The effects on Foreign Direct Investment of the United Kingdom decision not to adopt the Euro

Marcos Sanso-Navarro*
Universidad de Zaragoza

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Abstract

The decision of the United Kingdom not to join the Euro can be understood as a policy intervention in a single country within the European Union. We obtain robust evidence of a significant cost derived from this decision in terms of inward Foreign Direct Investment by applying a synthetic control method for policy evaluation.

Keywords: UK and EMU, Policy Evaluation, Comparative Case Studies, Foreign Direct Investment.

JEL codes: C49, E52, E65, F02, F21.

1 Introduction.

Five economic tests were conducted by the authorities of the United Kingdom (UK) in order to decide whether to adopt the European single currency. One of them was concerned with to what extent inward Foreign Direct Investment (FDI) could be affected by staying out of the European Monetary Union (EMU). This is specially relevant for the UK since it receives higher FDI flows as a percentage of GDP than the larger Euro Area economies (HM Treasury (2003)), a great proportion of them coming from outside Europe. In line with the "Export-Platform" FDI patterns[1], not joining the Third Stage of the EMU should have influenced investors looking for a gateway to Europe.

*Contact details. Address: Departamento de Análisis Económico. Facultad de Ciencias Económicas y Empresariales. Gran Vía, 2. 50005, Zaragoza (Spain). Tel: (34) 9761000 Ext. 4653. Fax: (34) 9761996. e-mail: marcossn@unizar.es. Homepage: http://www.dae.unizar.es/marcossn/index.html.

[1]See Bergstrand and Egger (2007), Blonigen et al. (2007) and Ekholm et al. (2007).

The first studies about the consequences of staying out of the Euro on the investment received by the UK were not conclusive enough, mainly because of the lack of data (Barr et al. (2003) and HM Treasury (2003))[2]. We contribute to this literature by quantifying this effect with a comparative case study. Since this decision can be understood as a policy intervention in a single country within the European Union (EU), we use the synthetic control method of Abadie and Gardeazábal (2003) and Abadie et al. (2007), designed for policy evaluation.

2 Comparative case studies using synthetic controls.

The method proposed by Abadie and Gardeazábal (2003) is an appealing data-driven procedure to build a control group for the study of policies implemented at country level. A combination of countries is expected to provide a better counterfactual for the treated country than a single one.

Assume that we have information about one country ($i = 1$), exposed to a certain policy intervention at a date T_0, corresponding to T time periods ($1 \leq T_0 < T$). Furthermore, we also observe data for J different non-affected countries ($i = 2, ..., J+1$). With no intervention, our variable of interest for country i and period t is given by $Y_{it}^N = \delta_t + v_{it}$ ($i = 1, ..., J+1$; $t = 1, ..., T$). δ_t is a time period effect common to all countries and v_{it} is assumed to have zero mean.

Let $\alpha_{1t} = Y_{1t}^I - Y_{1t}^N$ be the policy effect in the treated country during its implementation ($t \in \{T_0 + 1, ..., T\}$). Therefore, the observed outcome for a given country i at a certain time period t is given by:

$$Y_{it} = \delta_t + \alpha_{it} D_{it} + v_{it} \tag{1}$$

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

Abadie et al. (2007) specify a factor model for v_{it}:

$$v_{it} = Z_i \theta_t + \lambda_t \mu_i + \varepsilon_{it} \tag{2}$$

where:

[2]Papers establishing the positive effects of the EMU on FDI for its member countries have recently appeared due to better available information (De Sousa and Lochard (2006), Petroulas (2007) and Schiavo (2007)).

Z_i is a (1xr) vector of observed covariates not affected by the intervention

θ_t is an (rx1) vector of unknown parameters

μ_i is an unobserved unit-specific effect[3]

and λ_t is an unknown common factor

This structure is used to demonstrate that $\hat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}$ is an unbiased estimator of α_{1t} for $t \in \{T_0 + 1, ..., T\}$. w_j^* denotes the $j-th$ element of a (Jx1) vector W^*, composed of optimal weights that solve the following optimization problem:

$$\begin{aligned} \min \ \ \|X_1 - X_o W\| &= \sqrt{(X_1 - X_o W)' V (X_1 - X_o W)} \\ \text{subject to} \qquad w_j &\geq 0; \quad \sum w_j = 1; \quad j = 2, ..., J+1 \end{aligned} \tag{3}$$

$X_1 = (Z_1, \bar{Y}_1^{T_0})$ is an (($r+1$)x1) vector of pre-intervention characteristics referring to the country affected by the policy, where $\bar{Y}_1^{T_0} = \frac{1}{T_0} \sum_{s=1}^{T_0} Y_{1s}$ is the simple average of the outcome before the treatment. X_0 refers to its equivalent (($r+1$)xJ) matrix for the potential controls.

Note that V is an (($r+1$)x($r+1$)) diagonal matrix with non-negative components that determine the relative importance of the explanatory variables. Thus, it can be concluded that $W^* = (w_{2,}^*..., w_{J+1}^*)'$ depends on V. The most reasonable way of selecting the latter is such that the resulting synthetic control best resembles the treated country in terms of the variable of interest before the intervention. This can be done by the minimization of the Mean Squared Prediction Error[4].

3 The empirical approach to FDI determination. Data description.

There exists evidence that FDI tends to be horizontal[5] and between industrialized countries. A recent survey of the empirical literature dealing with the factors that drive FDI can be found in Blonigen (2005). Among other relevant conclusions, he establishes

[3]Both Z_i and μ_i are assumed to have zero mean.

[4]This method has been implemented using the Synth Stata package (version 0.0-5) downloaded from Jen Hainmueller's homepage (http://www.people.fas.harvard.edu/~jhainm/software.htm). A file with the dataset used in this paper will be made available on the web.

[5]Development of the same production process at different locations.

that a gravity specification fits FDI cross-sectional data quite well. Therefore, we are apply the method described in the previous section within the framework of a gravity specification to quantify the consequences for the UK of not adopting the Euro in terms of US inward investment.

FDI stocks will be analyzed instead FDI flows because they are more reliable and give a better indication of the long-term cumulative position. They will be proxied using the sales of US affiliates in a given country[6], expressed in terms of its GDP, for the period 1986-2004. Initially, the countries used as potential members of the synthetic control are those belonging to the EU in 1986 that later joined the Third Stage of the EMU in 1999[7].

Following the gravity empirical approach to FDI determination, we have used GDP per capita of the host country as an explanatory variable that reflects its market potential. It contains information about both production and population size and is assumed to be less affected by the EMU than GDP. Note that we are not working with data referring to the home country because it is the same in all cases. Although geographical distance is usually introduced as a predictor, this will only be done here when the OECD countries form the control group. This is because it is preferable to focus on the other predictors rather than including an additional time-invariant one of a similar magnitude.

Other commonly used explanatory variables have also been included: openness, manufacturing unit labor costs and educational attainment. Since there is a recent trend of using third country effects as a determinant of FDI, we have also considered a Surrounding Market Potential measure as a predictor. It has been calculated as a distance-weighted sum of the per capita GDP for all the other OECD countries.

Data sources and additional details are included in Table 1.

[Insert Table 1 about here]

4 Results.

The synthetic control that best resembles the evolution of US affiliate sales over GDP in the UK before the start of the Third Stage of the EMU is made up of four countries. The weights assigned to each country belonging to the control group are found in the

[6] This variable has also been used in Baltagi et al. (2007), Blonigen et al. (2007) and Ekholm et al. (2007), among others.

[7] The exception is Luxembourg for which educational data is not available.

second column of Table 2. Not surprisingly, the highest corresponds to Germany (0.48). The other three countries from which the synthetic UK has been constructed are the Netherlands (0.21), Ireland (0.19) and Italy (0.11).

[Insert Tables 2 and 3 about here]

Several indications of the suitability of applying this method to this context are found. In the second and third columns of Table 3, average values of the FDI determinants during the years before 1999 are shown for the UK and its EMU synthetic counterpart. Apart from openness, the synthetic control has mean values for the explanatory variables relatively close to those in the UK during the period 1986-1998, especially with regard to GDP per capita and education. Moreover, it can also be observed in Figure 1 that our measure of inward FDI stock in the synthetic control follows a similar path to that of the UK until 2000, when a clearly divergent pattern appears.

[Insert Figure 1 about here]

In 2004, US affiliate sales in the UK were 29.16% of the GDP, while the figure corresponding to its synthetic control is 38.18%. This is equivalent to saying that our FDI measure would have been 602,598.55 million (2000) US dollars instead of the observed 460,250.44, 30% greater, if the UK had adopted the Euro. Therefore, it can be concluded that the decision not to join the Third Stage of the EMU has had an important effect on US inward investment in the UK compared to those 1986 EU members that joined the European single currency.

In order to check the robustness of this estimated impact, we implement two different "placebo" exercises. The first consists of applying the synthetic method to the eight EMU countries previously used as potential controls, as if each of them had decided not to join the Euro in 1999. The resulting gaps between the observed magnitude of our variable of interest and that corresponding to the data-driven constructed controls for the nine EU countries analyzed are shown in Figure 2. It can be observed that the UK is the only case for which a clear increasing negative gap is obtained after the Euro began to function and that ends the sample period with a significant adverse effect.

[Insert Figures 2 and 3 about here]

Results for the German "placebo" study are detailed in the third column of Table 2 and in Figure 3. Apart from being the biggest economy of the Eurozone, its relevance here derives from the fact that it received the highest weight in the synthetic UK. Again, the performance of the data-driven procedure that selects the countries belonging to the control group and the empirical specification is seen to be adequate. France receives most of the weight (0.89) to replicate US inward investment into Germany. The other two countries used are the Netherlands (0.08) and Belgium (0.03). It can be appreciated in Figure 3 that a small difference between the actual German inward FDI series and that constructed by the estimation method appears after 1996 and remains approximately constant until 2004. Although the aggregate analyzed follows a more irregular path for Germany, it must be emphasized that the synthetic method is able to reproduce it.

The second "placebo" study has been carried out using some OECD countries that do not belong to the EU as potential controls[8]. The evolution of FDI activity for the UK and its OECD synthetic approximation[9] is shown in Figure 4. In this case, the approximation until 1999 is not as accurate as the two previous cases. However, no divergent pattern is found after this date. This corroborates the robustness of our central result since we cannot find any difference between the behavior of the UK after the start of the EMU and that of the control constructed using countries unconnected with it.

[Insert Figure 4 about here]

5 Concluding remarks.

Our results suggest that, five years after the Third Stage of EMU started, our measure of inward FDI stock in the UK is 24% less than if this country had adopted the Euro. In other words, US affiliate sales would be around 30% higher in the case of EMU membership. The robustness of this estimated effect has been checked by "placebo" exercises using both EMU members and OECD countries.

Analyzing the other EU countries that did not join the Euro is difficult. In the case of Denmark, this is because of data limitations for the FDI measure in the years 1998-2000 and 2002. As well as a lack of some information, the Swedish case is more cumbersome

[8] Czeck Republic, Hungary, Iceland, Poland, Slovak Republic and Switzerland do not enter the potential OECD control group due to data limitations.

[9] The weights given to the control countries are found in the last two columns of Table 2.

since this country joined the EU in 1995. So, the policy evaluation could reflect both the effects of their adhesion and the consequences of not joining the European single currency.

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Table 1: Data description.

Variable	**Source**	**Details**
Foreign Affiliate Sales	US Bureau of Economic Analysis	Expressed in millions of US Dollars. Deflated using a chain-type investment price index (see below). Missing data points interpolated using TRAMO/SEATS.
Investment Price Index	Economic Report of the President	Non-residential fixed investment. Chain-type. 2000=100.
Gross Domestic Product	World Bank's World Development Indicators	Constant 2000 US Dollars.
Gross Domestic Product per capita	World Bank's World Development Indicators	Constant 2000 US Dollars, PPP converted.
Distance with the US	Centre d'Etudes, Prospectives et d'Informations Internationales	Geodesic distances calculated following the great circle formula. Use coordinates of the most important cities.
Openness	Penn World Table 6.2.	Total trade (Exports plus Imports) divided by GDP.
Manufacturing Unit Labor Costs	OECD Main Economic Indicators	Trend, quarterly benchmarked series. 2000=100.
Educational Attainment	Barro and Lee (2000)	Average years of schooling for those over 25. Frequency is 5 years. For that reason, the value for a given year is also used in the following four.

Table 2: Weights assigned to the each country in order to construct the synthetic control. Euro effects on US Foreign Affiliate Sales over GDP.

Control Countries	**EU 1986 / EMU 1999**			**OECD**
Country Analyzed	**UK**	**GER**		**UK**
RMSPE	0.01	0.00		0.02
Weights Assigned				
BEL	0	0.03	**AUS**	0
FRA	0	0.89	**CAN**	0.49
GER	0.48	—	**JAP**	0.28
IRE	0.19	0	**KOR**	0.04
ITA	0.11	0	**MEX**	0
NLD	0.21	0.08	**NWZ**	0
PRT	0	0	**NOR**	0
SPA	0	0	**TUR**	0.19

Table 3: Mean values of the US Foreign Affiliate Sales predictors for the UK and its synthetic counterparts before the Third Stage of EMU (1986 - 1998).

	UK	**EU 1986/ EMU 1999**	**OECD**
GDP per capita	21141.34	21207.47	19402.84
Education	8.74	8.72	8.88
Openness	44.01	69.67	43.81
Manufacturing Unit Labour Costs	87.27	99.47	86.29
Surrounding Market Potential	548.39	639.00	104.71
Distance with the US	5570.16	—	5325.79

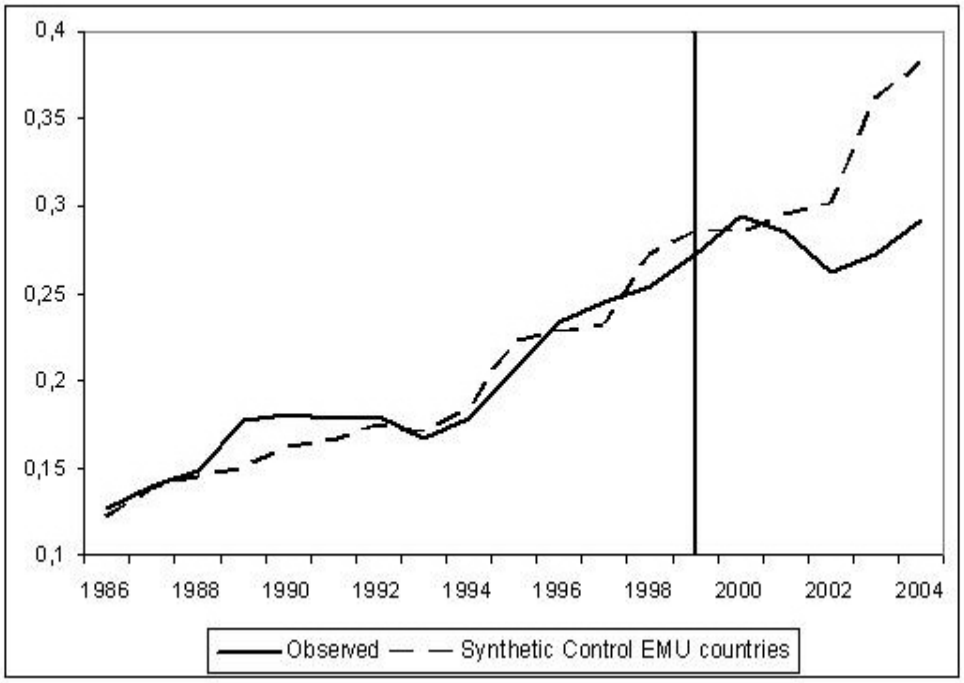

Figure 1: US affiliate sales over GDP in the UK.

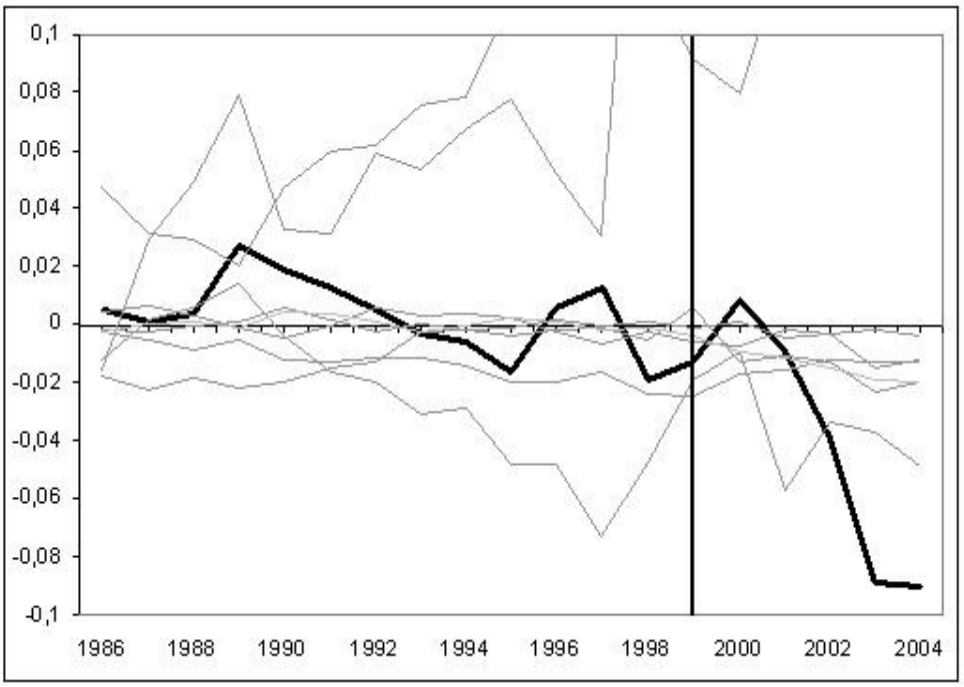

Figure 2: US affiliate sales over GDP gaps (observed minus synthetic counterpart) for the UK (black line) and its eight potential EMU countries controls (grey lines).

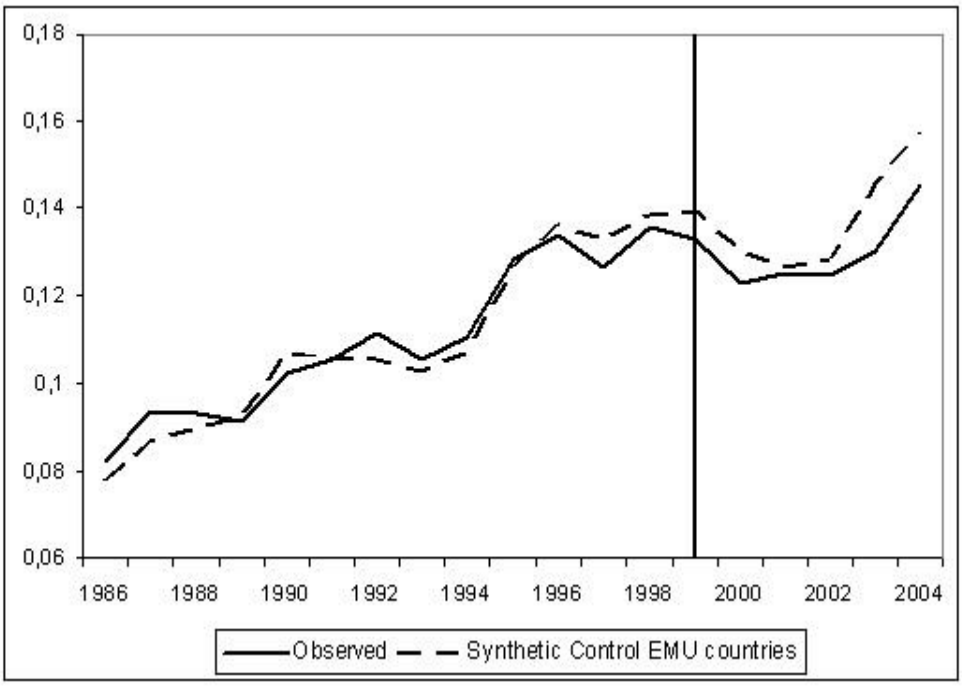

Figure 3: US affiliate sales over GDP in Germany.

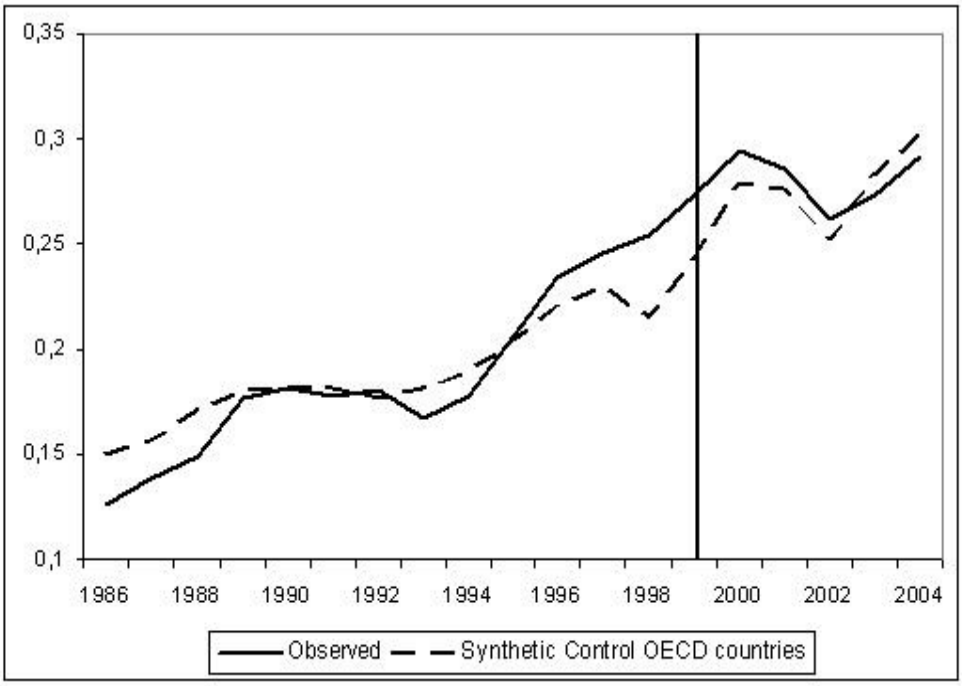

Figure 4: US affiliate sales over GDP in the UK.