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DO REGULARIZATION PROGRAMS FOR ILLEGAL IMMIGRANTS HAVE A MAGNET EFFECT? EVIDENCE FROM SPAIN*

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This paper attempts to determine whether regularization programs of illegal immigrants have a magnet effect. Using a comparative case study approach, we analyze the most recent amnesty implemented in Spain. More specifically, we apply a synthetic control method that is suitable for the evaluation of policies at the country level. Our results suggest that the increasing trend followed by the foreign population in the period analyzed is not a consequence of the amnesty under scrutiny. Rather, it corresponds to the path for a counterfactual country with similar socioeconomic characteristics.

1 Introduction

There is a consensus in the literature that migrants tend to move from low- to high-income countries, and that the greater the income differential, the greater the number of migrants. This not only reflects the desire of individuals to leave their home countries but also requires the host country to accept immigration. The latter may lead countries to restrict the number and types of immigrants allowed to enter through immigration policies such as border controls, selection of immigrants and/or international enforcement (Ethier, 1986).

Despite the efforts to limit migratory inflows, many individuals enter countries illegally with the hope of an eventual legalization. Coppel *et al.* (2001) have estimated that around 500,000 illegal immigrants enter Europe each year. This figure is 400,000 for the United States (Hoefer *et al.*, 2006). Because of the high number of illegal immigrants in their territories during the last 25 years, certain developed countries have chosen to use

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regularization programs.[1] In these amnesties, workers follow a procedure, at the end of which some are regularized and, hence, allowed to remain in the host country for a certain period. The main reason why these immigrants are not legalized immediately is that this would encourage foreigners to attempt to enter the country illegally. This incentive is commonly known as the magnet effect and leads to an increase in immigration.

The more widespread use of regularization has emphasized the need for further research. Levinson (2005) reviews the literature on amnesties and describes the main characteristics of the programs introduced in the European Union (EU) and the United States, without providing any information about their effects. Epstein and Weiss (2011) study the effects of government actions on migration flows and propose an optimal amnesty policy. Also adopting a theoretical approach, Myers and Papageorgiou (2002) set out to determine the optimal quota of legal migrants in a model with a redistributive public sector facing costly immigration controls. Thus, it can be stated that little attention has been paid to empirically establishing the effects of regularization programs for illegal immigrants. The exceptions are studies of the Immigration Reform and Control Act (IRCA) of 1986 in the United States. This amnesty is the most significant regularization program as it led to the legalization of more than 2.5 million illegal immigrants. The consequences of this program were analyzed by Donato *et al.* (1992) who, using a descriptive analysis, concluded that it had no effect on the illegal migration received from Mexico. Gang and Yun (2006) developed a theoretical model to determine the effects that amnesties have on the quantity of migration received by the host country, and also studied the effects of the IRCA on the salaries of immigrants.

Regularization programs have frequently been used on the southern frontier of Europe. Proof of this is that Greece, Italy, Portugal and Spain account for 15 of the 40 amnesties applied around the world in the last three decades. Of particular interest is the case of Spain, a country that has implemented the largest number of these exceptional measures. The last amnesty in Spain took place in 2005 and, as a result, almost 600,000 illegal immigrants were legalized. Kosttova (2006) analyzes this amnesty and concludes that it generated a magnet effect. Nonetheless, this conclusion is drawn without relying on any empirical analysis, and thus our paper is intended to empirically determine the effects that this regularization program has had on the foreign percentage of the population in Spain.

Our analysis consists of the application of a synthetic control method (Abadie and Gardeazábal, 2003; Abadie *et al.*, 2010) that allows the evaluation of policies implemented at a country level through a comparison of the

[1]Nevertheless, rich countries with income maintenance and welfare programs may be interested in allowing some illegal immigrants into their low-productivity sector (Karlson and Katz, 2003).

observed situation with a counterfactual constructed from several potential controls. Our results suggest that, contrary to the common wisdom, the most recent regularization program in Spain had no significant effect on the foreign percentage of the population in this country. The increase in the foreign population during the analyzed period is the result of a catching-up process. Hence, the evolution of the foreign population in Spain after 2005 corresponds to that of a country with similar socioeconomic characteristics.

The rest of the paper is structured as follows. Section 2 presents migratory trends in certain selected EU countries and an overview of the regularization programs implemented in Spain. Section 3 describes the main characteristics of the applied synthetic control method. Section 4 presents the empirical analyses of the effects of the 2005 amnesty. Finally, section 5 presents our conclusions.

2 The Migratory Phenomenon and Regularization Programs in Spain

2.1 Immigration Data

One difficulty when analyzing data on immigration is its reliability. This has to do with the definition of 'immigrant', its consistency across countries and its measurement. In the present paper, data comparison problems across European countries have been avoided by the use of the information compiled in the EU Labour Force Survey (EU-LFS). It is the largest European household sample survey providing quarterly and annual data on individuals aged 15 and over. This database contains information on labor market participation, and it also covers those who reside in private households but are outside the labor force as well as other socioeconomic factors.

Although the national statistical institutes of EU member countries are responsible for designing their own national questionnaires, drawing the sample and conducting the interviews, the information is centrally processed by the European Commission through its statistical office: Eurostat.[2] Among other functions, Eurostat provides assistance to national statistical institutes, promotes harmonized concepts and methods, and disseminates comparable national and European labor market statistics.

As noted earlier, the scope of the EU-LFS is the resident population defined, for a given country, as those who stay, or intend to stay, within the economic territory for a period of 1 year or longer. Therefore, the survey does not capture temporal migration and includes both legal and illegal immigrants. In addition, migrants who do not intend to reside for more than 1 year are removed from the sample, even if they eventually do stay for a longer period.

[2]http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/

The main variable of interest in the present study is the foreign percentage of the total population,[3] considering as 'foreigners' those individuals with nationality other than their country of residence. Nationality will be interpreted as citizenship, which corresponds to the country issuing the passport and, according to the European System of Accounts (ESA95), is defined as 'the particular legal bond between an individual and his/her State acquired by birth or naturalisation, whether by declaration, option, marriage or other means according to national legislation'.

This definition of nationality can be considered to be a limitation of the database as the requirements for acquiring citizenship differ from country to country. Among other consequences, those countries where it is easier to obtain the dual nationality will report a lower foreign percentage of total population.

2.2 Descriptive Analysis

The migratory phenomenon has become extremely important in Spain during the last two decades. Although the foreign population was less than 2% of Spain's total in the 1990s, this figure rose to almost 11% by 2008. Nevertheless, not all immigrants have the documents required for residence in Spain. Although there are no official data about the number of irregular immigrants, 700,000 individuals who arrived in the country between 2002 and 2004 applied for regularization in 2005. The main objective of this amnesty was to incorporate the underground economy into the formal labor market.

Those immigrants who could apply for regularization were workers who had resided in Spain for more than 6 months, without criminal records and with a work contract longer than 6 months (3 months for workers in the agricultural sector). The number of applications implied that at least 280,000 foreign workers arrived in Spain every year from 2002 to 2004. As the official number is 30,000, this is equivalent to saying that more than 250,000 immigrant workers were irregular. This number is significant enough to try to establish mechanisms to reduce the related underground economy.

Migratory policies in Spain underwent changes in 1986, 1991, 1996, 2000, 2001 and 2005. The regularization programs implemented until 2001 were unable to cope with the irregular immigration flows, but that of 2005 legalized 575,000 foreign workers, more than all the preceding programs put together. After such a massive regularization, the question that arises is whether or not it produced the so-called magnet effect (Gang and Yun, 2006; Epstein and Weis, 2011). This should be taken into account when considering the implementation of further regularization programs.

[3]The main reason for not analyzing migration flows into Spain, in levels or as a percentage of the total population, is that they are of such a magnitude that it is not possible to construct an appropriate counterfactual. In addition, the possible role of Spain as a 'gateway' to the EU would make the estimated effects from this variable misleading.

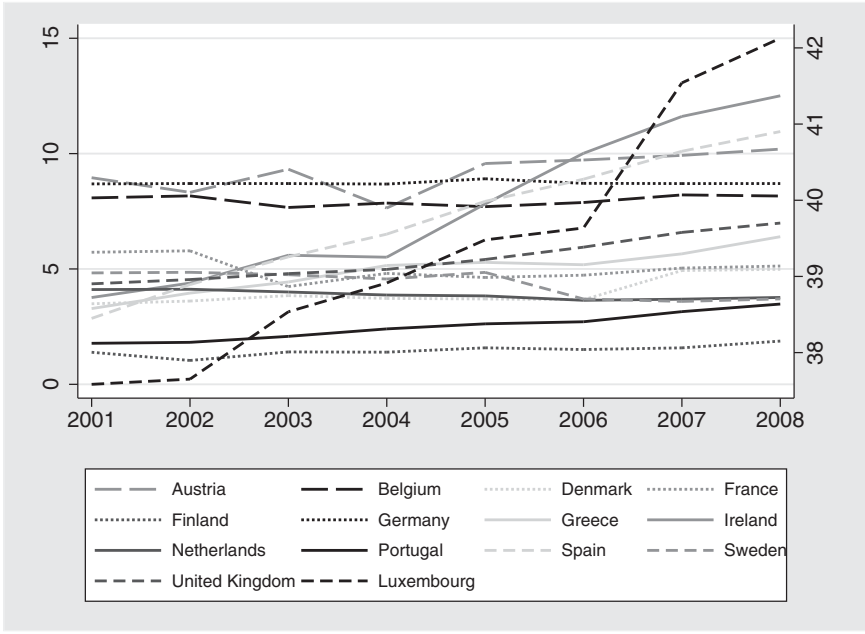

FIG. 1. Foreign Percentage of Population. Selected European Union Countries, 2001–2008. Data Source: Eurostat

A tentative answer to this question can be derived through a descriptive analysis, i.e. to examine the effect of the policy through the evolution of the foreign percentage of the population before and after the amnesty.

The foreign percentage of the total population in Spain, and some selected EU countries, during the period 2001–2008 is plotted in Fig. 1. It can be observed that the percentage of foreigners residing in Spain increased during this period. This stable evolution can be interpreted as evidence that the effect of the regularization was of a limited magnitude. Nevertheless, the foreign percentage in the majority of the other European countries considered suffered a stagnation over this same period (see France, Belgium, Germany and Finland), or even a decrease as in the case of the Netherlands and Sweden. In other countries—Portugal, Luxembourg,[4] Ireland, Greece and the United Kingdom—the increase in the foreign percentage is not so prominent. These findings lead us to consider a deeper analysis of the effects of the amnesty through the application of a policy evaluation statistical method.

The technique used in this paper consists of the construction of a synthetic control that is suitable for the evaluation of policies implemented at

[4]The scale for Luxembourg is on the secondary (right) *y*-axis.

country level. This will allow us to determine whether the increase in the received migration is due to the regularization program or to socioeconomic factors. The estimation technique applied is described in the next section.

3 Policy Evaluation Using Synthetic Controls

Comparative case studies are commonly used to estimate the effects of policy interventions. They consist of comparing the evolution of the variables under scrutiny in the case of one agent affected by the policy ('treated') with the evolution of the same variables in one or more unaffected agents ('controls'). The idea is to use the latter to proxy for the outcome that would have taken place for the treated unit in the absence of the treatment. The main difficulties when applying this approach are: (i) how to choose the units of comparison and (ii) uncertainty about the ability of the controls to reproduce the counterfactual situation of interest.

Abadie and Gardeazábal (2003) propose an appealing data-driven procedure to build a control group for the study of policies implemented at country level. Their main idea is that a combination of countries is expected to provide a better counterfactual for the treated country than a single one. This synthetic control is constructed as the weighted average of the available control units that best approximate the relevant characteristics of the treated unit before the intervention. Post-intervention outcomes are then used to estimate the counterfactual situation. In the rest of this section, the model used by Abadie *et al.* (2010) to explain the applicability of synthetic controls in comparative case studies is briefly described, along with its empirical implementation.

Assume that we have information about $J + 1$ ($i = 1, \ldots, J + 1$) countries during T time periods. The first ($i = 1$) is the one to which the intervention analyzed has been applied at a certain date T_0 ($1 \leq T_0 < T$). Thus, we have J countries that can be labeled as potential controls and comprise the 'donor pool'.

Let Y_{it}^N be the variable of interest observed in the absence of the policy intervention for country i at period t and Y_{1t}^I its corresponding values for the treated country during the implementation period ($t \in \{T_0 + 1, \ldots, T\}$). Assuming that the intervention has no effect before its implementation, $\alpha_{1t} = Y_{1t}^I - Y_{1t}^N$ is the effect of the policy in the treated country. This allows us to express the observed outcome Y_{it} for country i in period t as:

$$Y_{it} = Y_{it}^N + \alpha_{it} D_{it} \tag{1}$$

$$D_{it} = \begin{cases} 1 & \text{if } i = 1 \quad \text{and} \quad t > T_0 \\ 0 & \text{otherwise} \end{cases}$$

We want to estimate $\alpha_{1t} = Y_{1t} - Y_{1t}^N$, which is equivalent to estimating Y_{1t}^N. Abadie *et al.* (2010) specify a factor model to propose

$\hat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}$ as an estimator for α_{1t} ($t \in \{T_0 + 1, \ldots, T\}$), where w_j^* denotes the jth element of a $(J \times 1)$ vector W^* of weights. Therefore, an estimation of the counterfactual situation for the treated country in the post-intervention period is obtained as a linear combination of the outcomes in the potential controls:

$$\hat{Y}_{1t}^N = \sum_{j=2}^{J+1} w_j^* Y_{jt} \qquad t \in \{T_0 + 1, \ldots, T\} \tag{2}$$

This estimator will be unbiased if W^* is obtained by solving the following optimization problem:

$$\min_W \|X_1 - \chi_0 W\|_V = \sqrt{(X_1 - \chi_0 W)' V (X_1 - \chi_0 W)} \tag{3}$$

subject to the following constraints on the weights:

$$w_j^* \geq 0 \qquad \text{for} \qquad j = 2, \ldots, J+1 \tag{4}$$

$$w_2^* + \ldots + w_{J+1}^* = 1$$

where:

$$X_1 = (Z_1, \bar{Y}_1^1, \ldots, \bar{Y}_1^M)' \tag{5}$$

$$\chi_0 = (X_2, X_3, \ldots, X_{J+1}) \qquad X_i = (Z_i, \bar{Y}_i^1, \ldots, \bar{Y}_i^M)' \qquad i = 2, \ldots, J+1$$

$$\sum_{j=2}^{J+1} w_j^* \bar{Y}_j^1 = \bar{Y}_1^1, \ldots, \sum_{j=2}^{J+1} w_j^* \bar{Y}_j^M = \bar{Y}_1^M \qquad \text{and} \qquad \sum_{j=2}^{J+1} w_j^* Z_j = Z_1$$

For a given country i, Z_i is a $(1 \times r)$ vector of observed explanatory factors. X_1 is a $(k \times 1)$ vector of pre-intervention ($\mathbf{t < T_0}$) characteristics in the treated country, x_0 its equivalent $(k \times J)$ matrix for the potential controls and $\bar{Y}_i^1, \ldots, \bar{Y}_i^M$ are M linear functions of the outcomes before the policy was implemented in a given country i satisfying $M \geq F$ in expression (3).

V is a diagonal, positive and semi-definite $(k \times k)$ matrix determined by the predictive power of the explanatory variables during the pre-intervention period. In the application below,[5] we assume the presence of a single unobserved common factor with different effects in each country and that the linear function of the pre-intervention outcomes in (5) is the simple average ($M = F = 1$).

In other words, W^* is chosen such that the resulting synthetic control is the best approximation to the unit exposed to the policy under evaluation with respect to the explanatory variables and outcomes before the intervention. V is

[5]This methodology has been applied in the subsequent analysis using the Stata version of the related software provided by Jens Hainmueller on his homepage.

introduced to allow for different weights for the characteristics. This matrix has been chosen through the minimization of the mean squared prediction error in the 2 years previous to the policy intervention. Proceeding in this way, we will obtain a more feasible magnitude for its effect. Conditional on V, the matrix W has been chosen using a fully nested optimization procedure that searches among all (diagonal) positive semi-definite V-matrices and sets of W-weights for the best fit convex combination of the control units. Three different starting points for V have been considered in order to avoid local minima in the parameter space: equal weighted, regression based and determined by maximum likelihood.

A justification of the variables included in the vector of observed explanatory factors (Z_i) for the foreign population as a percentage of the total population in a given country (Y_i) will be introduced in the following section.

4 The Effects of the Spanish Regularization Program of 2005 on the Stock of Immigrants

4.1 The Determinants of Immigration

The data used in this paper have been primarily extracted from Eurostat, in particular, from the national accounts, population and social conditions indicators and, as mentioned in Section 2, the EU-LFS. The variable to be studied in our empirical analysis is the foreign population as a percentage of the total population of a given country during the period 2001–2008. In principle, the potential controls are those EU member countries that did not carry out a regularization program after 2001. For this reason, Italy does not enter our donor pool. There is a missing value in the information regarding the number of foreigners in Ireland. Nonetheless, its time series allows us to interpolate the missing observation. As a result, there are 13 potential control countries that could build the synthetic counterfactual.

In the pioneering model for the economic analysis of migration proposed by Harris and Todaro (1970), expected wage was the determinant of migration. In addition, Hooghe *et al.* (2008) conclude that migration reacts to economic incentives, especially those related to the labor market. Following these studies, the compensation of employees as a percentage of gross domestic product (GDP) has been introduced as an explanatory variable in order to proxy for the wage level in a given country. The employment rate for the population between 15 and 64 years has also been introduced as a measure of labor market size (Juarez, 2000). Furthermore, real GDP per capita and expenditure on social protection per inhabitant has been included in order to reflect the standard of living in a given country. Both variables are expressed in PPP and in real terms. The economic structure is reflected by the consideration of the shares of gross value added in agriculture, industry and construction over all branches (He and Gober, 2003). The population density

Table 1
Weights Assigned to Selected European Union Countries in Order to Construct the Spanish Synthetic Foreign Percentage of Population

Belgium	*Denmark*	*Germany*	*Greece*	*Ireland*	*France*	*Luxembourg*
0.00	0.00	0.00	**0.28**	**0.71**	0.00	**0.01**
Netherlands	Austria	Portugal	Finland	Sweden	UK	RMSPE
0.00	0.00	**0.00**	0.00	0.00	0.00	**0.67**

Note: RMSPE is the root mean squared prediction error in 2001–2004.

(McConnell, 2008) and the values of the foreign percentage of population in the pre-intervention period have been introduced to control for demography and to consider networks (Zavodny, 1997). Finally, the shortest estimated travel distance[6] of the capital of a given country from the capital of a country on the southern border has also been included as a determinant of the foreign percentage of the population.

4.2 Results from the Synthetic Control Method

An estimation of the foreign population as a percentage of the total population that would have existed in Spain, if the regularization program of 2005 had not been implemented, can be obtained through the application of the synthetic control method described in Section 3. The results obtained are presented below.

Weights assigned to each country in the EU donor pool when constructing the synthetic foreign percentage of the population in Spain are shown in Table 1. The counterfactual situation that best resembles the observed evolution of this variable before 2005 is built as a linear combination of the percentages in three countries. The highest weight corresponds to Ireland (0.71), with the other two countries from which the synthetic Spanish foreign percentage has been constructed being Greece (0.28) and Luxembourg (0.01).

The intuition of these weights can be inferred from Table 2, where the mean values of both the foreign population and its determinants in Spain and the countries that comprise its synthetic control are reported. The high percentage assigned to Ireland is due to its similarity in terms of the average foreign percentage of population. This is also determined by the similar evolutions followed (see Fig. 1). Another relevant analogy between these two countries is the high weight of the construction sector in the economy during this period. In comparison with Spain, Greece is also a southern country that has a similar economic structure, employment rate and population density. Moreover, its social protection expenditures and geographical conditions favoring migrations are also comparable. The case of Luxembourg seems

[6]http://www.mapcrow.info

TABLE 2
MEAN VALUES FOR THE FOREIGN PERCENTAGE OF POPULATION AND ITS DETERMINANTS IN SPAIN AND THE COUNTRIES THAT CONFORM TO ITS SYNTHETIC CONTROL, 2001–2008

	Spain	*Greece*	*Ireland*	*Luxembourg*
Foreign population	7.14	4.92	7.65	39.43
Real gross domestic product (GDP) per capita	22825	20712.50	31725	56500
GDP share of agriculture	3.46	4.92	2.25	0.52
GDP share of industry	18.51	13.29	27.62	10.79
GDP share of construction	10.80	7.01	8.87	6.20
Compensation of employees	47.92	34.41	40.45	46.82
Social protection expenditure	4214.19	4143.53	6555.32	13648.28
Employment rate	61.90	59.54	67.00	63.25
Population density	85.79	84.69	60.64	179.02
Distance to southern border	0	0	1452	989

Source: Eurostat.

paradoxical due to the fact that neither real GDP per capita nor economic structure is similar. Although with a low weight, this country forms part of the synthetic control due to its high foreign percentage of population.

The rest of the countries in the donor pool have a zero weight as the paths followed by their foreign percentages of population are very different from those experienced by Spain. In particular, there was a stagnation of the foreign percentage of population, or a decrease, in the case of the Netherlands or Sweden. The United Kingdom also experienced an increase in the foreign percentage of population, but the rest of the variables are dramatically different: much higher GDP per capita and employment rate, and lower weight of the agriculture and construction sectors.

The suitability of the applied technique in this context can be inferred from Table 3, where average values of the determinants of immigration in the pretreatment period in Spain, and its synthetic EU counterpart, are shown in the second and third columns, respectively. It can be observed that the synthetic control has mean values for the explanatory variables relatively close to those in Spain. This is especially true with regard to the sectoral structure of the economy and the rate of employment.

The main results obtained from the synthetic control approach are shown in Fig. 2, where the evolution of the observed values for the foreign percentage of population in Spain and those corresponding to its synthetic counterpart are plotted. The percentage experienced a clear upward trend in the period analyzed with a steady slope during the whole sample period. The estimated values for the synthetic Spain have also followed an upward trend, although less pronounced before 2004.

The greatest negative difference between the observed number of foreigners as a percentage of the total population in Spain, and that percentage for the synthetic control, is in the years 2001 and 2004. Nevertheless, and in order for our analysis to be valid, it must be assumed that this difference is

TABLE 3
MEAN VALUES FOR THE DETERMINANTS OF THE FOREIGN PERCENTAGE OF POPULATION IN SPAIN AND ITS SYNTHETIC CONTROL IN THE PRE-INTERVENTION PERIOD, 2001–2004

	Spain	*Synthetic Spain from European Union countries*
Foreign population (2001)	2.86	3.79
Foreign population (2002)	4.32	4.42
Foreign population (2003)	5.53	5.42
Foreign population (2004)	6.51	5.56
Real gross domestic product (GDP) per capita	20700	25789.65
GDP share of agriculture	3.98	3.55
GDP share of industry	19.32	25.55
GDP share of construction	9.70	7.82
Compensation of employees	48.50	37.72
Social protection expenditure	3951.17	5238.47
Employment rate	59.30	63.36
Population density	82.65	65.93
Distance to southern border	0	1031.58

Source: Eurostat.

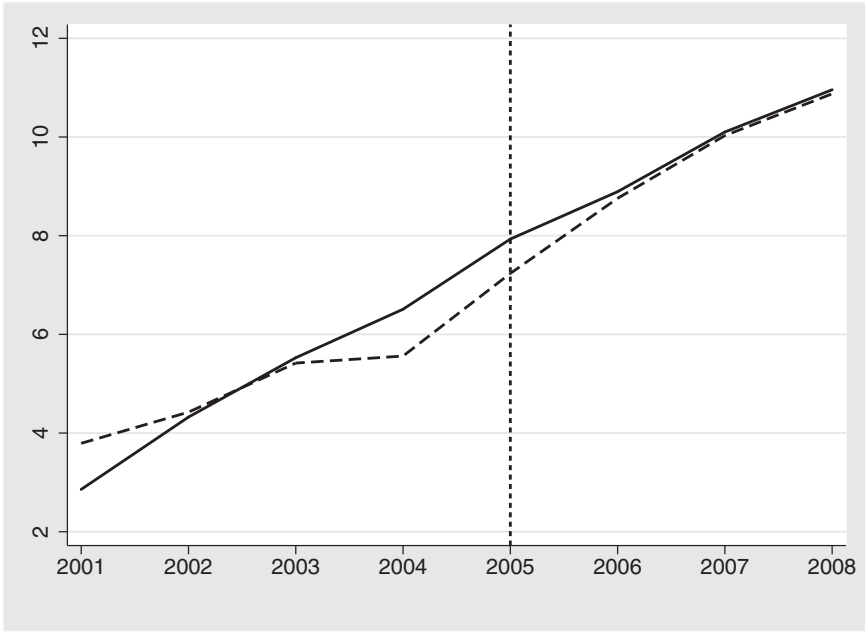

FIG. 2. Foreign Percentage of Population in Spain (Solid) and Synthetic Control Constructed from Selected European Union Countries (Dashed)

not a consequence of the regularization carried out in 2001, which affected 240,000 immigrants. This assumption is reasonable since the 2001 regularization had no significant effect on the trend that began in 1999 and led the foreign population in Spain to a level and pattern corresponding to a country with similar socioeconomic characteristics.[7] In addition, there are no significant differences between the evolution of Spain and its synthetic control after 2004, leading us to conclude that the regularization program of 2005 did not generate a magnet effect after its implementation.

4.3 Assessing the Significance of the Estimated Effect

When working with aggregate data, comparative case studies do not always ensure that the control group is able to reproduce the counterfactual situation, although there are several alternatives for assessing the significance of the estimated effect in the previous subsection.

The first was proposed by Abadie *et al.* (2010) to make exact inferences about the estimated policy effects. Its main virtue is that it does not depend on the number of potential controls and time periods nor on the type of data analyzed. Instead, the method relies on classical permutation tests and consists of applying the synthetic control method to each of the potential controls as if they were exposed to the policy intervention; these were denoted 'placebo' exercises by Abadie and Gardeazábal (2003). The idea is to compare the estimated effect for the treated unit with those of each of the potential controls. This comparison tells us the magnitude (great or small) of the estimated effect for the treated unit, and it allows us to assess the size of the estimated effect for the policy intervention, relative to the effects estimated for a nontreated unit chosen at random.

Following this suggestion, the synthetic control method has been applied to the 13 EU countries in our donor pool.[8] The evolution of the gaps between the observed foreign percentage of the population in all the countries analyzed and their synthetic counterparts during the whole sample period is plotted in Fig. 3. It can be seen that the difference between the observed and the counterfactual situations for Spain is negative during the first year of the pre-intervention period. Although the gap is positive in 2004, it dramatically decreases toward zero in the following year and it is maintained in most of the post-intervention period.

In addition to the placebo exercises carried out earlier, the significance of the differences between the observed series for the country studied and its synthetic control can be statistically tested, following the proposal in Sanso-Navarro (2011), using the matched-pair signed-rank test of Wilcoxon (1945). This non-parametric test, which is applied to two related samples, is

[7]These results are available from the authors upon request.

[8]Details of the results derived from this analysis, similar to those reported in Tables 1 and 3, are available from the authors upon request.

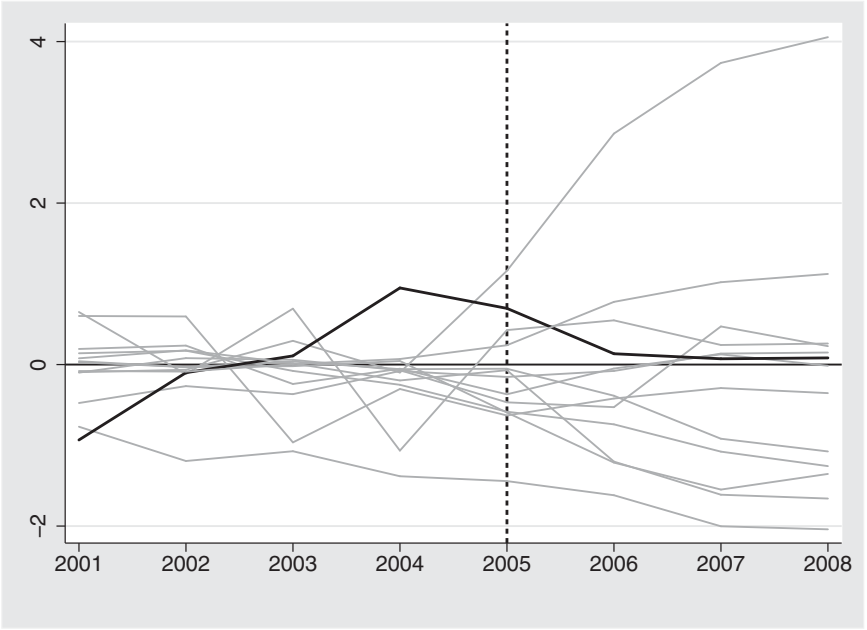

FIG. 3. Foreign Percentage of Population. Observed Minus Synthetic Gaps. Spain (Black) and Selected European Union Countries (Light Grey)

TABLE 4
WILCOXON MATCHED-PAIR SIGNED-RANK TEST

Number of observations						
Positive	Negative	Total	W^+	W^-	Test statistic	(*p*-value)
4	0	4	10	0	1.83	(0.07)

Note: Differences between the observed foreign percentage of population in Spain and its synthetic control.

often used to compare the data collected before and after an experimental manipulation. It is an alternative to the paired Student's *t*-test when the data cannot be assumed to be normally distributed. Under the null hypothesis, the median of the differences is expected to be zero. In our context, rather than comparing individuals, the observational units will be time periods.

Results obtained from the comparison of the observed values for foreigners as a percentage of the total population in Spain, and those predicted by the synthetic control method, are shown in Table 4. Considering the whole post-intervention period, the null hypothesis cannot be rejected at the 5% significance level even when the differences are of the same sign, due to their low magnitude. Jointly with the previous analysis, this result reinforces the estimated effect obtained in the previous subsection from a statistical point of

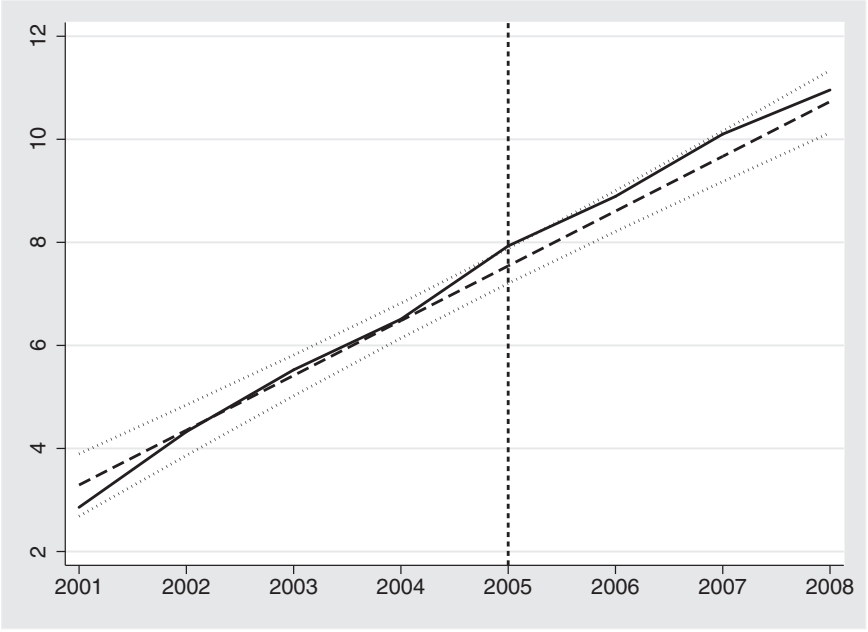

FIG. 4. Foreign Percentage of Population in Spain and Fitted Trend for the Synthetic Control Constructed from Selected European Union Countries (Dashed, 95% Confidence Bands Reported)

view. Thus, it could be stated that the values predicted by the synthetic control for the foreign percentage of the population in Spain are no different from those actually observed after the regularization program in 2005.

Another alternative for analyzing the statistical (lack of) significance of the estimated effect of the policy under scrutiny is to compare the observed values of the foreign percentage of the population with those estimated for a linear trend of the synthetic control. These results are plotted in Fig. 4 with two bands, representing the 95% confidence interval for the fitted trend. The observed flows are systematically within the confidence bands for the years 2001–2008 and, hence, we can conclude that the observed values do not diverge from the estimated trend and that they fall within the confidence bands.

Summarizing the results presented throughout this subsection corroborate the robustness and significance of our results regarding the absence of an effect of the regularization program of 2005 on the foreign percentage of the population in Spain in the following years.

5 Concluding Remarks

The effects that regularization programs have on the stock of immigrants have been theoretically established in the literature. Nonetheless, little effort

has been made to empirically establish this link. We have set out to contribute further to this strand of the literature by analyzing the case of Spain, an important country in this respect because it has implemented the largest number of such exceptional measures. We have focused on the amnesty that took place in 2005 and legalized more irregular workers than any of the preceding programs.

Our analysis has been carried out through a comparative case study and the use of a synthetic control method that is suitable for policy evaluations at the country level. Our results suggest that the pre-intervention period presents a significant growth in the foreign percentage of the population. In the post-intervention period, there are no significant differences with this past trend and, more importantly, between the observed data and the estimated value for the synthetic control. Hence, the increase of the foreign population in Spain in the period analyzed is the result of a catching-up process, rather than of a magnet effect arising from the 2005 regularization program.

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