2004 (Garcia-Montalvo (2011)). Using detailed data from payroll-tax revenues, we estimate that each newly legalized immigrant increased social-security revenues by 3,504 Euros on average. This estimate is only 49 percent of what we would have expected from the size of the newly documented immigrants, which suggests that newly legalized immigrants probably earned lower wages than, and maybe affected the labor-market outcomes of, other workers. We estimate that the policy change *deteriorated* the labor-market outcomes of some low-skilled natives and immigrants and *improved* the outcomes of high-skilled natives and immigrants. This led some low-skilled immigrants to move away from high-immigrant locations. Correcting for migration and selection, we obtain that each newly legalized immigrant increased payroll-tax revenues by 4,398 Euros or 26 percent more than the raw payroll-tax revenue data estimates. This shows the importance of looking *both* at public revenue data and the labor market to understand the consequences of amnesty programs fully.

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1 Introduction

Many countries host large numbers of undocumented immigrants.[1] By many accounts, the United States leads this ranking. According to the Pew Research Center, in 2010 there were as many as 11 million unauthorized immigrants on American soil, representing 26 percent of all immigrants.[2] These large numbers of undocumented immigrants have led recent US Administrations, not without controversy, to consider either legalizing these immigrants or deporting many of them to their countries of origin.

The US is not alone in having undocumented immigrants. In the early 2000s, Spain experienced an incredible boom in immigration. From 1995 to 2004, the share of immigrants in the working-age population increased from less than 2 percent to around 10 percent.[3] Many of these newly arrived immigrants lacked work permits. According to some accounts, as many as 1 million immigrants – in a country of around 43 million inhabitants – were undocumented by 2004.[4]

Despite these large numbers and the public policy debates around immigration, little is known about the effects of amnesty programs. This paper fills this gap. In December 2004, the newly elected government of José Luis Rodríguez Zapatero passed a law that enabled the legalization of around 600,000 immigrants, increasing dramatically the number of workers registered in the social-security system. By many accounts, this policy change was completely unexpected. Zapatero won the general election in Spain only three days after the terrorist attack of March 11th, 2004 in Madrid that caused the death of nearly 200 people; the largest terrorist attack in Spanish history. Before the attacks, polls forecast that Zapatero trailed Rajoy by 7 percentage points. It is very likely that the mishandling of the post-attack days caused Rajoy's Popular Party candidate to lose this election, as explained in detail in Garcia-Montalvo (2011), and it was very unlikely that a government led by Rajoy would have ever passed such a large amnesty program.

Thus, we can use this episode as a natural experiment to estimate the effects of the policy change on a number of outcomes. To build a continuous difference-in-difference estimator, therefore, we compare Spanish provinces that had large immigrant populations prior to the policy with those that had small immigrant populations. Using a combination of administrative and very detailed survey data, we first estimate that, for each newly legalized immigrant, payroll-tax revenues increased by around 3,504 Euros.[5] This is only 49 percent of what we would have anticipated given the 3 percentage-point increase in workers registered in the social-security system as a result of the legalization. This suggests that either newly legalized immigrants earned less than average workers or that other workers were also affected by the policy change (or a combination of both).

Second, we investigate the effect of the amnesty program on the labor-market outcomes of various types of workers. We find that, for every 10 newly legalized immigrants, 6 low-skilled natives and 3.5 low-skilled immigrants lost their job, whilst 0.1 additional high-skilled natives and 2.1 additional high-

[1] In this paper, 'undocumented immigrants' refers to workers born outside the country in which they reside and that do not have the legal right to work or stay in the host country.

[2] See link.

[3] Data from SLFS. See more details below.

[4] See Domingo and Recaño (2005).

[5] Payroll taxes in Spain are around one-third of wages. Average wages before the policy change were around 20,000 Euros.

skilled immigrants found work.[6] This suggests that the legalization of mainly low-skilled immigrants had a detrimental effect on the employment outcomes of similar workers and a positive effect on the employment outcomes of complementary workers, much like the heterogeneous effects of immigrant inflows on native employment outcomes estimated recently in Borjas and Monras (Forthcoming).[7] Instead, wages of both high- and low-skilled natives seemed to increase as a result of the policy, whilst low-skilled immigrant wages slightly *decreased* and high-skilled immigrant wages *increased* by almost 1 log point for a 1 percent increase in the share of legal immigrants. Finally, we also document that, for each newly legalized immigrant in a location, 0.43 low-skilled immigrants relocated to other lower-immigration locations, whilst 0.07 high-skilled immigrants relocated to high-immigrant locations.

The estimated effects of the policy change on the labor market imply that, for each newly legalized immigrant, payroll-tax revenues should have increased by only 1,969 Euros. This falls 1,535 Euros short of the direct estimates obtained from payroll-revenue data. We show how selection can explain this divergence. More specifically, if we assume that newly legalized immigrants earn wages around 22 percent lower than those of longer-standing legal immigrants, and that low-skilled native workers who lost their jobs also were earning 22 percent less than the average low-skilled native, we obtain that the direct estimates from payroll-revenue data and the implied payroll-tax revenues from the estimated labor-market effects coincide. This is important, since direct estimates of payroll-tax revenues cannot account for the fact that some low-skilled immigrants moved away from high-immigrant locations to low-immigrant locations and thus also contributed to payroll-tax revenues, though not in the original regions.

Taking into account both selection and internal migration, we estimate that each newly legalized immigrant increased payroll-tax revenues by 4,359 Euros, or 26 percent more than the raw payroll-revenue data estimates suggest. Given that, prior to the policy change, undocumented immigrants already had access to public education and public healthcare, this estimate represents a net gain in terms of tax revenues. This estimate would be even larger if we included income taxes that newly legalized immigrants started to pay.[8] Thus, these results highlight important public revenue losses associated with not granting work permits to immigrant workers.

To the best of our knowledge, this is the first paper to combine public-revenue data and detailed labor-market data to account for the various channels through which amnesty programs can affect the economy. It provides the first account of the potential gains and losses that such policies may bring. On the one hand, it provides clear evidence that the policy succeeded in one of its goals: increasing tax revenues from workers who were already working but were not contributing to public finances. On the other hand, we show how the policy had important distributional consequences – both native and newly legalized low-skilled workers lost out, whilst highly skilled native and immigrant workers benefited.

Several empirical papers have studied amnesty programs in a variety of countries. In a recent paper, Pinotti (2017) uses a sharp discontinuity design to show that legal status significantly reduces crime

[6] We know the employment rates of native workers and immigrant workers prior to the policy change; however we cannot distinguish undocumented from documented workers among immigrants.

[7] See also the work by Llull (2017b).

[8] There are no direct data for this since income taxes differ across Autonomous Communities and are collected by the national government.

rates. Whilst his identification strategy is very convincing, it is not suited to studying the overall effects of the amnesty program on the labor market, as we do. See also related evidence in Mastrubuoni and Pinotti (2016).

There are also several papers that estimate the effects of amnesty programs on the labor-market outcomes of immigrants. Most of these papers show that the employment prospects of newly legalized immigrants improve as a result (see Devillanova et al. (2017), Amuedo-Dorantes and Bansak (2011), Amuedo-Dorantes et al. (2007), Kaushal (2006), Cobb-Clark et al. (1995)). In general, however, these papers make no mention of the potential consequences that these programs have on native workers.

Many of these amnesty programs, most famously the Immigration Reform and Control Act of 1986, combine the amnesty with increased border enforcement. Hence, there are also some papers that estimate the attracting or deterring effects that these programs have on prospective immigrants (see for example Hanson and Spilimbergo (1999)).

Relative to most of these papers, our case study generates arguably exogenous variation stemming from the particular circumstances that led Zapatero to become the Spanish prime minister in 2004. Moreover, relative to other studies, ours is the only paper that combines detailed data on both public tax revenues and labor-market outcomes disaggregated at a fine geographic level, something that we show is crucial for the overall analysis.[9]

In what follows, we start by describing the particular circumstances that led to the policy change and the data that we have at our disposal to conduct the analysis. We then show empirical evidence on both public revenues and labor-market outcomes. This is done in Section 3. In Section 4 we discuss the results and explain the various biases that potentially arise when working with tax-revenue data or labor-market data exclusively. In Section 4 we also show how we can combine these estimates to obtain more accurate results. We conclude in the last section.

2 Background, Data, and the Policy Change

Spain is among the countries with the highest levels of immigration. More than 13 percent of its population is foreign-born, with Romania, Morocco, and Ecuador the top countries of origin. Relative to other European countries, such as Germany, this is a recent phenomenon. Immigrants started to arrive in Spain in large numbers in the late 1990s, and this flow continued through the 2000s up to at least the beginning of the Great Recession in 2008.

Concerns about the arrival of large waves of immigrants are not new and probably intensified in the early 2000s. For example, a new law drafted in 2000 and put into effect in June 2001 recognized Spain as "a land of immigration", and subsequently established tougher conditions for immigrants to settle in Spain.[10] Similarly, in June 2002, the EU Summit in Seville agreed on tougher regulations to deter illegal immigration to Europe.

[9] This paper is obviously related to the wider literature that uses geographic variation to estimate the labor-market effects of immigrant inflows. See Card (1990), Altonji and Card (1991), Borjas et al. (1997), Card (2005), Lewis (2012), Llull (2017a), Glitz (2012), Borjas and Monras (Forthcoming) and Monras (2015).

[10] See the Real Decreto 864/2001.

Most of these efforts to deter further immigration were put in place by the Popular Party. This is the major center-right party in Spain, which ruled the country under the presidency of José Maria Aznar between 1996 and 2004. Like other center-right parties in Europe, this is the party that in Spain has traditionally adopted tougher regulations to limit immigration. The party won the general election in 1996 with a simple majority and consolidated its power in the 2000 elections with an absolute majority of seats. From the beginning of his mandate, Aznar announced that he would stay in power for only eight years. He was replaced as head of the party by Mariano Rajoy, already in his cabinet and, at the time, one of his closest ministers. Despite the large political protests against Spanish involvement in the Iraq war, the government and most of the people in Spain expected the Popular Party to continue in power in the March 2004 elections. According to the CIS (*Centro de Investigaciones Sociológicas* in Spanish), the vote forecast for the two main political parties in Spain (pool conducted in January of 2004) was 42.2 percent for the Popular Party and 35.5 percent for the Socialist Party.

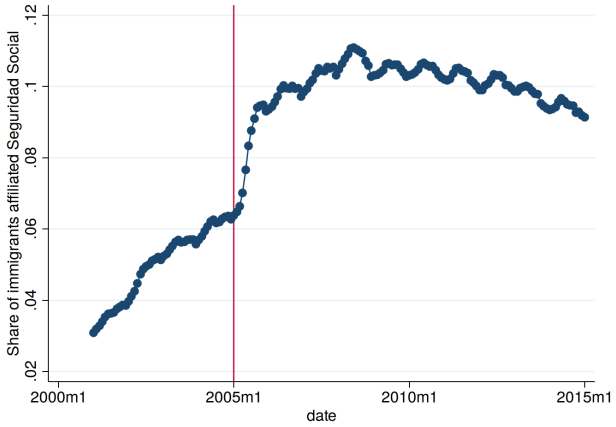
Yet something completely unexpected occurred on March 11th, 2004, just three days before the election. Early that morning, several terrorists attacked a number of commuter trains in Madrid. Almost 200 people died in what was the largest ever terrorist attack on Spanish soil. The attack was, in many respects, larger than all the terrorist attacks that took place on Spanish soil from the early 1970s, mainly perpetrated by the Basque terrorist group, ETA (see Abadie and Gardeazabal (2003)). Following the attacks, the three days leading to the general election were chaotic. Initially, the government tried to blame ETA. One of the government's concerns was whether the attacks had been committed by an Islamic terrorist organization, which could be perceived by voters as a retaliation for Spanish involvement in the Iraq war; a hugely controversial topic at the time. To avoid this, the government delayed official statements on who was responsible. The handling of the three days after the terrorist attacks likely caused the Popular Party to lose the general election of March 14th, 2004, as Garcia-Montalvo (2011) shows, by comparing the voting behavior of Spanish nationals living abroad (who cast their votes before the attacks took place) with post-attack voting (Spanish residents) from this election and prior ones. Garcia-Montalvo (2011) concludes that the attacks ultimately changed the outcome of the election and unexpectedly gave power to José Luis Rodríguez Zapatero. The Socialist Party finally obtained 42.6 percent of the popular vote, whilst the Popular Party had only 37.7 percent, in sharp contrast to the forecast of just a few weeks earlier.[11] Among the first laws that President Zapatero put in place was the legalization of a large number of undocumented immigrants. By December 2004, Zapatero managed to pass new immigration guidelines that resulted in around 600,000 immigrants already in Spain obtaining legal status.[12] Thus, completely unexpected a few months earlier, a significant share of the Spanish immigrant population saw an extremely important change in their labor-market conditions. By gaining legal status, over the course of a few months a large number of undocumented immigrants gained a working status very similar to that of natives. In what follows, we document this policy change in more detail.

[11] For more details on voting intentions one week before election day, see Garcia-Montalvo (2011).
[12] Real Decreto 2393/2004.

2.1 Policy change

Less than a year after the election that brought Zapatero to power in March 2004, the Spanish government allowed a large number of immigrants – who were already in Spain and working – to legalize their migration status. This policy became effective in February 2005 and had a huge impact on the share of migrants registered in the social-security system. The stated goal of the policy was "on the one hand, to speed up the [work] authorizations based on vacancies for which employers do not find resident workers, and, on the other hand, increase the control over the concession of these authorizations".[13] The policy recognizes the "high number of foreign-born workers lacking a work permit" and offered a period of three months (between February 7th and May 7th, 2005) to give work permits to workers who complied with the following set of criteria: a) the workers had to be in the *Padrón Municipal* – the official local Municipal Registry of Population – at least six months prior to February 7th 2005;[14] b) the employer needed to show that it wanted the worker by offering a legal working contract for at least six months.[15] When the policy came into effect, large numbers of immigrants took the opportunity to gain legal status.

Figure 1: Social-security registration and the immigration reform



Note: This figure shows the share of immigrants registered in the social-security system. Source: Ministry of Labor and Social Security.

The simplest way to show this is to plot the share of immigrants among the total population registered in the social-security system. This is shown in Figure 1. More specifically, Figure 1 shows how the share of immigrants among workers in the social-security system moved from around 6 percent to around 9 percent in the course of the period of the legalization. This is a significant change, and is the result of almost 600,000 immigrants throughout the entire country gaining work permits. In fact, there were 691,655 applications to the amnesty program, of which 578,375 (83.6 percent) were approved. As in many other countries, there is a lot of heterogeneity in relation to where immigrants cluster. On the one hand,

[13] Real Decreto 2393/2004. In Spanish: *"Por un lado, agilizar las autorizaciones basadas en vacantes para las que los empresarios no encuentran trabajadores residentes, y, por otro lado, aumentar el control en la concesión de dichas autorizaciones."*

[14] This criterion was subsequently relaxed, accepting registration by default (*empadronamiento por omisión* in Spanish) upon presentation of any official document proving that the immigrant was in Spain in August of 2004.

[15] There were some exceptions for the agricultural, construction, hotel and restaurant, and domestic services sectors as well as for part-time workers.

immigrants concentrate in coastal provinces with high levels of tourism and European retirees. This is the case, for example, in Alicante, the Balearic Islands, Girona, Tenerife, and Málaga. All these provinces have immigrant share above 8.5 percent. Immigrants also concentrate in large cities; in 2002, for example, Madrid and Barcelona had immigrant shares of 9.2 and 6.8 percent respectively, numbers that have risen further in recent years. On the other hand, there were in 2002 many provinces with extremely low levels of immigration; more peripheral provinces, such as Asturias, Coruña, or Lugo in the north, Córdoba, Jaén, Sevilla or Cádiz in the south, and provinces in central Spain all had immigrant shares that were 2–3 percentage points below the national average. Actual numbers can be observed in Table 1. Thus,

Table 1: Immigrant shares across selected Spanish provinces

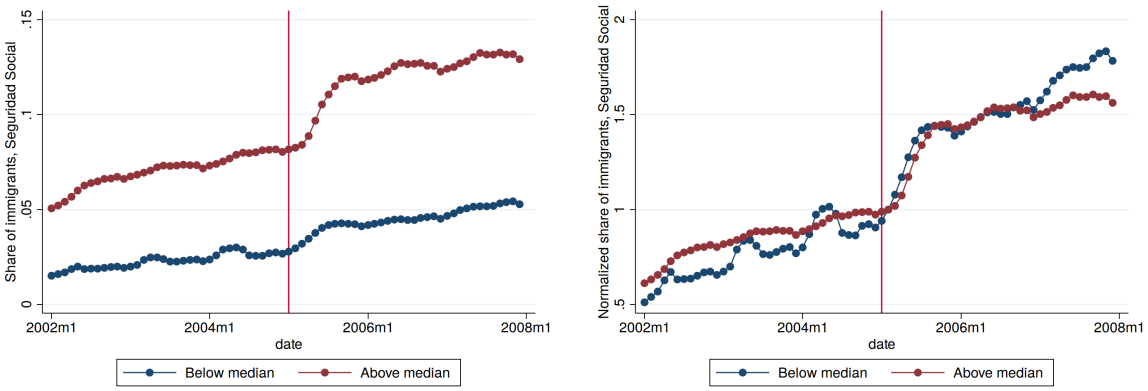
Province Name	*Immigrant Share*	*Population*	*Rank*
Alicante	0.135	1595.2	1
Balears. Illes	0.121	932.2	2
Girona	0.101	608.9	3
Madrid	0.092	5623.0	4
Tenerife	0.090	904.0	5
Málaga	0.086	1352.5	6
Almería	0.086	555.9	7
Palmas. Las	0.082	965.3	8
Murcia	0.079	1248.1	9
Castellón	0.073	509.7	10
Barcelona	0.068	4979.4	11
Tarragona	0.067	642.7	12
Ávila	0.018	165.3	39
Salamanca	0.017	347.7	40
Asturias	0.016	1074.7	41
Cádiz	0.015	1148.3	42
Coruña. A	0.014	1116.4	43
Lugo	0.013	361.1	44
Sevilla	0.012	1770.8	45
Palencia	0.011	175.6	46
Badajoz	0.010	663.0	47
Jaén	0.009	649.5	48
Zamora	0.009	200.2	49
Córdoba	0.009	773.5	50
National Average	0.042	42,133.1	–

Note: This table shows the top and bottom 50 Spanish provinces by immigrant share in mid-2002. Population is measured in thousands. Immigrants are defined as foreign-born individuals. Source: Own elaboration based on Municipal Register.

the legalization of around 600,000 immigrants likely had heterogeneous effects across space. A simple way to view this spatial heterogeneity is to divide Spanish provinces or regions by their median level of migration in 2002. This separates provinces or regions into two groups: the first group (below the median), comprises those provinces that had fewer immigrants as a share of total population than that of the median province; the second group comprises the provinces or regions above that median. In all that follows, we always show two types of graph: the first graph is the raw data, which we show for provinces above and below the median; the second graph is the raw data normalized by the value of the outcome variable in the period immediately before the policy change. These graphs allow us to visualize both the

total and proportional impact that the policy change potentially had across locations as a function of initial immigrant shares. Figure 2 shows these two graphs for the share of immigrants registered in the

Figure 2: Social-security registration and the immigration reform



Note: The figure on the left shows the share of immigrants registered in the social-security system in Spanish provinces above and below the median level of immigration (in 2002). The vertical red line indicates the last period before the reform (2005m1). The figure on the right normalizes the figure on the left, using the last observation before the policy intervention. Source: Ministry of Labor and Social Security.

social-security system. The graph on the left of Figure 2 shows that, in high-immigration regions, the share of foreign-born individuals registered in the social-security system increased from around 7 percent to more than 10 percent in a period of just three months. This is an extremely large increase, occurring in an extremely short period of time, which came from a policy change that was very unexpected. This represents an exceptional opportunity to evaluate the consequences of this immigration reform. As can be seen in the graph on the left of the figure, this policy change disproportionately affected initially high-immigration locations in Spain. The graph on the left of Figure 2 also shows that the policy change affected low-immigration regions too, albeit with less intensity. The share of immigrants registered in the social-security system moved from around 3 percent to around 4 percent over the same period. The graph on the right of Figure 2 shows that, in fact, the effect of the policy was similar across locations in proportional terms. When we normalize the share of immigrants registered in the social-security system to a value of 1 right in the period before the policy change (i.e., January 2005), we observe that the trends in high- and low-immigration regions are similar, as is the dramatic rise in values observed both above and below the median. These patterns suggest that the best way to analyze this policy change is through a difference-in-difference estimator set up with continuous treatment. This demonstrates that the legalization of undocumented immigrants affected all provinces in Spain, but it affected some more than others. We can rely on this variation, and on the unexpected reform, to evaluate the consequences that legalizing immigrants had on the economy. We proceed to this goal in the following section. We conclude this section by describing in more detail the data used to generate Figures 1 and 2 and that we use throughout the paper.

2.2 Data

We combine a number of different data sets, from several sources, to explore the consequences that the 2005 Spanish legalization of immigrants had on payroll-tax collection and also on different labor-market outcomes such as employment, wages, and internal migration. Our unit of analysis is the province; in fact, we consider 50 Spanish provinces, excluding the two Spanish enclaves in Africa (Ceuta and Melilla).

2.2.1 Social-security contributions data

We use two different data sets from the Ministry of Labor and Social Security: statistics of registration in the social-security system and payroll-tax collection, both at province level. These data sets cover the period 2000-2016. The number of individuals registered in the social-security system is available for all regimes of social security, for natives and foreigners, at monthly frequency. Total payroll-tax collection statistics include contributions to different regimes existing in the Spanish social-security system, contributions to unemployment insurance and contributions to workers' accident insurance, at yearly frequency. This detailed data set allows us to identify the effect of the policy change on payroll-tax revenues.

2.2.2 Employment and population data

Our main data set on employment and population is the Spanish Labor Force Survey (SLFS, *Encuesta de la Población Activa* (EPA) in Spanish). The SLFS is conducted by the Spanish National Institute of Statistics (INE, *Instituto Nacional de Estadística* in Spanish) every quarter with a sample of some 65,000 households (about 180,000 individuals) and it is designed to be representative of the Spanish population. The main goal of the survey is to reveal the characteristics of that population with regard to the labor market. Therefore, we use the SLFS for the period 2002-2008.

We also use the SLFS/EPA to construct the provincial share of immigrants each quarter. In addition, and as a cross-check, we compute the same population shares using the Spanish Municipal Register (*Padrón Municipal* in Spanish). We focus our analysis on the SLFS results for two reasons: the SLFS allows us to compute these shares by skill level, and the data are available at a higher frequency – quarterly instead of yearly. Results using the Municipal Register were deferred to the appendix A.1.

2.2.3 Wage data

We use Spain's Continuous Sample of Employment Histories (MCVL, or *Muestra Continua de Vidas Laborales* in Spanish) to compute wages. This is a micro-level administrative data set obtained by matching social security, income tax, and census records. It is a representative sample of the population that, in a given year, has any relationship with Spain's social -security system (individuals who are working, receiving unemployment benefits, or receiving a pension). The MCVL represents a 4-percent non-stratified random sample of this reference population, consisting of nearly 1.1 million individuals each year, and covers the period 2004–2015 with retrospective information going back further in time. The MCVL has longitudinal information. Individuals who are present in one wave of the MCVL, and remain

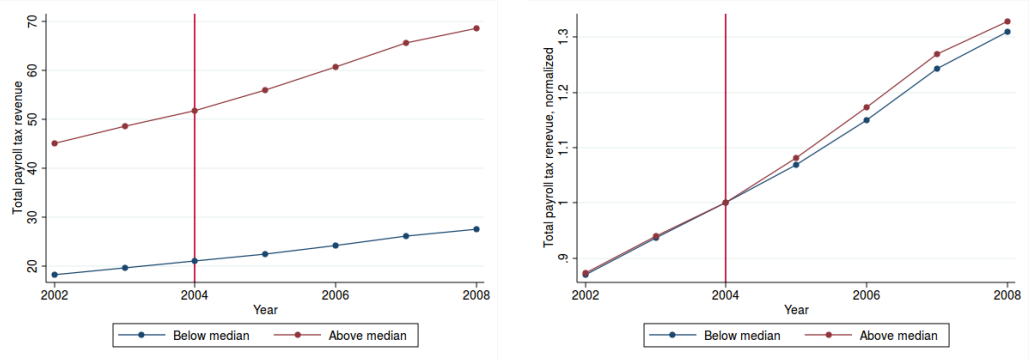
registered in the system, continue in the sample for the next wave. Also, new individuals are added to the sample each year to ensure that it remains representative of the population. In particular, we use this data set with the objective of estimating the unit price of labor. We consider natives and foreign-born male workers, aged between 25 and 47 years old, who were employed at any point in our period of analysis (January 2002 to December 2007). In this, we follow the sample of individuals constructed in de la Roca and Puga (2017) but we also include immigrant workers and extend our period of analysis to include 2002. Altogether, our sample includes 216,873 workers. Natives compose the majority of the sample (174,851 natives and 42,022 foreign-born individuals). This sample has 10,009,971 monthly observations (8,602,570 natives and 1,407,401 foreign-born individuals). This means that, on average, each native is observed over a period of 49.2 months and each foreign-born individual is observed, on average, over a period of 33.5 months.

3 Empirical Evidence

3.1 Public finances

One of the most immediate consequences of the reform was that undocumented immigrants started to pay payroll taxes. Thus, it is worth starting our analysis by looking at the effect that the reform had on public revenues. To do this, we first plot the level and proportional changes in total payroll-tax revenues. Figure 3 shows that total payroll taxes in Spain generated around 70 billion Euros in 2004. Provinces with high levels of immigration tend to be larger. Thus, the split between below- and above-median levels of immigration results in high-immigration provinces generating around 50 billion Euros. The trend in total payroll-tax revenues was positive in the early 2000s. This was a consequence of both the number of legal immigrants entering the Spanish system and the high participation rates and low unemployment rates typical of a booming economy. In the graph on the left of Figure 3, we see that there is a small break in the trend in 2005 that coincides with the policy change. The break in the trend is in fact more pronounced in high- than in low-immigration regions. The graph on the right of Figure 3 normalizes

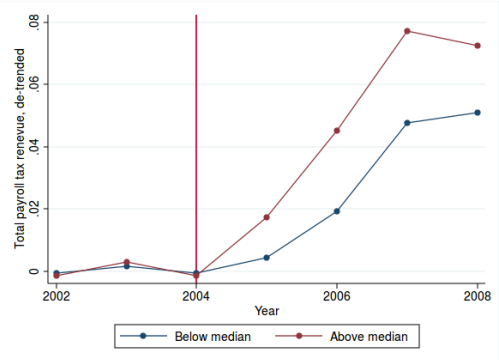
Figure 3: Payroll taxes and the immigration reform



Note: The figure on the left shows the payroll-tax revenue in Spanish provinces above and below the median level of immigration (in 2002). The vertical red line indicates the last period before the reform (2004). The figure on the right normalizes the figure on the left, using the last observation before the policy intervention. Source: Ministry of Labor and Social Security.

the level of tax revenues to the year 2004. It is clear from the graph that, from 2005, the increase in total payroll-tax revenues is larger in high-immigration regions. To help us clarify the magnitude of the change, it is useful to remove the linear trend leading to the policy change from the graph on the left. When we do so, we obtain Figure 4. Figure 4 allows us to understand the effect on total payroll-tax

Figure 4: Payroll taxes and the immigration reform, de-trended

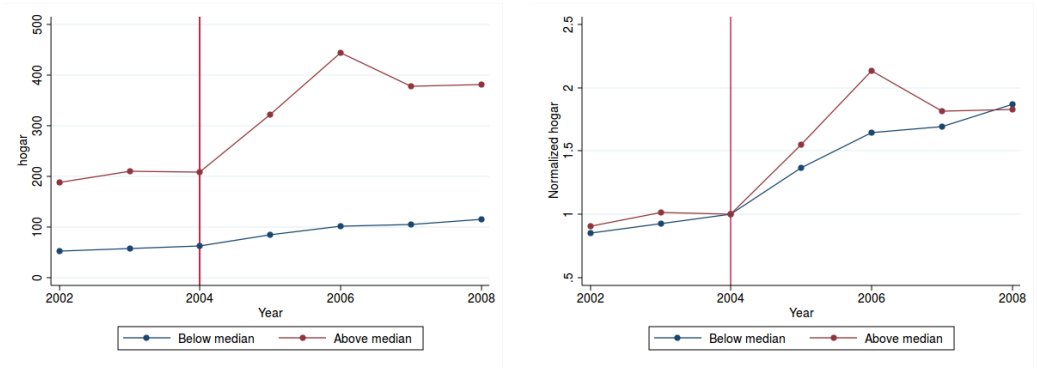


Note: This figure shows the de-trended series of total payroll-tax revenues. The vertical red line indicates the last period before the reform (2004). Source: Own elaboration based on Ministry of Labor and Social Security data.

collection of legalizing immigrants. We observe that, relative to trend, the reform increased by almost 2 percent total revenue in high-immigrant provinces and by almost 1 percent in low-immigrant locations from 2004 to 2005. The increase continued in the following years. To see whether these are large or small changes in total revenue, it is worth comparing them to the change in the share of workers who registered in the social-security system as a result of the reform. Figure 2 shows that the policy change increased the number of immigrants as a share of total population registered in the social-security system by around 4 percentage points. Thus, every immigrant that obtained a work permit contributed around half as much as the existing population. This is not surprising, since immigrants in Spain tend to be less skilled than natives and, within the same skill levels, tend to earn less. Moreover, the reform may have impacted the labor market directly, affecting tax collected from different groups of workers. We investigate this further in Section 3.2. To gain confidence that, indeed, these changes in total payroll revenues are a consequence of the policy reform, it is worth zooming in on particular items of total payroll-tax collection. Spain has different fiscal regimes for different types of workers. Most of workers pay the "régimen general", but there are also a number of "special" payroll-tax regimes. One that is used particularly by the immigrant population (given the occupational distribution of immigrants relative to natives) is the "régimen del hogar", which are housekeeping services. We can use this regime to show that the change is indeed, in this case, more pronounced than in regimes used less by immigrants.

Figure 5 shows that payroll revenues from housekeeping services increased by 50 percent in 2005 and by almost 100 percent in 2006 in high-immigrant regions, whilst the increases were of 40 and 50 percent respectively in low-immigrant locations. This is a remarkable increase, which is in line with the heavy presence of immigrants in this payroll-tax category. To quantify immigrants' contributions to total payroll-tax revenue we carry out two additional exercises. First, we estimate the Euro increase per regularized immigrant that followed the reform. Second, we estimate whether the increase in payroll-tax

Figure 5: Payroll taxes and the immigration reform, selected item



Note: The figure on the left shows the payroll-tax revenue, from the housekeeping regime, in Spanish provinces above and below the median level of immigration (in 2002). The vertical red line indicates the last period before the reform (2004). The figure on the right normalizes the figure on the left, using the last observation before the policy intervention. Source: Ministry of Labor and Social Security.

revenues was proportional to the increase in social-security registration. To quantify the contribution per newly regularized immigrant, we can regress the de-trended series of payroll revenues per capita on the de-trended series of immigrants registered in the social-security system per person. The difference between the pre- and the post-periods will be the average contribution of each newly regularized immigrant across the 50 Spanish provinces. These results are shown in Table 2. In total, each newly regularized immigrant increased payroll revenues by around 3,504 Euros. This increase comes from the increase in payroll revenues from the "régimen general", " régimen del hogar", and "régimen agrario". A final exercise that

Table 2: Estimates of the change in payroll-tax revenues per newly legalized immigrant

VARIABLES	(1) General OLS	(2) Trabajo Auto. OLS	(3) Agrario OLS	(4) Mar OLS	(5) Carbon OLS	(6) Hogar OLS	(7) Accidente OLS	(8) Desempleo OLS	(9) Total OLS
Δ Regularized immigrants/population,	3,300***	57.95	178.5***	-18.23	37.10	286.8***	-44.07*	-293.1	3,504***
	(1,052)	(39.89)	(51.22)	(17.24)	(36.47)	(97.30)	(26.14)	(504.9)	(769.9)
Observations	50	50	50	50	50	50	50	50	50
R-squared	0.425	0.028	0.349	0.035	0.015	0.522	0.070	0.024	0.528

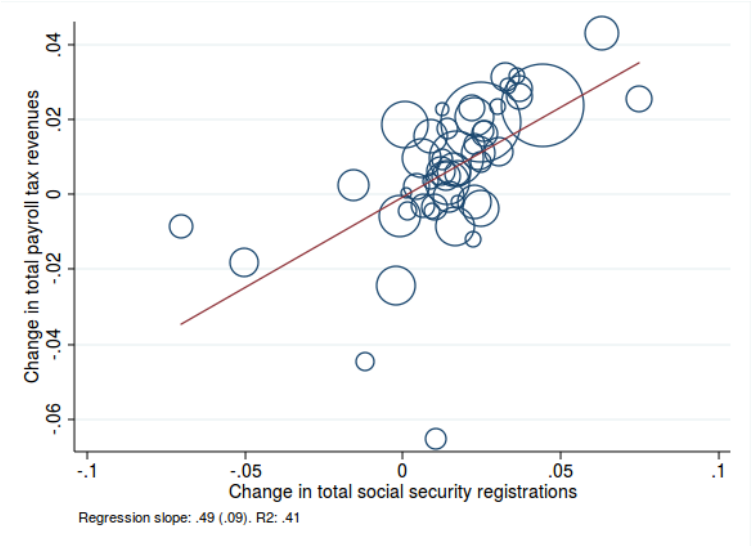
Note: This table estimates the contribution per regularized immigrant in each type of payroll tax in Euros. To do so, we used variation across 50 provinces. Regressions are weighted by population. Robust standard errors reported.

helps to quantify the contribution of immigrants to total payroll taxes is to run the following regression:

$$\Delta \ln \text{Total Payroll Revenue}_c = \alpha + \beta \Delta \ln \text{Total affiliates to social security}_c + \varepsilon_c$$

where c indicates provinces and β estimates how much newly regularized immigrants contributed to total payroll revenues. An estimate of $\beta = 1$ means that newly regularized immigrants contributed as much as previous immigrants and natives. An estimate of less than 1 means that they contributed relatively less. This may be because newly legalized immigrants' wages were lower or that the regularization also affected the labor market (or a combination of both). We investigate this in detail in Section 3.2. The estimate that we obtain is 0.49 (0.09) (with an r-squared of 0.41), as shown in Figure 6. This means that,

Figure 6: Payroll-tax revenues and social-security registration



Note: This figure plots the de-trended change in total payroll-tax revenues against the change in total registration in the social-security system between the periods 2002-2004 and 2005-2007. The size of the dots represents the population size of each province. Source: Own elaboration based on Ministry of Labor and Social Security data.

for a 10 percent increase in the number of workers registered in the social-security system as a result of the regularization process, total payroll revenues increased by only 4.9 percent. A priori, it is not clear whether this brought additional *net* revenues to the government or not, since it depends on government expenditures. However, the largest government expenditures are in healthcare and education. Both public services were already available to immigrants so, in this particular case, public expenditure did not increase. In other contexts, this should be taken into account to evaluate the complete effect of the policy.

3.2 Labor market outcomes

To better understand the reasons behind the effects of the policy on total payroll-tax collection, we need to explore in some detail whether the reform changed the labor-market outcomes of natives and immigrants and, if so, by how much. It may be the case that all of the increase in payroll-tax revenue is accounted for by the additional immigrant workers who started to pay taxes. However, it may also be the case that the policy change affected the labor market, and thus the change in payroll-tax revenue reflects both the newly incorporated tax base *and* the changes in the labor market that the policy brought. To investigate this more thoroughly, we can decompose the change in total payroll-tax revenues per newly legalized immigrants as follows:

$$\frac{\Delta\text{Total Payroll-Tax Revenue}_c}{\Delta\text{Documented Immigrant}_c} \approx \tau w_{c,imm} + \sum_{i,s} \tau\left(\frac{\Delta L_{isc}}{\Delta DI_c}\frac{E_{isc}}{L_{isc}}w_{isc} + \frac{\Delta E_{isc}}{\Delta DI_c}w_{isc} + E_{isc}\frac{\Delta w_{isc}}{\Delta DI_c}\right) \quad (1)$$

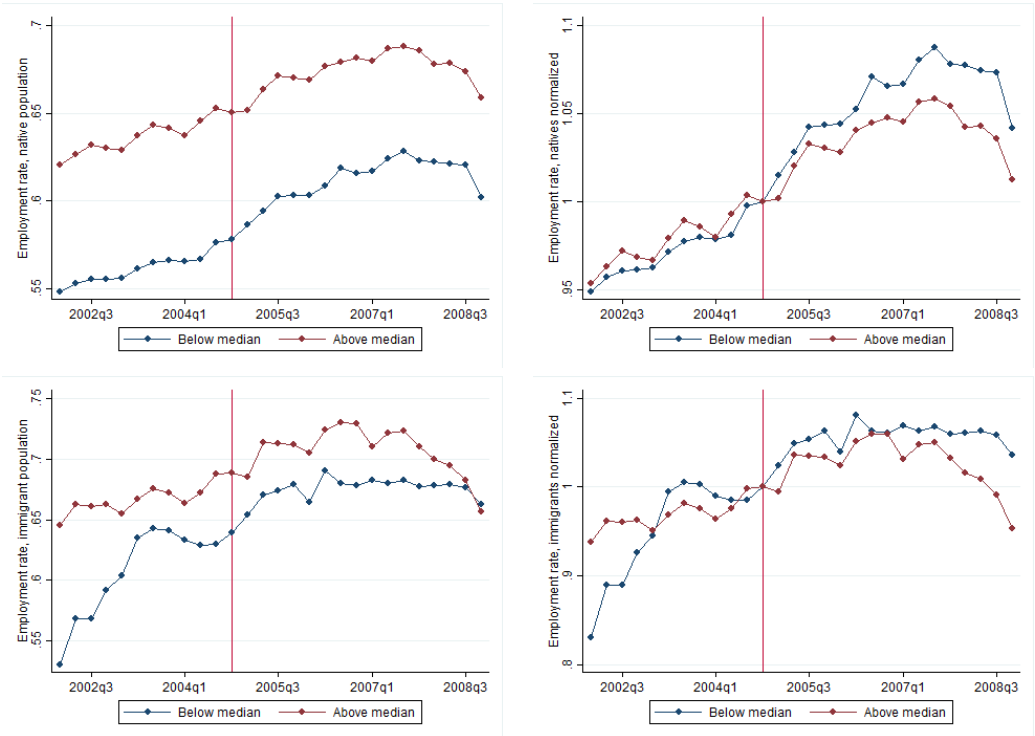
This decomposition shows that the change in total payroll revenues can come from either the incorporation of the immigrants into the documented labor force, or the indirect effect that this may have on internal

migration (ΔL_{isc}), employment (ΔE_{isc}), and the effect on wages (Δw_{isc}). We document these labor-market changes in what follows, and we discuss its relative importance in detail in Section 4.

3.2.1 Employment

We begin our exploration of the consequences that the legalization of almost 600,000 immigrants had on the labor market by documenting changes in employment rates. Employment rates are defined as the share of the working-age population that is actually working. We also differentiate between natives and immigrants and between different skill levels, as the reform might have affected each group differently. As before, the first step toward understanding whether the reform had an impact on employment rates is to differentiate between the provinces with high and low levels of immigration. Figure 7 shows these series for natives and for immigrants. In the graph on the left of the figure, we observe how high-immigration regions in Spain are also characterized by high levels of native employment.[16] The difference is substantial, at around 10 percentage points, and it reflects the fact that the high-employment provinces of Madrid and Barcelona are among the high-immigration group as well. The graphs on the right of

Figure 7: Employment rate



Note: The figure on the left shows the employment rate in Spanish provinces above and below the median level of immigration (in 2002). The vertical red line indicates the last period before the reform (2004q4). The figure on the right normalizes the figure on the left, using the last observation before the policy intervention. Source: SLFS.

Figure 7 show the same series but normalizing the employment rate to 1 just before the immigration reform took place. It is apparent from the figure that, whilst the trends leading to the policy change

[16] This is not so surprising, as explained in Albert and Monras (2017).

were very similar between high- and low-immigration regions, the two start to diverge in the first quarter of 2005. Thus, it seems that the legalization of immigrants decreased the employment rates of natives. We later quantify this effect. The graph on the right of Figure 7 also shows the series for immigrants. This series is supposed to include both documented and undocumented immigrants. Thus, we *should not* expect to see an effect of the policy on employment rates caused by the mere fact that undocumented immigrants gained work permits. The series for immigrants seems to be a bit noisier than for natives – which is not surprising, given the smaller number of observations. If anything, it seems that employment rates of immigrants in high-immigration regions decline slightly relative to low-immigration regions. We quantify the results shown in Figure 7 in Table 3. To do so, we compute the effect of the reform on total employment, and then quantify how much of the effect on total employment comes from each of the different groups of workers. In this exercise, we take into account potentially different trajectories of the different provinces in Spain, which means that our estimates reflect the change occurring with the immigration reform relative to province-specific linear time trends. More specifically, we first run:

$$\frac{\text{Emp}_{ct}}{\text{Pop}_{ct}} = \alpha + \delta_c + \delta_t + \delta_c * t + \varepsilon^1_{ct}$$

where c indicates province, t indicates year, and δ indicates fixed effects. This regression removes province-specific linear time trends as well as time and province fixed effects. This accounts for the potentially different levels of employment across provinces that are unrelated to immigration and removes potentially diverging secular trends on the evolution of employment across provinces. We apply this regression to the pre-immigration reform period exclusively, since trends after the reform are likely to be contaminated by the reform itself. We use these residuals to compute the level of employment rates before and after the immigration reform. The second step is to do the same exercise of removing pre-reform trends for those registered in the social-security system. In particular, we run the following regression:

$$\frac{\text{Imm Soc Sec}_{ct}}{\text{Pop}_{ct}} = \alpha + \delta_c + \delta_t + \delta_c * t + \varepsilon^2_{ct}$$

Once we have removed province-specific trends from these series, we take the difference between the employment rates and immigrants registered in the social-security system before and after the reform, and we run the following regression:

$$\Delta \widehat{\frac{\text{Emp}}{\text{Pop}}}_c = \alpha + \beta \Delta \frac{\widehat{\text{Imm Soc Sec}}}{\text{Pop}}_c + \varepsilon^3_c$$

This regression isolates the variation of interest and β measures the effect of the newly legalized immigrants on total employment. It has a simple interpretation: if $\beta = -1$ it means that each newly legalized worker prevents one other resident from working. To investigate the effect on particular groups of workers, we can simply substitute Emp_{ct} for the number of employed workers in the group of interest. The results in Table 3 are clear. We see that employment rates drop as a consequence of the immigration reform. For each newly regularized immigrant who started to pay taxes, 0.7 workers lost their job and thus stopped paying payroll taxes. This partly explains why revenues after the regularization increased less than proportionally to the additional number of workers contributing to the social-security system.

Table 3: Estimates of the effect of the immigration reform on employment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Δ Total Emp.	Δ Emp. Nat.	Δ Emp. Imm.	Δ Emp. Nat. LS	Δ Emp. Nat. HS	Δ Emp. Imm. LS	Δ Emp. Imm. HS
Δ Immigrants	-0.736***	-0.595**	-0.141	-0.602***	0.00732	-0.346	0.205*
in social security	(0.260)	(0.295)	(0.185)	(0.211)	(0.257)	(0.207)	(0.105)
Observations	50	50	50	50	50	50	50
R-squared	0.138	0.071	0.006	0.103	0.000	0.047	0.070

Note: This table estimates the effect of immigrant regularization on employment. Regressions are weighted by population. Robust standard errors reported.

When we look at the split by skill groups and place of birth, we see that low-skilled workers seem to lose whilst high-skilled workers seem to gain in terms of employment. For each newly legalized immigrant, 0.6 low-skilled natives and 0.35 low-skilled immigrants lose their job, whilst 0.01 high-skilled natives and 0.21 high-skilled immigrants gain a job. This shows that, whilst total employment increased by around 0.3 workers, the policy change had important distributional consequences in terms of employment opportunities.

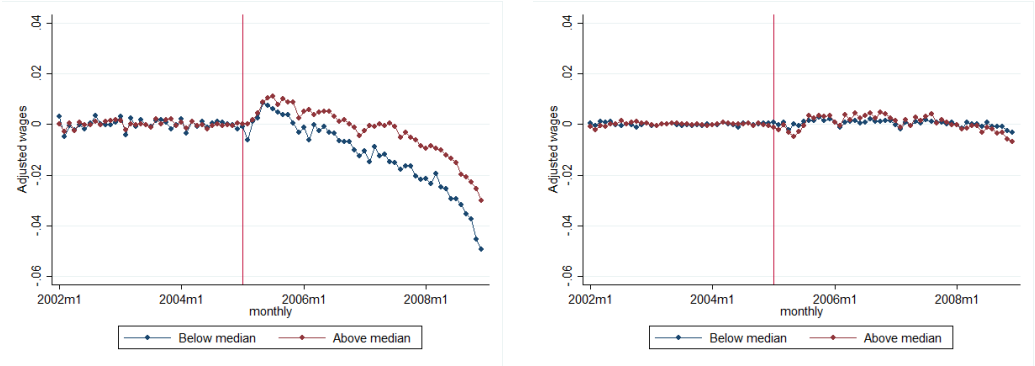
3.2.2 Wages

Another labor-market outcome that might have changed as a consequence of the reform is wage levels. In this case, we are interested in knowing whether the reform changed the unit price of labor. Later, we investigate whether workers who lost or gained jobs were selected in particular ways. Wage changes can obviously help to explain why the contribution of newly legalized immigrants was proportionally less than we would have expected from the change in social-security registration. As explained in section 2.2, we use composition-adjusted wages to measure the unit price of labor. As before, we start by comparing high- and low-immigration locations and then we quantify the results in a regression framework. Figure 8 shows the wage series for both natives and immigrants. It is clear that, after the reform, wages in high-immigration locations seem to increase relative to low-immigration locations – wages were increasing during this period – but the increases were less pronounced from 2005 to 2008 than previous linear trends predict, hence the negative trends in the series. This is apparent for native workers; differences are minimal in the case of immigrants. When we split the sample between high- and low-skilled workers, we observe that, if anything, high-skilled native wages increase more than low-skilled native wages, and that wages of low-skilled immigrants do not increase in high-immigrant locations relative to low-immigrant locations.[17] We quantify the insights of Figure 8 in Table 4 before removing linear province-specific time trends.[18] Table 4 shows that native workers' wages increased following the policy change. Given that we have controlled for observable characteristics, the estimated changes in wages can only come from changes in the price of labor or changes in unobservable characteristics of those who are working. Given that employment effects are small for high-skilled individuals, whilst large for low-skilled individuals, it is very likely that most of the wage results for high-skilled individuals reflect changes in the price of labor, whilst changes for low-skilled individuals reflect statistical selection. We return to this point in

[17] Given that we use composition-adjusted wages, i.e., we remove observable characteristics and year and province fixed effects, the series that we show are equivalent to the normalized series shown in Figure 7.

[18] See more details in Section 2.2.

Figure 8: Composition-adjusted wages



Note: The figure on the left shows the average composition-adjusted native wage in Spanish provinces above and below the median level of immigration (in 2002). The vertical red line indicates the last period before the reform (2005m1). The figure on the right shows the same series for immigrant workers. Source: Own elaboration based on MCVL.

Section 4. The results show that native workers' wages increased as a result of the policy change. Wages

Table 4: Estimates of the effect of the immigration reform on wages

	Δ ln(wages) Natives			**Δ ln(wages)Immigrants**		
	All	High Skilled	Low Skilled	All	High Skilled	Low Skilled
Δ Immigrants	0.308***	0.421*	0.273***	-0.0549	0.995*	-0.119
in social security	(0.113)	(0.224)	(0.0929)	(0.279)	(0.592)	(0.286)
Observations	50	50	50	50	50	50
R-squared	0.214	0.077	0.188	0.001	0.022	0.004

Note: This table estimates the effect of immigrant regularization on *log* wages. Robust standard errors reported.

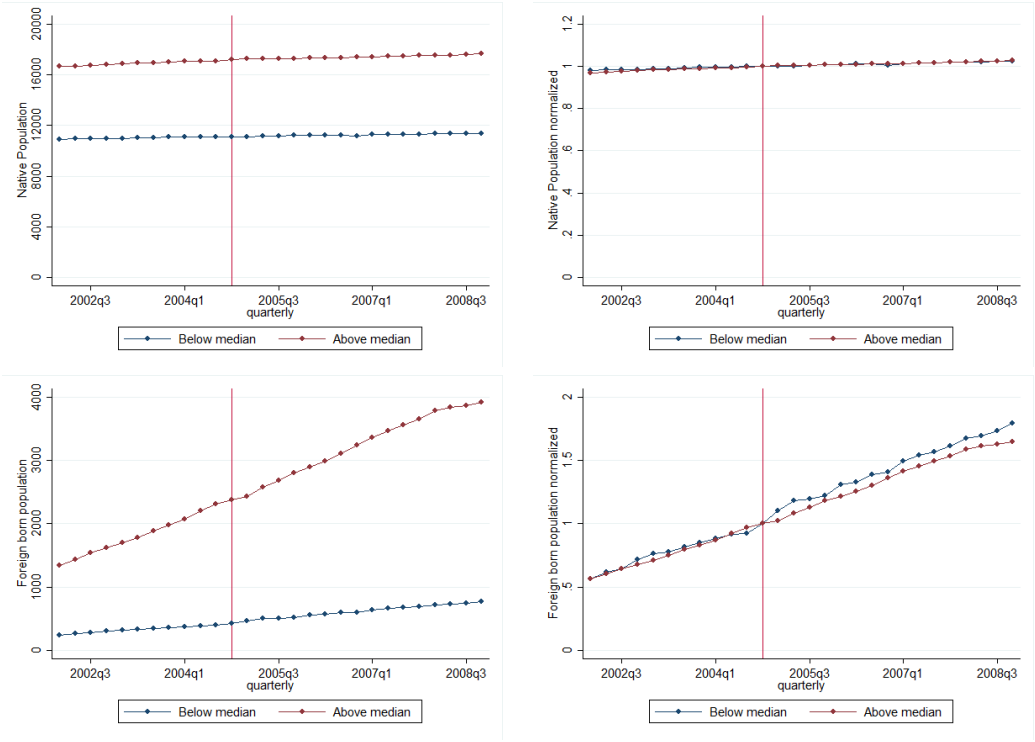
for high-skilled workers in high-immigration locations increased by 0.42 log points per percentage point increase in the share of immigrants registered in the social-security system, whilst wages for low-skilled workers increased by 0.27 log points. The results are more mixed for immigrants. The policy seems to have increased the wages of high-skilled immigrants by as much as 1 log point, whilst the wages of low-skilled immigrants decreased, if anything.

3.2.3 Internal migration

As we see from the decomposition of changes in total payroll-tax revenues shown in equation 1, not only employment rate or wages may change as a result of the immigration reform but also internal migration might have responded. This could have happened as a consequence of natives relocating across Spanish provinces, or immigrants themselves relocating. To investigate this, we proceed as in previous sections. We start by splitting the sample of Spanish provinces between high- and low-immigration provinces. We then plot the evolution of total native population and total immigrant population in the two sets of regions. For this exercise, we use data from SLFS (see section 2.2). In Appendix A.1, we show that we obtain the same results using administrative data. We base our main estimates on SLFS survey data instead of administrative data because we can distinguish skill levels in SLFS data. Figure 9 shows the

results. The top graphs of the Figure show that native population did not change significantly around the time of the policy change. When we look at levels and when we normalize the series, we see that native population trends remain unchanged around the time of the policy change. The bottom graphs show the same series but for immigrant population. In this case, it is evident that more immigrants start to arrive in low-immigration regions right at the time of the reform. This change is particularly apparent when we normalize the series in the bottom right part of the Figure. The results are striking. After the reform,

Figure 9: Spanish and foreign-born population and the immigration reform



Note: The figures on the left show Spanish and foreign-born population in Spanish provinces above and below the median level of immigration (in 2002). The vertical red line indicates the last period before the reform (2004q4). The figures on the right normalize the figures on the left, using the last observation before the policy intervention. Source: SLFS.

low-immigration regions started to gain immigrant population. We quantify this in Table 5. Specifically, we compute the share of immigrants across regions and we de-trend the series for employment, as we did before. We prefer to use the share of immigrant population instead of levels of the different groups to make the various regions more easily comparable. We then run the following regression:

$$\Delta \widehat{\frac{\text{Imm}}{\text{Pop}}}_c = \alpha + \beta \Delta \frac{\widehat{\text{Imm Soc Sec}}}{\text{Pop}}_c + \varepsilon_c^4$$

Where, again, c indicates the various Spanish provinces and β estimates how many immigrants moved away from high- to low-immigration regions for each immigrant that gained legal status following the reform. Table 5 shows that for every newly legalized immigrant, 0.36 immigrants left high-immigration regions. This is due to the outflow of low-skilled immigrants. For every newly legalized immigrant, 0.43 low-skilled immigrants left high-immigration locations, whilst 0.07 high-skilled immigrants moved

Table 5: Estimates of the effect of the immigration reform on internal migration

	Δ Immigrant population share		
	All	High Skilled	Low Skilled
Δ Immigrants	-0.359*	0.0734	-0.432**
in social security	(0.201)	(0.0862)	(0.206)
Observations	50	50	50
R-squared	0.029	0.012	0.055

Note: This table estimates the effect of immigrant regularization on the share of foreign-born population. Regressions are weighted by population. Robust standard errors reported.

in. These estimates are relative to native population and thus implicitly assume that native population did not respond by moving across regions. This assumption is in line with the evidence shown in Figure 9.

4 Discussion

Given the results reported in section 3, it seems quite clear that newly legalized individuals contributed positively to public finances, and that they changed some labor-market outcomes for other workers. In this section, we discuss these results and what they mean for the overall evaluation of the policy change and our understanding of how labor markets work. To start the discussion, note that we can compare the direct estimates of the effect of the policy change on payroll taxes with the implied increase in payroll taxes that would be suggested by our estimates of the effects of the policy on the labor market. We can use the following equation for this, previously introduced:

$$\frac{\Delta \text{Total Payroll-Tax Revenue}_c}{\Delta \text{Documented Immigrant}_c} \approx \underbrace{\tau w_{c,imm}}_{\text{Direct contribution}} + \underbrace{\sum_{i,s} \tau \left(\frac{\Delta L_{isc}}{\Delta DI_c} \frac{E_{isc}}{L_{isc}} w_{isc} + \frac{\Delta E_{isc}}{\Delta DI_c} w_{isc} + E_{isc} \frac{\Delta w_{isc}}{\Delta DI_c} \right)}_{\text{Labor-market effects}} \tag{2}$$

Again, this equation simply says that the change in payroll taxes per newly documented immigrant can be decomposed in two blocks. The first block, which we can label as "direct contribution", is simply the wage that a newly legalized worker receives $w_{c,imm}$ multiplied by the payroll taxes they need to pay τ. A newly legalized immigrant may have an impact on the labor market as well, as documented in Section 3.2. The labor-market effect can be decomposed into the effect of newly legalized immigrants on various groups of workers. In particular, we have estimated the impact of the policy on high- and low-skilled natives and immigrants. This is the second block, which we have identified as the labor-market effects of the legalization. We summarize all the results in Table 6. In the first row, we assume a certain distribution of newly legalized immigrants between high- and low-skilled individuals, since this is not directly observable. For that, we use the skill distribution of immigrants already legalized. Accordingly, for every 10 newly legalized immigrants, we assume that 8 are low-skilled whilst 2 are high-skilled. The second row shows the migration estimates previously reported. As discussed, we estimate that, on

average, for each legalized immigrant in a given location, 0.43 low-skilled immigrants leave and 0.07 high-skilled immigrants arrive. The third row displays the results on employment. We obtain that, for each newly legalized immigrant, 0.6 low-skilled natives and 0.35 low-skilled immigrants lose their job, whilst 0.01 high-skilled natives and 0.21 high-skilled immigrants obtain new jobs. The fourth row displays the results on wages. In this case, natives of all skill levels seem to gain slightly, whilst low-skilled immigrant wages decreased by around 0.12 percent and high-skilled immigrant wages increased by around 1 percent. In order to be able to use Equation 2, we also need some summary statistics on the key variables defining

Table 6: Evaluation of the immigration reform, raw estimates

	Native LS	**Natives HS**	**Immigrants LS**	**Immigrants HS**
		Assumed distribution of newly legalized immigrants		
Δ Documented immigrants	0	0	0.8	0.2
		Estimates of the labor market effects		
Δ Migration	0	0	-0.43	0.07
Δ Employment	-0.6	0.01	-0.35	0.21
Δ (log) Wages	0.27	0.42	-0.12	1.00
		Summary statistics		
Employment rates	0.62	0.81	0.66	0.71
Average wages	19,261	27,396	16,520	21,821
Employment distribution	0.48	0.13	0.04	0.01
		Estimates on payroll taxes by skill		
Labor change	-3,171	619	-3,692	2,060
Total change	-3,521	238	933	3,216
Contribution per skill	-161%	31%	47%	163%
		Estimates of the effect on payroll taxes		
Direct estimates pay roll taxes		3,504 Euros		
Estimates of total effects, labor market		1,969 Euros		
Difference in estimates		- 1,535 Euros		

Note: This table reports the estimates of the effect of the policy on labor-market outcomes, reported in Tables 3, 4, and 5, some summary statistics on employment variables before the policy change, i.e., the years 2002-2004 inclusive, estimates on the contribution to changes in payroll-tax revenues by skill group, and total changes in contributions using predictions from labor-market changes and direct estimates from payroll-revenue data reported in Table 2.

the labor market. We report this in the third block of Table 6. These numbers refer to the averages before the policy change, i.e., during the period 2002-2004 inclusive. In order to use Equation 2 together with the estimates in Tables 3, 4, and 5, it may be useful to rewrite Equation 2 as follows:

$$\frac{\Delta\text{Total Payroll-Tax Revenue}_c}{\Delta\text{Documented Immigrant}_c} \approx \tau w_{c,imm} + \sum_{i,s} \tau w_{isc}(\beta^{Mig}\frac{E_{isc}}{L_{isc}} + \beta^{Emp} + \frac{E_{isc}}{L_c}\beta^{wage}) \qquad (3)$$

where β indicates the estimates of the various labor-market outcomes. Using Equation 3, we can build the fourth block of Table 6. In this block, we first report the contribution to the change in payroll taxes using the estimates of the policy on the labor market. We can compute this for each of the skill groups, using the average employment variables reported in the summary statistics block of Table 6. These computations suggest that, as a result of the labor-market effect, low-skilled natives contributed 3,171 fewer Euros per newly legalized immigrant. This reflects the negative effects that the legalization had

on employment outcomes of low-skilled natives. Similarly, we estimate that the policy change increased high-skilled natives' contributions by 619 Euros, decreased low-skilled immigrants' contributions by 3,692 Euros, and increased high-skilled immigrants' contributions by 2,060 Euros. Importantly, these numbers only reflect the effect of the policy on payroll contributions via the effect on the labor market. To obtain the total effect, we need to take into account that the newly legalized immigrants started to contribute to payroll taxes. These computations are displayed in the second row of the fourth block of Table 6. Remarkably, the negative contribution of low-skilled immigrants now becomes positive since we add the direct effect of the policy. This also increases the size of the contribution of high-skilled immigrants. In total, the estimates from the labor-market data suggest that payroll taxes should have increased by 1,969 Euros per newly legalized immigrant. This contrasts with the direct estimates that we obtained using payroll-revenue data. With these data, we obtained that, on average, locations gained 3,504 Euros per newly legalized immigrant. In order to explain this divergence, we need to understand the assumptions made so far in some more detail. One of the crucial assumptions made is that the wages of the low-skilled natives who lost their job as a consequence of the policy were equal to the average wages of other low-skilled workers. This is a very unrealistic assumption since it is very likely that there is some type of selection. For example, it is not hard to imagine that those who lost their job were earning lower wages than the average low-skilled worker. In other words, it is conceivable that workers who lost their job were negatively selected. Similarly, it is hard to imagine that newly legalized immigrants started earning exactly the same average wage of those who already had work permits. Table 7 recomputes the

Table 7: Evaluation of the immigration reform, accounting for selection

	Native LS	**Natives HS**	**Immigrants LS**	**Immigrants HS**
		Estimates on payroll taxes by skill		
Labor change	-2,462	619	-2,866	2,060
Total change	-2,462	619	1,759	3.216
Contribution per skill	-70%	18%	50%	92%
		Estimates of the effect on payroll taxes		
Direct estimates pay roll taxes		3,504 Euros		
Estimates of total effects, labor market		3,504 Euros		
Difference in estimates		0 Euros		

Note: This table reports estimates on the contribution to changes in payroll-tax revenues by skill group, total changes in contributions using predictions from labor-market changes under the assumption that newly legalized immigrants and low-skilled workers who lost their job are negatively selected, and direct estimates from payroll-revenue data reported in Table 2. See more details in the main text.

contribution of each type of worker to payroll taxes following the legalization of immigrants by assuming that low-skilled natives who lost their job and newly legalized low-skilled immigrants earned around 22 percent less. This is the number that equalizes the estimates using labor-market data and payroll-revenue data, and coincides with the estimated effects on low-skilled native wages shown in Table 4. This obviously changes the estimated contribution of the various groups. In this case, the decrease in payroll-tax contributions of low-skilled natives is estimated at 2,462 Euros per newly legalized immigrant. This is the only group for which the policy change clearly reduces the total contributions. All the others contribute more to payroll taxes as a result of the policy, for various reasons. In the case of high-

skilled natives and immigrants, this is the positive consequence that the policy had on both wages and employment outcomes. In the case of low-skilled immigrants, the increase in contributions comes from the newly legalized immigrants. In this case, the estimate is lower than in Table 6 because we assumed that they received lower wages than the average low-skilled immigrant. The fact that we are taking migration into account in these computations is both right and misleading. It is right in the sense that migrants who leave a particular location stop contributing in that location, something that needs to be taken into account. But it is also a little bit misleading because if these migrants migrated to another location within Spain they still contribute to payroll taxes. If all immigrants who leave high-immigration locations relocated within Spain, then in order to estimate the contribution of the policy change on payroll contributions we need to shoot down the migration channel. We do this in Table 8. In this case,

Table 8: Evaluation of the immigration reform, accounting for selection and migration

	Native LS	**Natives HS**	**Immigrants LS**	**Immigrants HS**
		Estimates on payroll taxes by skill		
Labor change	-2,462	619	-1,593	1,680
Total change	-2,462	619	3,033	2,837
Contribution per skill	-56%	14%	69%	64%
		Estimates of the effect on payroll taxes		
Direct estimates pay roll taxes		3,504 euros		
Estimates of total effects, labor market		4,398 euros		
Difference in estimates		894 euros		

Note: This table reports estimates on the contribution to changes in payroll-tax revenues by skill group, total changes in contributions using predictions from labor-market changes under the assumption that newly legalized immigrants and low-skilled workers who lost their job are negatively selected, and direct estimates from payroll-revenue data reported in Table 2. In this table, we assume that all immigrant migration responses were within Spain. See more details in the main text.

the contribution of low- and high-skilled immigrants increases to 3,033 and 2,837 Euros, respectively. This implies that the total change in contribution per legalized immigrant, once we take into account selection and internal migration, increases to 4,398 Euros per newly legalized immigrant, i.e., 1,043 Euros more than we obtained by simply looking at payroll-tax revenues. Table 8 highlights the importance of doing the complete exercise as we did. First, it is important to have data on payroll-tax revenues. This allows for a direct estimate of the contribution of newly legalized immigrants to total payroll-tax revenues. It also allows us to see whether the increase is larger or smaller than we would have anticipated by simply looking at the change in social-security registration. It is equally important to have detailed data on labor-market outcomes. The fact that the contribution of newly legalized immigrants was only 49 percent of what we would have anticipated, given the change in the number of workers registered in the social-security system, suggests that either newly legalized immigrants earn lower wages than already documented immigrants or that the policy also affected the labor-market outcomes of other groups. By having detailed data on high- and low-skilled natives and high- and low-skilled immigrants, we could estimate the effect of the policy on the labor market. Using the effect of the policy on the labor market we could then predict the change in payroll-tax revenue, assuming that the newly legalized immigrants and workers who lost their job were not selected in any particular way. The fact that the direct estimates using payroll-revenue data and the changes in payroll-tax revenues predicted on the basis

of the labor-market-outcome changes do not coincide suggests that, indeed, newly legalized immigrants probably received lower wages than already documented immigrants and that the low-skilled natives who lost their job because of the policy were probably also negatively selected. Thus, this comparison allows us to quantify the effects of selection on the labor market, something that is otherwise unobservable. Once we know the role of selection, we can re-estimate the contribution of newly legalized immigrants by considering the idea that perhaps many of those who decide to relocate to low-immigration locations in Spain still contributed to payroll taxes. This leads to our preferred estimate: each newly legalized immigrant increased payroll-tax revenues by 4,398 Euros, on average. This suggests that the biases that arise from not taking into account selection and migration are substantial.

5 Conclusion

This paper estimates the contribution of newly legalized immigrants to payroll-tax revenues. To do so, we combined detailed geographic data on tax revenues and labor-market outcomes, and we show that the legalization of around 600,000 immigrants directly increased tax revenues because these workers started to pay taxes, but it also had consequences for the labor market. We show that newly legalized immigrants, who were disproportionately low-skilled, worsened the labor-market outcomes of some low-skilled natives and immigrants and improved the labor-market outcomes of high-skilled natives and immigrants. Most of the effects on natives come via employment rates, whilst employment rates, wages and internal migration all seem to change for immigrants. In all, each newly legalized immigrant increased tax revenues by at least 4,398 Euros, given that undocumented immigrants already benefited from most public services such as education and healthcare, and started to pay income taxes when they became legal – something that we cannot take into account with the data at our disposal. Thus, amnesty programs likely have positive effects for the overall economy, but also have important distributional consequences between different types of worker.

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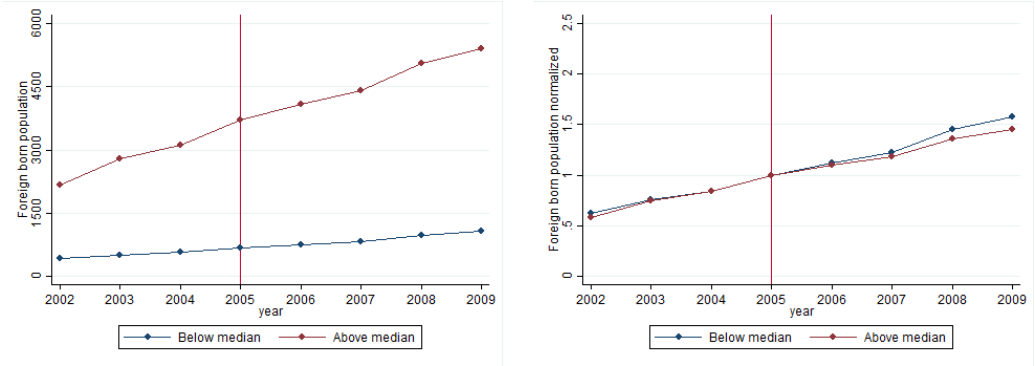
A Robustness

A.1 Migration results

An alternative data source to measure internal migration is the Municipal Register (*Padrón Municipal*). This contains administrative data that record the location of residence of individuals living in Spain. These data have the advantage of being administrative data. However, using data from the Municipal Register, as opposed to the SLFS used in the main text, has two disadvantages: first, it is possible that people take some time to register in their new location once they have moved. Individuals have strong incentives to do so, since it gives them access to public education and healthcare, but there are mechanisms to obtain these services temporarily in locations other than the official residence. Second, in this data set, we cannot distinguish between high- and low-skilled workers. It is reassuring that, using this alternative data set, we obtain very similar results compared to using the SLFS. In this appendix, we replicate the figures shown in the main text. We also check and can confirm that the estimation does not change significantly.

Figure A.1: Spanish and foreign-born population and the immigration reform, natives and immigrants



Note: The figures on the left show Spanish and foreign-born population in Spanish provinces above and below the median level of immigration (in 2002). The vertical red line indicates the last period before the reform (2004q4). The figures on the right normalize the figures on the left, using the last observation before the policy intervention. Source: Municipal Register.

B Conditions for Work Permits

Disposición transitoria tercera. Proceso de normalización. 1. En el plazo de tres meses desde la entrada en vigor del Reglamento de la Ley Orgánica 4/2000, de 11 de enero, sobre derechos y libertades de los extranjeros en España y su integración social, los empresarios o empleadores que pretendan contratar a un extranjero podrán solicitar que se le otorgue una autorización inicial de residencia y trabajo por cuenta ajena, siempre y cuando se cumplan las siguientes condiciones: a) Que el trabajador figure empadronado en un municipio español, al menos, con seis meses de anterioridad a la entrada en vigor del Reglamento de la Ley Orgánica 4/2000, de 11 de enero, sobre derechos y libertades de los extranjeros en España y su integración social, y se encuentre en España en el momento de realizar la solicitud. b) Que el empresario o empleador haya firmado con el trabajador un contrato de trabajo cuyos efectos estarán condicionados

a la entrada en vigor de la autorización de residencia y trabajo solicitada. En el contrato de trabajo, el empresario se comprometerá, con independencia de la modalidad contractual y el tipo de contrato utilizado, al mantenimiento de la prestación laboral por un período mínimo de seis meses, salvo en el sector agrario, en el que el período mínimo será de tres meses. En los sectores de la construcción y la hostelería, el cumplimiento del compromiso de mantenimiento de la prestación laboral de seis meses podrá llevarse a cabo dentro de un período máximo de doce meses. Cuando los contratos de trabajo sean a tiempo parcial, el período de prestación laboral se incrementará proporcionalmente a la reducción sobre la jornada ordinaria pactada en dicho contrato, en los términos que establezca el Ministerio de Trabajo y Asuntos Sociales. c) Que se cumplan los requisitos previstos en el artículo 50 del Reglamento de la Ley Orgánica 4/2000, de 11 de enero, sobre derechos y libertades de los extranjeros en España y su integración social, para el otorgamiento de una autorización para trabajar, con excepción de lo dispuesto en sus párrafos a), b) y g). 2. Con sujeción a los requisitos establecidos en los párrafos a) y c) del apartado anterior, y en idéntico plazo al establecido en éste, podrán solicitar igualmente la concesión de una autorización inicial de residencia y trabajo los extranjeros que pretendan desarrollar su actividad en el ámbito del servicio del hogar familiar, trabajando parcialmente y de manera simultánea para más de un titular del hogar familiar. Para ello deberán acreditar que reúnen los requisitos previstos por la legislación aplicable a los efectos del alta en el correspondiente régimen de Seguridad Social como empleados del hogar discontinuos y que van a realizar un número de horas de trabajo semanales no inferior a treinta, en el cómputo global. Las prestaciones laborales concertadas a estos efectos deberán de abarcar un período mínimo de actividad de seis meses. Los extranjeros que puedan desarrollar una actividad en el servicio del hogar familiar a tiempo completo para un solo empleador podrán obtener la autorización de conformidad con el apartado 1 de esta disposición, siempre que cumplan los requisitos establecidos en ella. 3. Sin perjuicio de lo establecido en la disposición adicional tercera de la Ley Orgánica 4/2000, de 11 de enero, y la disposición adicional cuarta de su Reglamento, el Ministerio de Administraciones Públicas podrá habilitar, mediante instrumentos adecuados previstos en la legislación vigente, otras oficinas públicas para la presentación de las solicitudes. 4. Las solicitudes basadas en lo dispuesto por esta disposición transitoria se tramitarán con carácter preferente. La presentación de la solicitud supondrá el archivo de oficio de cualquier otra solicitud de residencia o de residencia y trabajo para el mismo extranjero presentada con anterioridad. 5. La autoridad competente, a la vista de la documentación presentada, resolverá de forma motivada y notificará al empresario o empleador, en los casos del apartado 1, y al propio trabajador extranjero, en los casos del apartado 2, la resolución sobre la autorización de residencia y trabajo solicitada. Cuando la resolución fuese favorable, la autorización concedida estará condicionada a que, en el plazo de un mes desde la notificación, se produzca la afiliación y/o alta del trabajador en la Seguridad Social. La notificación surtirá efectos para que se proceda al abono de las tasas correspondientes. Resultará de aplicación lo dispuesto en la disposición adicional primera de la Ley Orgánica 4/2000, de 11 de enero, a los efectos del plazo para la resolución de las solicitudes. 6. Cumplida la condición de afiliación y/o alta, la autorización comenzará su período de vigencia, que será de un año. Transcurrido el plazo de un mes desde la notificación de la autorización sin que se haya cumplido la condición señalada, la autorización quedará sin efecto. En este caso, se

requerirá al empresario o empleador, en los casos del apartado 1, y al propio trabajador extranjero, en los casos del apartado 2, para que indique las razones por las que no se ha iniciado la relación laboral, con la advertencia de que, si no alegase ninguna justificación o si las razones aducidas se considerasen insuficientes, podrán denegarse ulteriores solicitudes de autorización que presente. 7. Durante el mes inmediatamente posterior a la entrada en vigor de la autorización, el extranjero deberá solicitar la tarjeta de identidad de extranjero, que será expedida por el plazo de validez de la autorización. 8. La concesión de la autorización determinará el archivo de los expedientes de expulsión pendientes de resolución, así como la revocación de oficio de las órdenes de expulsión que hayan recaído sobre el extranjero titular de la autorización, cuando el expediente o la orden de expulsión correspondiente esté basada en las causas previstas en el artículo 53.a) y b) de la Ley Orgánica 4/2000, de 11 de enero, sobre derechos y libertades de los extranjeros en España y su integración social. La denegación de la autorización implicará la continuación de los expedientes de expulsión y la ejecución de las órdenes de expulsión dictadas.