ASSESSING THE IMPACT OF FOREIGN DIRECT INVESTMENT ON REGIONAL GROWTH: AN ANALYSIS OF THE SPANISH CASE[*]

Oscar Bajo-Rubio
(Universidad de Castilla-La Mancha and Instituto de Estudios Fiscales)

Carmen Díaz-Roldán
(Universidad de Castilla-La Mancha)

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Abstract

The massive increase in foreign direct investment (FDI) inflows following the Spanish integration with the now European Union (EU) in 1986, has been one of the most important features shaping the behaviour of the Spanish economy in the last twenty years. In this paper we will try to assess the impact of FDI on regional economic growth following Spain's entry into the EU, using data for the 17 Spanish regions. To that end, we will estimate an aggregate production function augmented with FDI inflows.

Key words: Economic growth, Foreign direct investment, Regions

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Address for correspondence:
Facultad de Derecho y CC. Sociales
Universidad de Castilla-La Mancha
Ronda de Toledo, s/n
13071 Ciudad Real (Spain)
E-mail: oscar.bajo@uclm.es, carmen.diazroldan@uclm.es

1. Introduction

Foreign direct investment (FDI henceforth) has played in last years an increasing role as a way of internationalization of the economic activity, registering higher growth rates than both world trade and output.

On the other hand, FDI has been a crucial factor in the process of intense growth enjoyed by the Spanish economy since the beginning of the sixties. Even more, the massive increase in FDI inflows following the Spanish integration with the now European Union (EU) in 1986, coupled with the prospects about the completion of the Single European Market by 1992, has been one of the most important features shaping the behaviour of the Spanish economy in the last twenty years. An overview of FDI trends during this period can be found in Bajo-Rubio and Torres (2001).

In last years, several studies on the main features of the FDI received by the Spanish economy have appeared. From a long-term perspective, the macroeconomic factors behind FDI inflows received between 1964 and 1989 were analyzed in Bajo-Rubio and Sosvilla-Rivero (1994); and the sectoral allocation of FDI in manufacturing between 1986 and 1992 (the period where the affluence of FDI was more intense) was examined in Bajo-Rubio and López-Pueyo (2002). The role of FDI in fostering the favourable effects of the European Single Market was stressed in Sosvilla-Rivero and Herce (1998). However, despite the importance of FDI in the Spanish economy, their regional aspects have been hardly explored. Some exceptions are Egea-Román and López-Pueyo (1991), Fernández-Otheo (2000), and Pelegrín-Solé (2002), where the focus is on the description of regional FDI trends in Spain and their explanatory factors, but without analyzing growth effects.

In this paper we will try to assess the impact of FDI on regional economic growth following Spain's entry into the EU, using data for the 17 Spanish regions. To that end, we will estimate an aggregate production function augmented with FDI inflows, acting as a proxy of technological externalities. In addition to the additional insight that this exercise might provide on the role of FDI in the Spanish economy, the Spanish case might be also a relevant case study. Spain can be considered a medium-size economy, given the size of her main macroeconomic variables, which has

experienced a process of rapid growth in the last forty years, starting from a relatively weak position as compared to the rest of Western European countries. This has been particularly true after her accession to the EU in 1986, allowing her an even deeper integration with other more advanced economies, so Spain has been able to join the Economic and Monetary Union from its start. In sum, the Spanish experience could be of interest for other medium-size economies expected to follow a process of integration with other relatively more advanced countries, such as those of Central and Eastern Europe.

The rest of the paper is organized as follows: the theoretical framework is presented in Section 2, and the main empirical results are shown in Section 3; finally, the main conclusions are summarized in Section 4.

2. Theoretical framework

Our starting point will be a simple production function that includes human capital (as in Mankiw, Romer and Weil, 1992), written for simplicity in a Cobb-Douglas form:

$$Y_t = A_t K_t^{\alpha} H_t^{\beta} L_t^{\gamma} \tag{1}$$

where *Y*, *K*, *H*, and *L* denote, respectively, output, physical capital, human capital, and labour; and *A* is an index of the level of technology. Dividing by *L* and taking logs, the above function would become:

$$\log\left(\frac{Y}{L}\right)_t = \log A_t + (\alpha + \beta + \gamma - 1)\log L_t + \alpha \log\left(\frac{K}{L}\right)_t + \beta \log\left(\frac{H}{L}\right)_t \tag{2}$$

where $\alpha + \beta + \gamma$ would indicate the degree of returns to scale for all production factors. The question now would be: how does FDI enter the above equation? The main arguments below are taken from Bajo-Rubio and Díaz-Roldán (2002), who present a survey on the relationship between FDI, productivity growth, and technological innovation, by the multinational enterprise (MNE).

In the standard neoclassical growth model, FDI would be considered as an addition to the capital stock of the host economy (see, e.g., Brems, 1970), so that the effect of foreign capital would be indistinguishable from that of domestic capital. Notice that, in this case, the assumption of diminishing returns to capital would imply that FDI would affect growth only in the short run, i.e., during the transition to the steady-state

growth path. Such a characterization, however, is unsatisfactory given the recent trends in FDI. In fact, the main role of FDI would seem to be that of transferring assets from less efficient to more efficient owners, so that in practice FDI would consist of offsetting two-way flows that would be hardly related to productive investment (Lipsey, 2001). In other words, FDI would be less and less "greenfield", i.e., that FDI devoted to enlarge the production capacity of the host economy.

Endogenous growth models allow for a greater impact of FDI on growth. On the one hand, FDI could lead to externalities on the domestic production factors; the effect on growth, however, would be permanent only if the resulting returns to scale over all factors (i.e., including the externality) turn to be increasing. More importantly, the endogenous growth literature has tried to formalize technological innovation, which would emerge as a response to economic incentives, that is, profit opportunities detected by firms that would be influenced by the institutional, legal, and economic environment in which they act (Grossman and Helpman, 1994). And, in turn, this would lead to stress the role of FDI and, in general, the degree of economic integration, on influencing technological progress and consequently growth rates. So, a higher integration would mean an increase in market size, which would lead to greater incentives to R&D and hence higher growth; and it would facilitate the diffusion of knowledge among countries and avoid duplication of the research activity (Romer, 1990; Grossman and Helpman, 1991). In particular, integration among relatively similar economies would lead to a higher growth rate in the long run, since it would allow the exploitation at the world level of the increasing returns that would exist in the R&D sector (Rivera-Batiz and Romer, 1991).

On the other hand, FDI has acquired in last years an increasing importance as a way of internationalization of economic activity in the industrialized countries, enjoying growth rates remarkably above those of world trade. Indeed, the importance of FDI would not be limited to its spectacular growth in merely quantitative grounds, since it would have performed a crucial role in the diffusion of ideas and innovations across the borders (Romer, 1993). In fact, the possibility to gain access to modern technologies is probably the main reason behind the interest on the side of the less technologically advanced countries to attract FDI. The reason is that MNEs conduct a great part of world R&D, as well as generating and controlling much of the most advanced

production techniques. Still, in order to get a fully satisfactory transmission of such advanced technologies, the host countries should possess a minimum social capability, in the sense of an educated labour force and adequate organizational structures.

The literature has also analyzed extensively the possible presence of spillovers of the MNEs activities, when establishing a subsidiary leads to productivity or efficiency benefits for the host country's local firms, and the MNEs are not able to internalize the full value of these benefits (Blomström and Kokko, 1998). That is, the more evolved production methods, organizational and managerial techniques, marketing activities, and the like, of the MNEs, can be spread over the host country's local firms through several channels such as imitation, the higher competition associated with the presence of the subsidiary, or the mobility of the labour force previously trained and familiar with the more advanced techniques developed by the MNEs (Görg and Greenaway, 2004).

In general, a greater opening to FDI coming from the most advanced countries would lead to an increase in the rate of technological progress in the host country, and hence its rate of growth (Wang, 1990). Indeed, the incentive of a MNE to transfer technology would be inversely related to its perceived operation risks in the host country, which would explain that the average age of technologies transferred to their subsidiaries in developed countries is considerably lower than those transferred to developing countries; and technological transfer via FDI would be positively related to the investment in learning made by the host country's firms (Wang and Blomström, 1992).

According to the above theoretical arguments, we will assume that the level of technology A depends on its initial value, A_0, and the externalities from FDI inflows, in relative terms per employee:

$$A_t = A_0 \left(\frac{FDI}{L} \right)_t^{\theta} \tag{3}$$

Finally, replacing (3) in (2):

$$\log\left(\frac{Y}{L}\right)_t = \log A_0 + (\alpha + \beta + \gamma - 1)\log L_t + \alpha \log\left(\frac{K}{L}\right)_t + \beta \log\left(\frac{H}{L}\right)_t + \theta \log\left(\frac{FDI}{L}\right)_t \quad (4)$$

or, denoting by y, k, h, and *fdi* the logs of *Y/L*, *K/L*, *H/L*, and *FDI/L*, respectively, we get

$$y_t = \log A_0 + (\alpha + \beta + \gamma - 1)\log L_t + \alpha k_t + \beta h_t + \theta fdi_t \quad (5)$$

which will be the equation to be estimated in the next section.

3. Empirical results

Equation (5) has been estimated for the 17 regions (comunidades autónomas) established after the approval of the current Spanish Constitution in 1978, with the sample period running from 1987 (the first year where regional data on FDI are available) to 2000. The data are taken from:

- *Regional Accounts*, elaborated at the Spanish National Institute of Statistics, for Gross Domestic Product;

- Mas *et al*. (2005a) for the capital stock;

- Mas *et al*. (2005b) for employment and human capital;

- *Foreign Investment Registry*, elaborated at the Spanish Ministry of Industry, Tourism and Trade, for gross FDI inflows.

Note that the variable *K* includes both the private and public capital stock, where the public capital embodies only the directly productive items included into the whole government capital stock (i.e., roads, water infrastructures, urban structures, ports, railroads, and airports), hence excluding the non-directly productive items (i.e., education and health); for details, see Mas *et al*. (2005a). The human capital variable has been proxied by the share of the employed population with secondary and university studies. Finally, the variables in real terms are valued at 1986 prices.

The results of the econometric estimation of equation (5) are shown in Table 1, where the method of estimation is Generalized Least Squares. As can be seen in column (1), the coefficient on employment would be negative and significantly different from zero at the usual levels, so that the hypothesis of decreasing returns to scale over all inputs would not be rejected. In addition, both the (private and public) capital stock and the human capital variable show a positive and significant effect on the evolution of output per employee, with estimated elasticities of 0.55 and 0.12, respectively. Finally,

FDI inflows appear with a small and positive coefficient, significantly different from zero at the 7% level.

Table 1: Estimation of a production function for the Spanish regions, 1987-2000

(Dependent variable: y)

	(1)	(2)	(3)	(4)
$\log L$	−0.0368 (0.0012)	−0.0385 (0.0016)	−0.0329 (0.0058)	−0.0356 (0.0047)
k	0.5512 (0.0000)	0.5464 (0.0000)	0.5506 (0.0000)	0.5467 (0.0000)
h	0.1165 (0.0000)	0.1088 (0.0000)	0.1091 (0.0000)	0.1047 (0.0000)
fdi	0.0048 (0.0706)	–	–	–
$h*fdi$	–	0.0033 (0.1662)	–	–
fdi_{MP}	–	–	0.0078 (0.0108)	–
fdi_{LP}	–	–	−0.0001 (0.9746)	–
$(h*fdi)_{MP}$	–	–	–	0.0058 (0.0315)
$(h*fdi)_{LP}$	–	–	–	−0.0011 (0.7071)
R^2	0.9517	0.9529	0.9536	0.9545

Note: p-values in parentheses.

Next, in column (2) we replace FDI inflows by a multiplicative variable, constructed from the human capital and FDI variables (as in Borensztein *et al.*, 1998). This variable would indicate the existence of complementarities between human capital and FDI, so that the favourable effect of FDI on productivity would depend on the availability of some minimal endowments of human capital, which would proxy in turn the capability of the host country to absorb the new technologies. However, its coefficient, although positive, would be significant only at the 17% level.

On the other hand, as noticed by some authors (e.g., Fernández-Otheo, 2000), FDI in Spain would have been mainly located in the most advanced regions. Accordingly, we have divided the whole set of regions into two groups, namely, those enjoying a GDP per employee above and below the Spanish level, on average over the whole period of analysis. This procedure allows us to classify the regions into "richer" and "poorer" or, more precisely, into "more productive" and "less productive", if GDP per employee (that is, average labour productivity) is, respectively, above or below the Spanish average level. According to this criterion, the more productive regions would be Aragón, Baleares, Cantabria, Cataluña, Madrid, Navarra, País Vasco and Rioja; and the less productive regions Andalucía, Asturias, Canarias, Castilla y León, Castilla-La Mancha, Comunidad Valenciana, Extremadura, Galicia and Murcia.

Therefore, we have estimated equation (5) allowing for a different coefficient on FDI for the more productive and the less productive regions, which are denoted by the subscripts *MP* and *LP*, respectively. As can be seen in column (3) of Table 1, the coefficient for the more productive regions would be positive and more clearly significant than in column (1), unlike the coefficient for the less productive regions, which turns to be negative but non significant. Finally, similar results can be found in column (4), when FDI is replaced by the multiplicative variable.

4. Conclusions

In this paper we have tried to assess the impact of FDI on regional economic growth following Spain's entry into the EU, using data for the 17 Spanish regions. To that end, we have estimated an aggregate production function augmented with FDI inflows, acting as a proxy of technological externalities. According to our results, FDI inflows would have had a positive, though moderate, influence on the evolution of labour

productivity, both directly, and through its impact on human capital accumulation. However, when the whole set of regions was split between those with a GDP per employee above and below the Spanish average, the previous result was retained, and with a stronger effect, only for the more productive regions, unlike the less productive ones, for which the influence of FDI turned to be non significant.

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