

# NET FOREIGN RESOURCE INFLOWS, SAVING AND GROWTH: SPAIN (1970-1999)

## Abstract

The empirical evidence concerning the temporal precedence between saving and growth in open economies is mixed. The view that growth appears to cause saving rather than the reverse has found support in several recent studies. In this paper, the saving-growth nexus has been explored for the Spanish economy during the last three decades, a period in which this country experienced an important process of economic globalisation. In this analysis, we use the Granger non-causality test procedure developed by Toda and Yamamoto (1995) and Dolado and Lütkepohl (1996). The results obtained provide evidence in favour of Solow's model prediction that higher saving leads to higher economic growth; an evidence that is even stronger when foreign direct investment is included in the analysis.

*Key words:* Growth; Saving; Foreign Direct Investment; Granger Causality, Spain.

*JEL Classification:* F21; F43

## 1. Introduction

The existence of a positive association between saving and growth is a robust empirical finding (see, for example, Modigliani, 1970 and Maddison, 1992). However, although the strong correlation between these variables is firmly established, researchers have difficulty identifying the precise links between them. Most cross-country empirical studies that include growth in real income as a determinant of saving report a strong positive effect of income on saving (Schmidt-Hebbel *et al.*, 1996). In contrast, in time series studies, the saving-growth connection is not clear and the direction of causality is not particularly well-understood. While some studies find that increases in growth are followed by increases in saving (see, for instance, Gavin *et al.*, 1997 and Carroll and Weill, 1994), others support a reverse direction of causality or even the absence of any

causal relationship. That is the case of Sinha and Sinha (1998) and Paxson (1996)<sup>1</sup>. Taking this controversial evidence into account, Obstfeld (1999) emphasises the need for dynamic studies that go beyond the prevalent pure cross-sectional methodology. Time series estimations would allow to observe not only the direction of causality between domestic saving and output but also to bring into the analysis other relevant sources of saving.

The different models that support a correlation between saving and growth have quite different implications for causality. On the one hand, the central presumption of the Solow (1956) type growth models is that higher saving precedes and causes economic growth. Endogenous growth models also highlight that, other things equal, factors that stimulate saving promote growth. Higher saving finances investment, which is the main source not only of quantitative capital accumulation but also of improvement in total factor productivity if technological progress is embodied in new capital. On the other hand, Modigliani's classic life-cycle model implies that higher growth will increase the life-time wealth of younger savers relative to older dissavers, thereby increasing the aggregate saving rate.<sup>2</sup> Similarly, models of consumption with habit formation predict that consumption responds slowly to unexpected income growth, so unanticipated growth can produce a higher saving rate at least in the short run.<sup>3</sup> Therefore, while the first models take the positive association of saving and income as evidence in favour of the hypothesis that saving precedes growth, the latter two support that growth drives saving, instead.

Understanding the link between saving and growth is relevant not only because it may hold the key to the positive correlation between saving and growth but also for its policy implications: if the central presumption of the Solow's type models holds, and saving precedes growth, raising domestic saving should be a high priority to boost economic growth. Alternatively, if higher saving follows higher income, the policy emphasis should be shifted away from saving and concentrated on removing other impediments to growth.

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<sup>1</sup> By using data for four countries, this author concludes that the estimated effects of growth on saving along time are small relative to the size of the cross-country relationship between rates of saving and growth.

<sup>2</sup> Modigliani (1970).

<sup>3</sup> See, for instance, Carroll and Weil (1994).

An additional question that we try to stress in this paper is that empirical estimates of the relationship between these two variables cannot ignore the influence of foreign resource inflows over the saving-growth connection. Although in the long-run, domestic saving must be equal to investment, in the short- to medium-run, saving and investment need not to be equal in an open economy. In the presence of international capital mobility, domestic investment can be financed by domestic or foreign saving through inflows of international capital.

The effects of these inflows over domestic income may be different depending on the nature of those flows. Bosworth and Collins (1999) suggest a near one-for-one relationship between foreign direct investment (FDI) and domestic investment. In contrast, portfolio capital inflows appear to have no discernible impact on investment, and the effect of loans lies between the other two (pp. 164). Moreover, FDI seems to have a higher permanent component, as it is more persistent than other components of capital flows, in terms of its volatility and predictability (see, for example, Sarno and Taylor, 1997 and Lipsey, 1999).<sup>4</sup> FDI may also accelerate growth through the transfer of managerial and technological know-how.<sup>5</sup> Accordingly, estimates of domestic saving effects on growth which ignore the role of FDI (in the presence of international capital mobility) may give a misleading picture of the true saving-growth nexus (Alguacil *et al.* 2002).

The above arguments are particularly relevant for small and opened economies like Spain. This country can thus provide an interesting case of study to evaluate the impact of foreign inflows over the saving-growth connection. Moreover, there seems to exist a considerable agreement about the prominent role that FDI has played in Spain's industrial modernization over the last decades (see, for instance, Alonso and Donoso, 1999 and Alguacil and Orts, 2003). During the period of analysis (1970-1999), this country has experienced an increasing external opening, heavily reinforced since its integration into the European Union in 1986. At the same time, it has been a net borrower from abroad, capturing an important amount of foreign capital. Foreign direct investment has been one of the most important elements of the openness process in Spain. After a declining trend during the first seventies, concurrent with the political

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<sup>4</sup> Similarly, Obstfeld (1999) highlights that econometric applications must explicitly distinguish between different forms of resource inflows taking account of permanence and predictability as well.

<sup>5</sup> See Borensztein *et al.* (1998) and Balasubramanyam *et al.* (1996) for evidence pertaining to the favourable effects of FDI.

instability experienced in those years, the percentage of FDI inflows in Spain has unceasingly increased for almost two decades, with a strengthened upward tendency after the mid-eighties, coinciding with the Spain's joining of the European Union.

To understand the saving-growth connection and the role played by FDI in this relationship, this paper examines the causal relationship among these variables in a period during which Spain has experienced an important openness process, turning from an autarky position to be perfectly integrated in world markets. This analysis has been carried out for both gross and private saving.<sup>6</sup>

It's important to stress this paper's boundaries: We do not try to estimate a structural model or to identify growth determinants; the main aim of our analysis is to examine the saving-growth connection and its sensitivity to the consideration of a third variable: foreign direct investment. We consistently find evidence that higher saving and greater FDI are followed by increases in national income. These results are coherent with the Solow model and confirm the growth-enhancing effects of foreign investment in this country.

The rest of the paper is organised as follows. Section 2 contains a brief description of the estimation procedure and present empirical results. Concluding remarks are given in Section 3.

## **2. Estimation procedure and empirical results**

(INSERT FIGURE 1 HERE)

To obtain a first insight into the relation between saving and growth, we present the cross plot of income against total saving in Spain from 1970 to 1999. As can be seen in Figure 1, apart from the years with a greater political instability in this country (mid-seventies)<sup>7</sup>, the relationship between these series is clearly positive. We look also at the connection between output and household saving (that is, once government saving is removed from total saving), trying to avoid the potential interactions between public and private sector. The obtained correlation coefficient of 0.883 indicate that private

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<sup>6</sup> Note that the Solow (1956) model implicitly assume that the connection is about private saving and growth.

<sup>7</sup> Prior to the restoration of democracy in 1977, Spain went through a significant period of political instability and uncertainty.

saving and income are strongly and positively related. However, a correlation coefficient of  $-0.642$  between public and private saving would reflect the existence of a negative association between them.<sup>8</sup>

The strong association between both total and private saving and growth confirms the evidence firmly established in the empirical literature. However, as mentioned before, a positive relation between these two variables is consistent with either the Solow's type and the endogenous growth models (where higher saving is followed by higher growth) or with others, like the life-cycle or the consumption with habit formation models (where higher saving is preceded by higher growth).

Moreover, as it has been argued in Section 1, in an open economy, foreign direct investment should be considered a form of external finance that may affect the saving-growth nexus, at least in the short-to-medium run. Since international capital inflows (and particularly FDI) are part of private saving, they can contribute to increase total investment and growth.<sup>9</sup> In fact, the positive correlation that has been found between foreign investment flows and output (with a coefficient of  $0.844$ ) suggests the existence of a growth-enhancing effect of FDI in Spain.

However, as mentioned previously, correlation does not prove causality or temporal precedence among the analyzed variables, in spite of the importance of this question for policy design. Accordingly, in this section, we investigate the underlying links among saving (total and private, respectively), FDI flows and output, by means of Granger causality testing.<sup>10</sup>

Given the presence of potential two-way relationships among the considered variables, the estimation of a VAR model to test causality hypotheses is more reliable than that of a single equation model. VAR systems treat all variables as endogenous avoiding thus infecting the model with false identifying restrictions (Sims, 1980). So, to undertake our empirical analysis, we specify the following vector autoregressive model comprised of saving (total saving,  $S_T$ , and household saving,  $S_H$ , respectively), gross domestic income,  $Y$ , and foreign direct investment,  $FDI$ . That is,

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<sup>8</sup> This result would be coherent with the findings of Argimón and Roldán (1994). According to these authors, "the public sector has crowded out the private sector in Spain" (p. 66).

<sup>9</sup> Foreign direct investment seems to affect not only the level of investment but also the quality of investment (Fan and Dickie, 2000, pag. 314).

<sup>10</sup> Granger (1969).

$$x_t = \mu + \beta t + \Phi_1 x_{t-1} + \dots + \Phi_s x_{t-s} + u_t \quad t = 1, \dots, T$$

where  $x_t = (S_{it}', Y_t', FDI_t')$ ,  $S_i = S_T, S_H$ ;  $t$  represents a deterministic time trend;  $\Phi_j (j = 1, \dots, s)$  are all matrices of coefficients and  $u_t \rightarrow IN(0, \Sigma_u)$ . The data employed in this empirical analysis are annual (expressed in real term) and cover the period 1970-1999.

From this multivariate setting, and following the Granger's concept of causality, we appropriate check the gain in the explanatory power due to the addition of the lagged independent variables. Besides, in an attempt to investigate the sensitivity of the results to the presence of potential indirect effects, the causality tests are also conducted by using the traditional bivariate VAR model, as proposed by Sims (1972).

With this aim, we employ a procedure recently proposed by Toda and Yamamoto (1995) and Dolado and Lütkepohl (1996), hereafter called TYDL, that is robust to the integration and cointegration features of the process (and thus to the possible pretest biases).<sup>11</sup> According to these authors, even when the considered series are integrated or cointegrated, we can still estimate a level VAR model and apply the standard Wald criterion. All we need to do is to determine the maximal order of integration we believe may occur in the model ( $d$ -max) and to over-fit intentionally the model in levels with additional  $d$ -max lags (i.e., a VAR ( $p$ ),  $p = k + d$ ).<sup>12</sup> The conventional Wald test is then applied on the first  $k$  coefficients matrices using the standard  $\chi^2$ -statistic.

In order to ensure white noise errors, the lag structure of the VAR model is chosen by the Akaike's Information Criterion, AIC, and Hanna-Quinn Criterion, HQC (where the criteria indicated different lag lengths, the AIC criterion was preferred), setting the maximum lag at five.<sup>13</sup> In the multivariate VAR models, these criteria were minimise for  $s = 5$ , hence the order of the VAR employed to apply the Modified Wald (MWald)

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<sup>11</sup> A general problem that emerges when testing for Granger causality in time series analysis is the possible existence of stochastic trends in variables, as the traditional  $F$ -test and its Wald test counterpart do not have a standard distribution (Sims *et al*, 1990; Toda and Phillips, 1993). But, according to Giles and Mirza (1999), testing for stationary and cointegration before Granger causality testing may induce to an over-rejection of the non-causal null, leaving us open to the possibility of distortions in the inference procedure.

<sup>12</sup> Toda and Yamamoto (1995) show that if variables are integrated of order  $d$ , the usual selection procedure is valid whenever  $k \geq d$ .

<sup>13</sup> Higher orders of the VAR model produce singular variance-covariance matrices.

test was 6. In the bivariate cases, the lag length of the model varies depending on the particular variables included in it.<sup>14</sup>

(INSERT TABLE 1 HERE)

(INSERT TABLE 2 HERE)

The outcomes of the Granger causality tests based on TYDL augmented lags method for both total and household domestic saving are shown in Table 1 and 2, respectively. As can be appreciated from these tables, irrespective of the specification, there is strong evidence of a causal relationship running from both total and private saving to income. Our causality results confirm thus the central presumption of the Solow and the endogenous growth models that higher saving leads to higher economic growth. In the bivariate model, we also obtain certain evidence of a reverse causation, that is, from growth to saving. According to this result, private saving significantly respond to income fluctuations, as established either in the classic life-cycle model or in the models of consumption with habit formation. However, this causal relationship disappears when FDI is included in the analysis, such as shown in the multivariate model. A simultaneous influence of foreign investment decisions over both domestic output and saving might explain this result.<sup>15</sup> Indeed, we obtain that foreign direct investment Granger-causes domestic output in all cases considered, what verifies the importance of these investment projects in stimulating economy growth. Note also that when the influence of foreign capital inflows is considered in the relationship between total domestic saving and output, the significant level of this connection increase above 99%. This result lends further empirical support to the crucial role played by foreign investment flows in the saving-growth nexus.

Overall, the estimates obtained in this paper suggest that domestic performance in Spain improves when both domestic and foreign saving increases.

### **3. Concluding remarks**

In this paper, we study the relationship among domestic saving, foreign direct investment flows and economy growth in Spain. The results obtained, using the Granger

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<sup>14</sup> Though not presented here due to space constraints, these results are available on request from the authors.

<sup>15</sup> The higher the mobility of international capital, the greater the degree of endogeneity of foreign saving to domestic investment and domestic national saving decisions (Schmidt-Hebbel, et. al., 1996).

non-causality test procedure developed by Toda and Yamamoto (1995) and Dolado and Lütkepohl (1996), are consistent with the Solow's type and endogenous growth models prediction that higher saving precedes higher growth. However, the evidence concerning to a reverse causation between these variables is rather small, and disappears once the influence of FDI is taken into account. Additionally, the estimates presented here show that a causal relationship running from FDI to output exists. This last result suggests that the overall effect of foreign direct investment flows in the Spanish's domestic activity appears to be significant.

From the above outcomes, we can draw two main conclusions: First, the saving-growth connection in Spain seems to primarily respond to a causation from saving to income; an evidence that is even stronger when we include FDI in our analysis. Second, the crucial role played by foreign investment in promoting domestic activity confirms the evidence found in previous empirical studies about the growth enhancing effects of these type of inflows in Spain. Accordingly, ensuring an adequate level of domestic saving and promoting the inflows of foreign saving, as long as the domestic economy framework is sustainable, should be a central policy concern for growth in this country.

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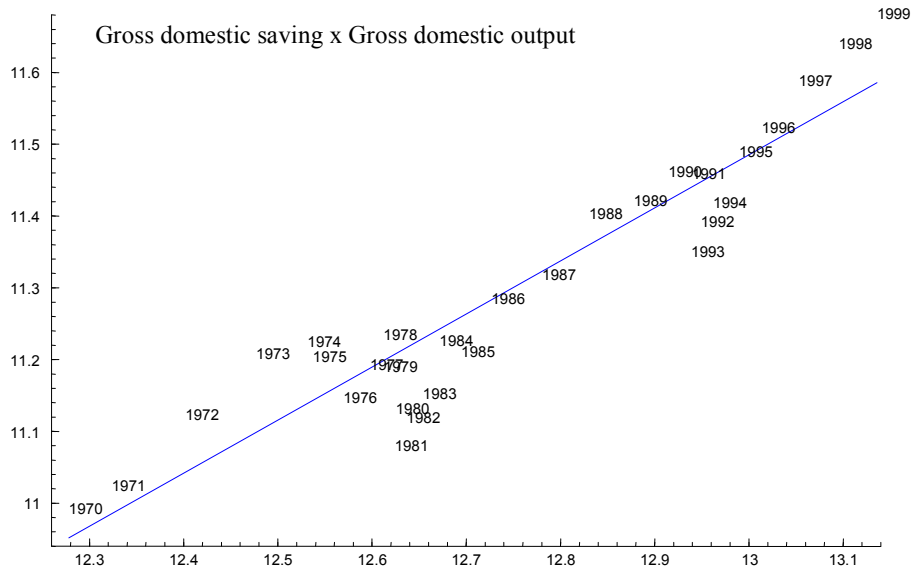
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# FIGURE

**Fig. 1. Gross domestic saving against gross domestic output in Spain, 1970-1999 (log values, in real terms).**



## TABLES

**Table 1: Granger Causality Test**  
(total saving, gross domestic product and inward foreign direct investment)

$H_0 :$	Lag length / VAR order	MWald test	p-value
Multivariate Model			
$S_T \not\rightarrow Y$	5 / 6	14.411	0.001
$Y \not\rightarrow S_T$	5 / 6	3.277	0.657
$FDI \not\rightarrow Y$	5 / 6	19.764	0.001
Bivariate Models			
$S_T \not\rightarrow Y$	3 / 4	9.394	0.024
$Y \not\rightarrow S_T$	3 / 4	3.753	0.289
$FDI \not\rightarrow Y$	5 / 6	16.553	0.005

Note:  $\not\rightarrow$  denotes “does not cause”. To determine the appropriate lag length, we employ Akaike’s Information Criterion and Hannan-Quinn Criterion.

**Table 2: Granger Causality Test**  
(household saving, gross domestic product and inward foreign direct investment)

$H_0 :$	Lag length / VAR order	MWald test	p-value
Multivariate Model			
$S_H \not\rightarrow Y$	5 / 6	17.888	0.003
$Y \not\rightarrow S_H$	5 / 6	3.803	0.578
$FDI \not\rightarrow Y$	5 / 6	18.913	0.002
Bivariate Models			
$S_H \not\rightarrow Y$	5 / 6	27.214	0.001
$Y \not\rightarrow S_H$	5 / 6	21.319	0.001

Note:  $\not\rightarrow$  denotes “does not cause”. To determine the appropriate lag length, we employ Akaike’s Information Criterion and Hannan-Quinn Criterion.

## Data appendix

Variable	Data	Source
PERIOD: 1970-1999		
$Y$	Gross domestic product (m.p.) deflated by the GDP deflator. Millions of Euro.	- OECD National Accounts.
$S_T$	Gross domestic savings calculated as GDP less final consumption expenditure (total consumption: household consumption expenditure plus general government expenditure) in constant terms (GDP deflator). Millions of Euro.	- World Development Indicators (2001). World Bank.
$S_H$	Household savings expressed in real terms using the GDP deflator. Millions of Euro.	- OECD National Accounts
$FDI$	Inward foreign direct investment. They represent the gross payment for foreign investment in Spain, net of disinvestment in real terms using the gross fixed capital formation deflator.	- <i>Banco de España</i> (Bank of Spain) and <i>Instituto Nacional de Estadística</i> (INE).

Note: Pre-1999 data were converted from Spanish pesetas to Euro using the irrevocable conversion Euro rates, which is 166.386 Spanish pesetas for 1 Euro.