

Macroeconomic effects of foreign direct investment in the Spanish economy

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Abstract

The present paper analyses the effects of Foreign Direct Investment (FDI) in Spain using a Computable General Equilibrium (CGE) model. It is the first model that undertakes a general equilibrium framework to grasp the effects of multinationals for the Spanish case. And it is a first step in building one of only a few CGE models offering a complete description of the foreign sector. The model shows evidence of crowding out of domestic production after FDI inflows. Further, FDI outflows produce bigger effects on aggregate output than equivalent amounts of FDI inflows, which is an alarming sign for the Spanish economy as it is currently undergoing a process of delocalization.

1. Introduction

The Spanish economy is nowadays facing a process of delocalization. For many years it received huge amounts of FDI flows which ended up in a very important presence of foreign multinationals (MNEs) in its productive system, particularly in manufactures, where foreign MNEs are nearly the half of firms with more than 200 workers (Gandoy and Myro, 2003, p. 223). Both the amount of FDI inflows received and MNEs' presence have been very remarkable in an international context (Bajo-Rubio and López-Pueyo, 2002; Bajo-Rubio and Sosvilla-Rivero, 1994; Martín and Velázquez, 1996).

However, the direction of flows has now reversed and some foreign multinationals are closing down factories in Spain and installing their production plants elsewhere. The process is not of an alarming magnitude yet, but there are signs that are certainly worrying. Only few authors are discussing this issue (Fernández-Otheo and Myro, 2003; Fernández-Otheo, Martín and Myro, 2004) and there is much scope for analysing the consequences that this delocalization process may have in the Spanish economy.

More generally, the process of delocalization has still not received much attention in a literature that is focused on the *determinants*, and not on the effects, of FDI *inflows* and *the growth of MNEs*, nearly ignoring the effects of FDI outflows and MNEs delocalization. Do FDI outflows and inflows affect in the same qualitative manner an economy, except for the opposite sign? Do MNEs leaving one country just have the reverse consequences than MNEs entering into that country? These questions are addressed here, offering some preliminary results.

This study is thus a first step to grasp the macroeconomic consequences of delocalization for an economy. The absence of macro theories that satisfactorily explain the effects of FDI and MNEs for economies, points to a general equilibrium framework as an interesting approach to the subject. Because, as will be seen, computable general equilibrium models offer a well grounded microeconomic structure through which macroeconomic effects can be derived.

A one-country model is used with six sectors corresponding to agriculture, manufactures and services that are domestic or foreign. As mentioned earlier, FDI effects of inflows versus outflows are analysed. Further, the different impact of flows is explored according to the sector involved in the shock. Do capital inflows exert a different effect depending on the sector to which they arrive? If so, till what extent?

The paper is organized as follows. Section 2 reflects on the concepts of FDI and MNEs. Section 3 gives an overview of the relevant CGE literature. Section 4 presents the original model, while section 5 introduces some new equations to deal with FDI and MNEs. Section 6 discusses the results. Finally, conclusions are shown in the last section, section 7.

2. FDI and MNEs: some concepts

In this preliminary version, FDI is seen as causing variations in the capital stock hold by the foreign MNEs installed in the economy. This means that both FDI flows and MNEs are taken into account simultaneously. This is an interesting feature because other studies rely either in FDI data or in MNEs' data, but not on both, to study internationalisation matters.

As it is well known, FDI flows are made up of equity capital, reinvested earnings, and other capital associated with an intercompany debt transaction¹. Thus, *FDI* is a concept related with a *flow of capital*. *MNEs are the “stock” resulting from the FDI flow*. Caves (1996) defined them as “an enterprise that controls and manages production establishments –plants- located in at least two countries. It is simply one subspecies of multiplant firm” (p.1). Although, it is commonly asserted, that MNEs have a superior technology of production and performance compared to domestic (not MNEs) firms. Both FDI and MNEs are thus related concepts, but each one on its own has a particular not small literature.

Because MNEs often borrow in their local markets and choose to internalize some part of their transactions, their importance for an economy can be underestimated by FDI flows. While MNEs’ data alone ignore counterbalancing effects in the balance of payments or in savings that may have considerable macroeconomic consequences as well. For example, Spain has for a long time financed its continuous commercial deficits with FDI capital inflows, and it may not have this possibility in the future if the delocalization process continues (Bandrés and Marchante, 2003). However, micro data on MNEs (e.g. use of labor, capital and intermediate consumption...etc) or on the amount of their local borrowing are difficult to obtain deterring better approaches to the matter.

General Equilibrium Models offer a nice framework in which the production side (more related to MNEs micro data) and the financial side (the capital flows related with FDI) can be taken into account simultaneously. The fact that not many models account for both factors, however, conveys the idea that it is not an easy thing to do. Actually, there are not many CGE models dealing with FDI or Multinational firms. We turn in the next section to analyse the relevant literature.

¹ According to the IMF, for such a financial transaction to be recorded as an FDI flow, one of the parties needs to own at least 10 percent of the other’s party equity.

3. The CGE literature

Among the still scarce evidence of CGE models dealing with FDI or MNEs, the following “strands” regard some comments.

There is a *GTAP Literature* on portfolio capital movements (rather than on FDI), which explains capital flows as a function of their rates of return. For the case of FDI, however, there exists little evidence of it being positively related to differences in capital endowments across countries. A contribution against this conclusion is the one by Yeaple (2003) who argues that most studies face an aggregation bias.

The *GTAP literature* has the interesting features of accounting for the importance of errors in investors’ expectations and introducing a novel investment theory of adaptative expectations (Inchovichina and McDougall, 2001; Ianchovichina, McDougall, and Hertel, 1999).

A few papers are using now what could be called *the FTAP literature*: a new database similar to the GTAP one that has been recently created and which includes FDI and capital stocks data for different regions in the world. This strand follows the seminal work of Petri (1997). They have focused on FDI in the service sector, particularly dealing with liberalization effects in it, as this is a future step in the GATS liberalization process.

Some authors in the *World Bank* have built a couple of CGE models of FDI: Jensen, Rutherford and Tarr (2004) which uses imperfect competition and Lee and Van der Mensbrugghe (2001) which uses perfect competition, both papers within a static framework. Our research intends to follow their lines.

Finally, a more *theoretical literature* has been gathered in the book by Markusen (ch 5, ch. 6, and ch.7, 2002). He and his coauthors work with models with MNEs, which do not model FDI flows. Their key point is differentiating the cost structure of the different types of firms: domestic firms and multinationals (which can be horizontal or vertical). Horizontal MNEs have higher initial capital costs of setting up production facilities than do vertical ones, as the latter do not need to install all producing facilities in every single plant. On the other hand, domestic firms do face transports costs while horizontal firms do not, because horizontal firms sell directly in the markets where they produce and do not have to export goods. Interestingly, these different costs structures yield different labor demands for every type of firm. This is the main mechanism through which the presence of MNEs affects the economy as labor demands affect the wage, which, in turn, influences national income in the economy and this leads demand for consumption and investment.

Markusen's models are really of the determinants of MNEs. Therefore they run loops over (i.e. they run the model with huge variations in) countries' incomes, trade costs, differences in factor endowments, etc. Which is not straightforwardly applicable to Computable General Equilibrium models based on real data as one cannot expect some of the changes above mentioned (e.g. in capital endowments) to take place in actual economies. In fact, they do not use real data in their models. However, they offer a complete theory of MNEs' behaviour, which is coherent with observed facts. All in all, their models lie somewhere between computable general equilibrium ones and stylized theoretical ones.

4. The model

We present a computable general equilibrium model (CGE), which follows a tradition of multi-sectoral neoclassical models developed over the last three decades. It is a one country

model. In its mathematical form, it is a system of simultaneous non-linear equations, derived from microeconomic optimization theory. We firstly develop where the equations that describe agents' behaviour come from. Afterwards, we introduce Foreign Direct Investment (FDI) and MNEs into the model.

4.1 The representative household

In this model there is a representative household. We want to focus on FDI effects on the production side and for households in general and therefore do want to keep the consumption side in the economy simple. The household embodies all types of consumers, enterprises and non-profit institutions at the service of households. Accordingly, his total income Y is:

$$Y = PK \cdot KS + PL \cdot LS \quad (1)$$

Where: PK : return to capital, KS : capital endowment in the Spanish economy, PL : wage rate and LS : labor endowment.

His consumption budget, $CBUD$, is:

$$CBUD = Y - SH \quad (2)$$

Where, SH , stands for household's savings.

He maximizes a LES utility function, also known as Stone-Geary utility. This form, which is commonly used in CGEs, is more flexible than other alternatives, such as Cobb-Douglas, with respect to the values of the income elasticities for the different types of commodities². The function reads:

² Cobb-Douglas utility functions always exhibit unitary income elasticities for the demand for commodities. This is at odds with 'Engel's law' (in its two good form) that the proportion of income spent on essential goods is a decreasing function of income. However, the LES function violates a second prediction of Engel's Law, which is that the gap between the elasticity of demand for non-essential goods and the elasticity of demand for essential

$$U = \prod_{i=1}^3 (C_i - \mu_i)^{\alpha_i^{HLES}}, \quad \sum_{i=1}^3 \alpha_i^{HLES} = 1. \quad (3)$$

where C_i is the demand for commodity i in “quantity” terms. Initially, we have three commodities i : agriculture, manufactures and services, which correspond to the three productive sectors in the economy. μ_i stands for the minimum expenditure on commodity i needed to obtain a minimum subsistence level. α_i^{HLES} is the marginal budget share, to be explained later on.

The household’s consumption budget is:

$$CBUD = \sum_{i=1}^3 P_i \cdot C_i, \quad (4)$$

Where, P_i , is the price of commodities excluding taxes.

The Lagrange function reads:

$$L(C_1, C_2, C_3, \lambda) = \prod_{i=1}^3 (C_i - \mu_i)^{\alpha_i^{HLES}} + \lambda \left(CBUD - \sum_{i=1}^3 P_i \cdot C_i \right) \quad (5)$$

From the First Order Conditions derived from the Lagrangean and after some algebra, we obtain the demand for commodities from the LES utility function:

$$C_i = \mu_i + \alpha_i^{HLES} (P_i)^{-1} \left(CBUD - \sum_{j=1}^3 P_j \cdot \mu_j \right) \quad i = 1, \dots, 3. \quad j = 1, \dots, 3. \quad (6)$$

goods increases as income goes up. GTAP models often use the Constant Difference in Elasticity (CDE) functional form since this avoids the latter problem. This function is, however, difficult to calibrate. (A nice revision of the relevant microeconomic theory in CGE modelling can be consulted in <http://www.nottingham.ac.uk/~lezgr/teaching/CGE/agenotes.htm>)

Where: The term $\left(CBUD - \sum_{j=1}^3 P_j \mu_j \right)$ is the income that remains after the consumer has purchased the minimum required quantities of all commodities. This marginal income is called “supernumerary income”. α_i^{HLES} : as said before, is the marginal budget share. It is the fixed fraction of the supernumerary income that is allocated over each commodity, i ³.

Our representative household has a constant marginal propensity to save, mps , over his income:

$$SH = mps.Y \quad (7)$$

We need to define a price index for the economy, $PCINDEX$. We use a Laspeyres one:

$$PCINDEX^t = \frac{\sum_{i=1}^3 P_i^t C_i^0}{\sum_{i=1}^3 P_i^0 C_i^0} \quad t = 0, 1. \quad (8)$$

where t stands for time, (periods 1 and 2).

4.2. Investment and Savings

Total savings in the economy S are:

$$S = SH + PCINDEX . SG + ER . SF \quad (9)$$

Where SG are government savings in real terms, ER is the exchange rate (in terms of units of foreign currency per domestic unit) and SF are foreign savings in foreign currency.

³ The income elasticity of the demand for each commodity i will never take a value of 1 (unless $\mu_i = 0$ for all i , in which case the LES function reduces to a Cobb-Douglas utility function).

We create an imaginary “bank” that allocates the savings over the investment demand from the firms in the economy according to a Cobb-Douglas utility function. His optimization problem reads:

$$\text{Max. } U = \prod_{i=1}^3 I_i^{\alpha_i^I} \quad , \quad \sum_{i=1}^3 \alpha_i^I = 1 \quad (10)$$

s.t. (9)

So that demand for investment takes the familiar Cobb-Douglas form:

$$I_i = \alpha_i^I \cdot P_i^{-1} \cdot S \quad (11)$$

I_i is investment in sector i , P_i , again, is the price of commodities (in this case, investment goods) excluding taxes and α_i^I is the Cobb-Douglas share parameter.

4.3 The firms in the economy

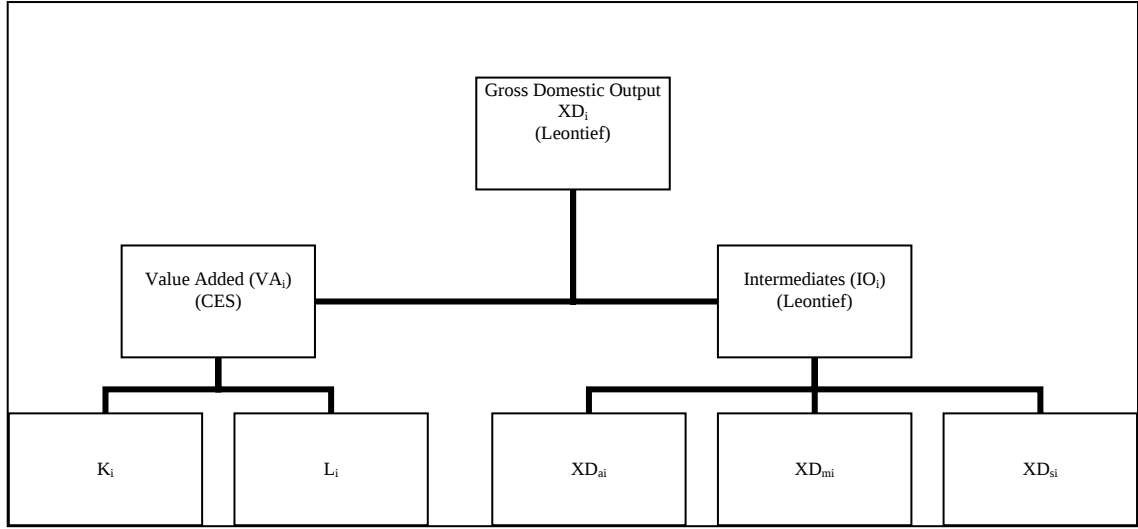
There are three domestic “firms” in the economy corresponding to the three production sectors and type of commodities (agriculture, manufactures, and services). Later on there will be six firms because there will be domestic and foreign firms for the three sectors. All firms face a multi-level (nested) production function, with capital and labor as factors of production and three intermediate inputs to production. Consequently, for firm 1 we have,

$$XD_1 = f(K_1, L_1, XD_{11}, XD_{21}, XD_{31}) \quad (12)$$

Where XD_{11} denotes the quantity of its own commodity that the firm in sector uses in its production process, and XD_{21} and XD_{31} denotes the quantity of commodities of the other sectors used in sector’s 1 production.

How is the production function? It's scheme is as follows

Figure 1: The structure of production



At the first level, there is a Leontief technology with the value added (VA) and intermediate inputs (IO) as (composite) inputs to production. Let VA_1 denote the value added of firm 1, and IO_1 the intermediates used by firm 1. Thus, at the first level the production function h is:

$$XD_1 = h(VA_1, IO_1) \quad (13)$$

Given the above Leontief production function we get:

$$VA_1 = b_1 XD_1 \quad (14)$$

$$IO_1 = (1 - b_1) XD_1. \quad (15)$$

Where b_1 is the fixed coefficient of (real) value added in output.

At the second level of nesting, on one hand, value added is

$$VA_1 = g(K_1, L_1) \quad (16)$$

where g is a linear homogeneous (i. e. constant returns to scale) CES technology with capital and labor as factors inputs to production. Therefore, it reads as follows:

$$VA_1 = \left(\gamma F_1 K_1^{(\sigma F_1 - 1)/\sigma F_1} + (1 - \gamma F_1) L_1^{(\sigma F_1 - 1)/\sigma F_1} \right)^{\sigma F_1 / (\sigma F_1 - 1)} \quad (17)$$

Combination of (14) and (17) yields

$$XD_1 = aF_1 \left(\gamma F_1 K_1^{(\sigma F_1 - 1)/\sigma F_1} + (1 - \gamma F_1) L_1^{(\sigma F_1 - 1)/\sigma F_1} \right)^{\sigma F_1 / (\sigma F_1 - 1)} \quad (18)$$

Where, aF_1 is usually called the efficiency parameter and has a value $aF_1 = b_1^{-1}$, γF_1 : is the distribution parameter of K in a CES production function, σF_1 : is the elasticity substitution between capital and labor in a CES function.

Also, at the second nesting level, the use of intermediate inputs is

$$IO_1 = f(XD_{11}, XD_{21}, XD_{31}) \quad (19)$$

where f corresponds to a Leontief technology with the commodities of the three firms as inputs to production. We can write this leontief technology as:

$$XD_{11} = d_1 IO_1 \quad (20)$$

$$XD_{21} = d_2 IO_1 \quad (21)$$

$$XD_{31} = d_3 IO_1 \quad (22)$$

Defining the following coefficients of volume share,

$$io_{11} = (1 - b_1) d_1 \quad (23)$$

$$io_{21} = (1 - b_1) d_2 \quad (24)$$

$$io_{31} = (1 - b_1) d_3 \quad (25)$$

We arrive at the familiar input – output relations:

$$XD_{11} = io_{11} XD_1 \quad (26)$$

$$XD_{21} = io_{21} XD_1 \quad (27)$$

$$XD_{31} = io_{31} XD_1 \quad (28)$$

A great part of the technology described can be represented just by the functions of demand for capital and labor. The standard cost-minimisation problem faced by the domestic firm i , in sector i is:

$$\text{Min. Cost function} = PL \cdot L_i + PK \cdot K_i$$

$$\text{Subject to } XD_i = aF_i \left(\gamma F_i K_i^{(\sigma F_i - 1)/\sigma F_i} + (1 - \gamma F_i) L_i^{(\sigma F_i - 1)/\sigma F_i} \right)^{\sigma F_i / (\sigma F_i - 1)}$$

Yielding the primary factors demands, K_i and L_i :

$$K_i = (\gamma F_i)^{\sigma F_i}.$$

$$\left[(1 + tk_i) PK \right]^{-\sigma F_i} \left((\gamma F_i)^{\sigma F_i} \left[(1 + tk_i) PK \right]^{1 - \sigma F_i} + (1 - \gamma F_i)^{\sigma F_i} \left[(1 + tl_i) PL \right]^{1 - \sigma F_i} \right)^{\sigma F_i / (1 - \sigma F_i)} \left(\frac{XD_i}{aF_i} \right) \quad (29)$$

$$L_i = (1 - \gamma F_i)^{\sigma F_i}.$$

$$\left[(1 + tl_i) PL \right]^{-\sigma F_i} \left((\gamma F_i)^{\sigma F_i} \left[(1 + tk_i) PK \right]^{1 - \sigma F_i} + (1 - \gamma F_i)^{\sigma F_i} \left[(1 + tl_i) PL \right]^{1 - \sigma F_i} \right)^{\sigma F_i / (1 - \sigma F_i)} \left(\frac{XD_i}{aF_i} \right) \quad (30)$$

Where tk and tl are taxes levied on capital and labor, respectively.

Capital and labor are mobile among sectors, and their endowments are exogenously fixed. Later on, capital endowments will vary according to FDI inflows and outflows, but in the present version they are fixed.

As we have said, the production functions exhibit constant returns to scale. This implies that long-run profits are necessarily zero (Euler's Theorem). According to this, we get the following zero profit equations:

$$PD_1XD_1 = (1 + tk_1)PK.K_1 + (1 + tl_1)PL.L_1 + (P_1.io_{11} + P_2.io_{21} + P_3.io_{31})XD_1 \quad (31)$$

$$PD_2XD_2 = (1 + tk_2)PK.K_2 + (1 + tl_2)PL.L_2 + (P_1.io_{12} + P_2.io_{22} + P_3.io_{31})XD_2 \quad (32)$$

$$PD_3XD_3 = (1 + tk_3)PK.K_3 + (1 + tl_3)PL.L_3 + (P_1.io_{13} + P_2.io_{23} + P_3.io_{33})XD_3 \quad (33)$$

4.4. The foreign sector

In this open economy, the domestically produced commodity is either sold domestically or exported, and goods differ accordingly to their final destination. The share of sales at home and abroad are determined by their relative prices. This is the idea conveyed by a constant elasticity of transformation (CET) function. A function that in reality has the same mathematical form as the CES function, except for the fact that the CET has negative elasticities of substitution, while the CES has positive ones. Thus, a domestic firm i maximizes its revenues

$$\text{Max. } PDD_i \cdot XDD_i + PE_i \cdot E_i \quad (34)$$

Subject to the CET function:

$$XD_i = aT_i \left[\gamma T_i \cdot E_i^{(\sigma T_i - 1)/\sigma T_i} + (1 - \gamma T_i) XDD_i^{(\sigma T_i - 1)/\sigma T_i} \right]^{\sigma T_i / (\sigma T_i - 1)} \quad (35)$$

PDD_i : price of domestic commodities supplied to the domestic market, XDD_i : domestic commodities supplied to the domestic market, PE_i : export price (in local currency), E_i : exports of the domestically produced commodities.

The following parameters are analogous to the ones in the CES function, it can be easily seen they are: aT_i : efficiency parameter of the CET function, γT_i : is the distribution parameter of exports in the CET function., σT_i : elasticity of substitution in the CET function.

The optimization problem results in the following equations:

$$XDD_i = (1 - \gamma T_i)^{\sigma T_i} PDD_i^{-\sigma T_i} \left[\gamma T_i^{\sigma T_i} P E_i^{1-\sigma T_i} + (1 - \gamma T_i)^{\sigma T_i} PDD_i^{1-\sigma T_i} \right]^{\sigma T_i / (1-\sigma T_i)} (XD_i / a T_i) \quad (36)$$

$$E_i = \gamma T_i^{\sigma T_i} P E_i^{-\sigma T_i} \left[\gamma T_i^{\sigma T_i} P E_i^{1-\sigma T_i} + (1 - \gamma T_i)^{\sigma T_i} PDD_i^{1-\sigma T_i} \right]^{\sigma T_i / (1-\sigma T_i)} (XD_i / a T_i) \quad (37)$$

On the other hand, what the representative household consumes stems both from domestic production sold domestically (XDD_i) and imports (M_i). The domestic market demand is for a “composite commodity”, which is made up of imports and domestic output. Two-way trade in the same type of goods underlies the idea that domestic production and imports are not perfect substitutes. To model this imperfect substitution in a framework of perfectly competitive markets, like the one assumed here, an Armington function is used, i.e. a CES aggregation function which using imports and domestic production as inputs creates the “composite commodity”. This composite commodity can be used as a final or as an intermediate good. As a final good it can be private consumption, government consumption or investment. Our representative household minimizes his expenses subject to the imperfect substitutability of goods. Its optimization problem is:

$$\text{Min. } PM_i \cdot M_i + PDD_i \cdot XDD_i \quad (38)$$

s.t. (the Armington function)

$$X_i = a A_i \left[\gamma A_i M_i^{(\sigma A_i - 1) / \sigma A_i} + (1 - \gamma A_i) XDD_i^{(\sigma A_i - 1) / \sigma A_i} \right]^{\sigma A_i / (\sigma A_i - 1)} \quad (39)$$

where: PM_i : is the import price (in local currency), M_i : imports of commodities, X_i : is composite commodity in sector i , $a A_i$: is the efficiency parameter of the Armington function, γA_i : is the distribution parameter of the imports in the Armington function, σA_i : elasticity of substitution of the Armington function.

From the above optimization problem we get:

$$XDD_i = (1 - \gamma A_i)^{\sigma A_i} PDD_i^{-\sigma A_i} \left[\gamma A_i^{\sigma A_i} PM_i^{1-\sigma A_i} + (1 - \gamma A_i)^{\sigma A_i} PDD_i^{1-\sigma A_i} \right]^{\sigma A_i / (1-\sigma A_i)} (X_i / a A_i) \quad (40)$$

$$M_i = (\gamma A_i)^{\sigma A_i} PM_i^{-\sigma A_i} \left[\gamma A_i^{\sigma A_i} PM_i^{1-\sigma A_i} + (1 - \gamma A_i)^{\sigma A_i} PDD_i^{1-\sigma A_i} \right]^{\sigma A_i / (1-\sigma A_i)} (X_i / a A_i) \quad (41)$$

We assume a small economy that can not therefore influence world price of exports ($PWMZ_i$) and imports ($PWEZ_i$), which are then exogenously given. The resulting domestic import and export prices are just a conversion using the exchange rate (ER) (in terms of units of foreign currency per domestic unit):

$$PM_i = ER \cdot PWMZ_i \quad (42)$$

$$PE_i = ER \cdot PWEZ_i \quad (43)$$

The balance of payments is:

$$\sum_{i=1}^3 PWMZ_i M_i = \sum_{i=1}^3 PWEZ_i E_i + SF \quad (44)$$

4.5. Government

As we have seen, the government levies taxes on capital and labor use of the firms. Taxes are proportional to their tax base. Its tax revenues ($TAXR$) are:

$$TAXR = \sum_{i=1}^3 (tk_i \cdot PK \cdot K_i + tl_i \cdot PL \cdot L_i) \quad (45)$$

The government consumes CG_1, CG_2 , and CG_3 commodities from agriculture, manufactures and services, respectively. This behaviour can be expressed as the government maximizing a Cobb-Douglas utility function

$$\text{Max. } U(CG_1, CG_2, CG_3) = CG_1^{\alpha_{CG_1}} CG_2^{\alpha_{CG_2}} CG_3^{\alpha_{CG_3}} \quad (46)$$

(with $\alpha_{CG_1} + \alpha_{CG_2} + \alpha_{CG_3} = 1$, i.e. all Cobb-Douglas value share parameters, also known as share of expenditure parameters add to 1).

The constraint is the disposable income of the government (where government savings will be initially balanced, $SG = 0$):

$$TAXR - PCINDEZX.SG = \sum_{i=1}^3 CG_i \quad (47)$$

The maximization problem results in:

$$CG_i = \alpha_{CG_i} PD_i^{-1} (TAXR - PCINDEZX.SG) \quad (48)$$

4.6. Market clearing equations

This is a neoclassical model in which all markets clear. As a consequence we have the following equations for the capital market:

$$\sum_{i=1}^3 K_i = KS \quad (49)$$

For the labor market:

$$\sum_{i=1}^3 L_i = LS \quad (50)$$

And for commodities markets (in “quantity” terms):

$$X_a = io_{aa}XD_a + io_{am}XD_m + io_{as}XD_s + CG_a + C_a + I_a \quad (51)$$

$$X_m = io_{ma}XD_a + io_{mm}XD_m + io_{ms}XD_s + CG_m + C_m + I_m \quad (52)$$

$$X_s = io_{sa}XD_a + io_{sm}XD_m + io_{ss}XD_s + CG_s + C_s + I_s \quad (53)$$

And in “value” terms:

$$P_i.X_i = PM_i.M_i + PDD_i.XDD_i \quad (54)$$

$$PD_i.XD_i = PE_i.E_i + PDD_i.XDD_i \quad (55)$$

The equations (1), (2), (6)-(9), (11), (29)- (34), (36), (37), (40)-(45), (48)-(55), when we take PL as the numéraire and give some exogenous (Spanish) values for KS, LS and SF define a model.

5. MNEs and FDI in the model

In which way do FDI and MNEs influence an economy? The model accounts for the fact that new FDI inflows or outflows increase or decrease to some extent the capital stock hold by MNEs foreign firms. It is not just a capital increase or decrease in the economy as a whole but a variation in MNEs’ capital stock. One might argue that there is more to be expected than a capital increase as a result of FDI coming in. It has been mentioned that MNEs presumably have a superior technology that could spill over domestic firms. However, there are considerable problems to measure spillovers (Görg and Greenaway, 2002). Further, for the Spanish case, econometricians have found little evidence of spillovers (Barrios and Strobl, 2002). Therefore, we focus at this stage on the effects of foreign MNEs capital stock variations.

The Bank of Spain (“Central de Balances”, year 1995) offers information regarding firms’ activities in the Spanish economy. This is a very rich dataset which includes use of capital and

labour, as well as intermediate consumption and social security contributions⁴, among others. This information is available regarding the activity of both foreign MNEs⁵ and domestic firms⁶ in the Spanish economy. Using this source we have splitted into a domestic part and a foreign part the production sectors contained in the SAM for Spain (done by Uriel *et. al.*, 2004)⁷. We will have then six sectors of production, corresponding to agriculture, manufactures and services, produced now not only by “domestic” firms but also by foreign (MNEs) firms. The stock of capital of MNEs is what will vary according to FDI inflows or outflows. That stock can only be changed by the shock considered and stays fixed after the shock, whereas the rest of capital in the economy is perfectly mobile across sectors. In other words, if some capital increases the stock of MNEs in services, the stock of capital of MNEs in services remains fixed after the shock while capital of domestic firms in services and of all remaining sectors can flexibly adjust to the shock. This way of introducing capital shocks allow us to see how all sectors would react in a medium term, between 3 or 5 years, which is a common interpretation of shocks in a static framework like this.

Thus, in the previous (49) equation:

⁴ The sample contains 8000 firms representing between 30 and 35% of value added at factor prices of non-financial firms in the economy. However, not all sectors are well represented. Manufactures is very well represented with coverage of nearly 50% of value added at factor prices. Nonetheless, manufactures also includes construction in this paper, which is not well represented and accounts for nearly 22% of production in manufactures. Services is well represented in commerce and repairs and transport and communications (again representing nearly 50% of value added) which together account for nearly 33% of total production in services. Data in services overestimate the presence of MNEs if we compare them to an alternative source (Martín and Velázquez, 1996). This will, in turn, overestimate the effects of FDI flows in services. Agriculture is not well represented, so we will have to be cautious when interpreting results of flows going to that sector (Bank of Spain, “Suplemento metodológico” and “Monografía Anual”, 2001, percentages of sectors weight have been extracted from the sam from Uriel *et al.*, 2004). Further, the sample is biased towards big firms so that the results in general will overestimate the presence of foreign MNEs. It is hard to find micro data that offer any detail regarding capital and labor uses...etc differentiating between MNEs and domestic firms and that at the same time offer good coverage of all sectors in the economy.

⁵ We use the standard definition of MNEs. These are firms acting in the Spanish economy, for which more than 10% of their social capital is owned by a foreign firm.

⁶ Note that Spanish MNEs are included in the group that we have called “domestic” firms. There is no way to separate data regarding Spanish MNEs from Spanish domestic firms. This is a problem shared by most of this literature, see for example: Barba-Navarreti *et. al.* (2004, ch. 7).

⁷ This SAM is for the year 1995, a particularly good benchmark as it is the year of a structural base of new series in national accounts.

$$\sum_{i=1}^3 K_i = KS \quad (49)$$

the term $\sum_{i=1}^3 K_i$ in (49) is now composed of capital hold by both domestic and foreign MNE

firms, it will be called $\sum_{i=1}^3 K_{Ti}$ now:

$$\sum_{i=1}^3 K_{Ti} = \sum_{i=1}^3 K_i + \sum_{i=1}^3 K_{Fi}$$

where, the subscripts F and T stand for foreign and total, respectively. So that the former capital market clearing equation becomes:

$$KS = \sum_{i=1}^3 K_i + \sum_{i=1}^3 K_{Fi} \quad (49^*)$$

Where K is the domestic part of capital in the sector and only $\sum_{i=1}^3 K_{Fi}$ should be changed by

FDI inflows or outflows in Spain.

6. Results

Different counterfactual scenarios are analysed in which changes in the capital stock take place just in one sector at the same time. The shock starts with an amount of capital which is 30 million of euros. This quantity is equivalent to 5% of the stock of foreign capital hold by MNEs in agriculture and approximately equal to the average capital received in that sector during the period 1995-2003 in Spain. We run loops by increasing (or decreasing) that quantity evenly till reaching approximately 9 thousand million of euros. This latest quantity of capital has never been overcome, neither by capital inflows into the Spanish economy in the period 1995-2003 nor by capital outflows that are indeed much lower, so far, than inflows⁸.

⁸ The only exception are the capital inflows received in the year 2000 in services, which amounted to 19,2 thousand million of euros due to an unusual merger in the telecommunications sector.

To understand the results it is important to take into account the different capital intensity of sectors. Table 1 summarises their capital and labor intensity measured as their corresponding contribution to value added in production. Domestic agriculture has the highest capital/labor ratio. As commented by other authors, the Spanish agriculture sector is characterized by a huge number of unincorporated farming businesses, whose value-added is statistically accounted as capital income (Roland-Holst *et al.*, 1995).

(TABLE 1)

The biggest shock on capital considered (approximately 9 thousand million of euros) amounts only to roughly 5 percent of the capital stock in the economy. As a result, there are not important changes in factor prices. In fact, *in all the capital levels considered factor prices remain nearly unchanged*. However, we encounter important changes in factor demands by the different sectors and also in their production levels. So that the shocks we are considering really have effects in the share of production of the different sectors, and also in aggregate magnitudes. These effects, obviously, increase with the quantity of capital involved in the shock.

The relative price of capital with respect to labor does not change, therefore firms do not change the proportion in which they combine capital and labor. As a consequence, we get that *the changes in labor and capital demand run parallel with the same percentage variation within the same sector*. This means that, for example, when capital increases in MNEs in the service sector by 2,5%, labor increases exactly by the same percentage, and so does production. The optimum combination of labor and capital for firms has not changed so if production is increased, capital and labor demands are increased in the same percentage. And

remember that there are important adjustments in factor demands after the shock in all sectors, as mentioned before.

Domestic firms of the sector involved in the capital stock change always react in the opposite direction to MNEs in that sector. If, for example, capital inflows increase the stock of MNEs in services, domestic firms in services will reduce their capital demand. We find that as mentioned by some authors there is a crowding out effect when capital arrives to a particular sector (Fernández-Otheo, 2003). According to this model, it is true that FDI flows caused some domestic firms to close down or at least made them reduce their production in considerable amounts. The rest of sectors, the ones not directly involved in the capital shock, react according to the Rybczinsky theorem. Output production is increased in sectors that are capital intensive when capital is increased in the economy, and the production of those (capital intensive) sectors decreases when the level of capital is reduced in the economy.

(TABLES 2, 3 & 4)

What about the effects of capital outflows? For capital (and labor) demands we continue to observe that whenever capital leaves the multinational part of a sector its domestic counterpart increases capital demand (i.e. the domestic part reacts in the opposite direction as the foreign part). Remember this was also the case for capital arrivals. Further, again sectors that are capital intensive will experience what the Rybczinsky Theorem predicts. The only exception is that when capital leaves services, production in foreign manufactures is reduced. This seems a bit puzzling since foreign manufactures are labor intensive and we would expect it to reduce production if they were capital intensive. However, note that the reduction in production in foreign manufactures is lower than the reduction in domestic manufactures which is a capital intensive sector.

(TABLES 5, 6 & 7)

We get an *a priori* surprising effect for agriculture production by multinationals. This sector increases its labor and capital demand very heavily (by 345%) when capital leaves the service sector, and even more (by 804%) when capital leaves the manufactures sector. A higher effect linked with manufactures makes sense given the higher amount of intermediate commodities traded between manufactures and agriculture than between the latest and services. Further, to explain this huge percentage changes one could argue that it is certainly a very tiny sector so that higher percentage increases are reached “easier”. Despite these enormous percentages in foreign agriculture the effect on total agricultural production is led by whatever happens in the domestic part of agriculture. This domestic part, in turn, reacts as predicted by its relative capital intensity and has percentage changes that are not so drastic.

Total production (the sum of foreign and domestic production for the three sectors) falls in the sectors where capital is gone, despite the counteracting reaction of domestic production (This is not shown in the tables). In fact, *an important result is that production falls in all sectors in the economy when capital leaves one of them*. When we were looking at the effects of capital increases we got that capitals directed to a particular sector did increase production in all sectors.

We turn now, after the analysis of the different sectors, to results regarding aggregate variables in the economy. An interesting result is that *capital outflows produce higher percentage changes in aggregate output (in absolute value) than the same amount of capital inflows* (Table 8). Why is this so? Some authors have noted that the Spanish economy has reached the level where capital increases have diminishing returns (Myro, 2003). It could well be the case that a capital increase puts the economy above the threshold of diminishing

returns, whereas when we diminish the amount of capital in the economy we may be at the other side of the threshold, so that a decrease in capital has a bigger reduction on output (because our production function is in the part where there are no diminishing returns). This is an important outcome to be explored further as it may involve alarming consequences for the delocalization process in the Spanish economy. We know, however, that part of the FDI outflows have to do with an increasing process of Spanish firms going abroad and not only with some foreign MNEs closing down their plants in Spain (Fernández Otheo and Myro, 2003; Fernández Otheo, 2003) . Although the first is certainly a sign of strength on behalf of Spanish MNEs, the second one is in some cases a clear decrease in the capital available in that economy.

(TABLES 8, 9 & 10)

A similar process is observed when looking at aggregate intermediate consumption. It falls more in percentage when capital diminishes than increases when there are capital inflows. One could think that whenever global production increases so will aggregate intermediate consumption do. This is, however, not always true, because the adjustment in levels of production of the different sectors leads sometimes to concentration of production in sectors that rely more on intermediate consumption in their production processes. An example of this is what happens with capitals outflows from agriculture. Capitals leaving that sector produce an increase in intermediate consumption, whereas capitals leaving manufactures and services produced a decrease (see table 9). As a result of that shock of capital leaving the foreign part of agriculture, production is increased in sectors which have more recourse to intermediate consumption so that total intermediate consumption increases.

Manufactures exerts a more important effect when looking at total output production and demand for intermediate consumption than services, services in turn exert a more important effect than agriculture (Table 8).

However, the differences between the effects of capital going to (or leaving) the three sectors boil down to a very small amount when looking straight to GDP measures. We do get the interesting result that capital inflows and outflows of the highest amount considered here produce an increase or decrease of around 2% in terms of GDP for the maximum increase in capital considered in the shocks⁹ (see details by sectors on table 10). The explanation about the evolution of GDP is grounded in the reallocation effects of total production and total intermediate consumption among sectors after the shock. Inflows in agriculture which cause a low increase in total production turn out to induce a fall in intermediate consumption which boosts the increase in GDP. Inflows in manufactures which yield the biggest increase in total aggregate production also yield the highest increase in intermediate consumption so that the effect on GDP is not as high as one could have expected just looking at aggregate production. Finally, inflows in services do have a lower effect on aggregate production than the ones in manufactures but as they increase intermediate consumption by a small amount in the end the effect on GDP is similar to the one in manufactures.

We do, of course, get the same in terms of GDP calculated from a demand point of view. From this side one can see how the little differences by sectors are related with the variations in taxations` levels in the sectors in Spain. Remember that public spending in this model stems from capital and labor taxes. And this is the component which explains the slight differences of GDP when changing capital levels in the three sectors considered. *The most profitable sector for the government is manufactures* where capital arrivals produce an increase in taxes,

⁹ Note, however, that percentage and absolute value changes in variables should not be taken strictly at the face value predicted by the model. As with many other types of models, results should be interpreted as dictating relative importance in adjustments and reactions among the different variables.

and correspondingly an increase in public spending of 0,78% for the maximum increase in capital considered so far (see Table 11). The effect on taxation when capitals leave that sector is bigger because remember there was a higher reduction in production levels, so that taxes are decreased by -1,4% (see Table 11). Increases of capital in services are less profitable for the government which gets an increase of taxes of 0,36% (always for the maximum increase in capital). While capitals leaving services are again more painful and lead to a reduction of taxes of -0,73%. As it is well known, agriculture has received a considerable amount of subsidies for years in the Spanish economy so increases of capital in that sector lead actually to a reduction in taxes of -0,91%. Capital leaving agriculture increase taxes slightly (a result not shown in the tables).

A common closure rule in one-country models dictates that foreign savings after the shock have to be equal to their level in the benchmark. Thus the evolution of imports and exports does not resemble their “natural” development, nor do their prices. Therefore we leave their analysis for a two or multi country framework, which will have to be addressed in future work. We are able to say, however, that although not captured in this model, presumably the initial inflow of FDI will lead to future repatriation of profits to the foreign MNE (i.e. and smaller outflow of money in the form of foreign exchange or euros), which will reduce the scope for future current account deficits (in concrete for commercial deficits, which is the most problematic balance within the current account). Uncomfortably assumptions about the real data on repatriation of profits will have to be made, because MNEs tend to use transfer prices among subsidiaries in the group to escape from public taxation.

Because we are in a Walrasian framework and at the present stage the model does not include unemployment, we are not able to infer any changes in total aggregate labor demand in the economy as a result of the shocks. There is always full employment and the quantity of labor

employed is after the simulations the same one as in the benchmark. Remember that we have considered a shock of the same quantity of capital increasing or decreasing its stock in a particular sector. Given all this, total income in the economy is the same no matter to which sector capital arrives or which sector it is leaving. We can, nonetheless, measure the increase expected in the aggregate variable after the biggest possible shock (an increase of 4,94% of the total capital stock available in the economy). The increase is 2,58% (see table 11).

Given that income increases by the same amount with capital increases (and decreases in the same manner) the evolution of household's savings (given by a constant marginal propensity to save) and the household consumption budget run parallel with the same percentage of variation as income. Utility which is also calculated in terms of consumption (see eq. 3) takes the same values no matter to which sector capital is going. But again it is interesting to get an idea of the percentage by which it increases or decreases. It is 2,83% for capital arrivals and has a negative sign when capital leaves (Tables 11 and 12).

7. Conclusions

The present model while being a preliminary version shows evidence of some important results, some of them are known from the literature and others are not.

Evidence is found of a *crowding out* effect following the arrival of foreign MNEs (or as a consequence of increased FDI inflows). The domestic counterpart involved in the process will always diminish production. This is an outcome mentioned by other authors. The rest of sectors, the ones that were not recipients of senders of the FDI flows, react as predicted by the Rybczinsky theorem.

Capital outflows on the other hand, do boost production of domestic firms in the sector they are leaving. Nonetheless, in the effect on total aggregate production prevails the decrease in the capital stock, i.e. total output production in the economy is reduced.

An interesting outcome is the different effect of capital outflows and inflows on global production. Capital outflows yield a higher decrease in production than the increase produced by the same amount in inflows. Further, these effects on production are stronger for manufactures than in services and also bigger in services than in agriculture.

Despite this, when it comes to GDP results the difference between sectors nearly vanishes and so do the differences between outflows and inflows.

These are the results extracted from a first approximation to the effect of MNEs and FDI flows based on capital stock variations on the foreign MNEs production in the Spanish economy.

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Appendix 1: Calibration

In our model, we use an income elasticity for agriculture commodities of 0.8, and of 1.0 and 1.0 for manufactures and services, respectively, in accordance with econometric evidence in Spain (Colino, 2003; Martínez Serrano and Picazo, 2003).

The expenditure elasticity of the marginal utility of expenditure, also called “Frisch parameter”, ϕ , takes a value of -1.1 in our model.

The elasticity substitution between capital and labor in a CES function, σF_1 , takes the values 0.56 in agriculture, 1.3 in manufactures and 1.3 in services (in all sectors we have assumed both foreign and domestic firms have the same elasticities). These values follow Hertel (1997).

The elasticity of substitution in the CET function, σT_i , is -3.9 in agriculture, -2.5 in manufactures and -0.7 in services, according to de Melo and Tarr (1992).

The elasticity of substitution of the Armington function, σA_i , takes the values 4.4 in agriculture, 5.0 in manufactures and 3.8 in services, according to Hertel (1997).

Appendix II: Tables

Table 1. Labor and capital intensity of sectors (percentages over value added)

	SecA	SecAF	SecM	SecMF	SecS	SecSF	Average
Labor	13,467	44,687	48,745	55,868	62,232	32,644	47,791
Capital	86,532	55,312	51,254	44,131	37,767	67,355	52,208

Note: A = agriculture, M = manufactures, S = services, F = foreign and its absence denotes it is domestic production.

Source: Bank of Spain ("Central de Balances")

Table 2. Effects of capital inflows in services on labor demand, capital demand and production (in percentage)

K increase	SecA	SecAF	SecM	SecMF	SecS	SecSF
0,29%	1.40	-20.23	0.20	0.01	-0.35	0.79
4,94%	7.10	-99.89	20.99	-29.05	-6.42	13.15

Note: total K increase is the amount by which the total capital stock of the economy is increased in the corresponding shock.

Table 3. Effects of capital inflows in manufactures on labor demand, capital demand and production (in percentage)

K increase	SecA	SecAF	SecM	SecMF	SecS	SecSF
0,29%	2.99	-43.27	-1.75	3.23	-0.31	0.83
4,94%	10.33	-99.90	-30.01	53.81	-10.75	21.24

Note: total K increase is the amount by which the total capital stock of the economy is increased in the corresponding shock.

Table 4. Effects of capital inflows in agriculture on labor demand, capital demand and production (in percentage)

K increase	SecA	SecAF	SecM	SecMF	SecS	SecSF
0,29%	-5.63	90.00	0.21	-0.24	-1.34	2.09
4,94%	-93.82	1500.00	3.42	-3.90	-22.25	34.86

Note: total K increase is the amount by which the total capital stock of the economy is increased in the corresponding shock.

Table 5. Effects of capital outflows in services on labor demand, capital demand and production (in percentage)

K Decrease	SecA	SecAF	SecM	SecMF	SecS	SecSF
- 0,29%	-1.43	20.60	-0.17	-0.06	0.35	-0.79
- 4,94%	-23.92	345.45	-2.68	-1.21	5.77	-13.15

Note: total K decrease is the amount by which the total capital stock of the economy is decreased in the corresponding shock.

Table 6. Effects of capital outflows in manufactures on labor demand, capital demand and production (in percentage)

K Decrease	SecA	SecAF	SecM	SecMF	SecS	SecSF
- 0,29%	-3.17	46.04	1.75	-3.23	0.28	-0.79
- 4,94%	-55.19	804.27	29.09	-53.81	4.36	-12.77

Note: total K decrease is the amount by which the total capital stock of the economy is decreased in the corresponding shock.

Table 7. Effects of capital outflows in agriculture on labor demand, capital demand and production (in percentage)

K Decrease	SecA	SecAF	SecM	SecMF	SecS	SecSF
0,29%	5.63	-90.00	-0.21	0.24	1.34	-2.09

Note: total K decrease is the amount by which the total capital stock of the economy is decreased in the corresponding shock. In the foreign agriculture sector there is not enough capital so as to study its -4,94% decrease.

Table 8. Effects of capital inflows and outflows in all sectors on Aggregate Output (in percentage)

K change	S		M		A	
	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows
0,29%	0.112	-0.113	0.177	-0.179	0.02167	-0.02163
4,94%	1.247	-1.882	2.460	-3.012	0.361	

Note: A = agriculture, M = manufactures, S = services

Table 9. Effects of capital inflows and outflows in all sectors on Intermediate Consumption (in percentage)

K change	S		M		A	
	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows
0,29%	0.086	-0.088	0.218	-0.223	-0.085	0.085
4,94%	0.200	-1.484	2.714	-3.764	-1.422	

Note: A = agriculture, M = manufactures, S = services

Table 10. Effects of capital inflows and outflows in all sectors on GDP
(in percentage)

K change	S		M		A	
	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows
0,29%	0.134	-0.133	0.141	-0.141	0.115	-0.115
4,94%	2.159	-2.229	2.239	-2.357	1.914	

Note: A = agriculture, M = manufactures, S = services

Table 11. Effects of INFLOWS in services, manufactures and agriculture on aggregate variables
(absolute values and percentage changes)

	Services	Manufactures	Agriculture
Return to capital (abs. val.)	-1.79E-07	2.59E-08	4.56E-07
Return to capital (%)	-1.79E-05	2.59E-06	4.56E-05
Wage rate (abs.val.)	-2.22E-07	-8.82E-08	5.64E-07
Wage rate (%)	-2.22E-05	-8.82E-06	5.64E-07
Consumption Price Index CPI (abs. val.)	2.22E-07	8.82E-08	-5.64E-07
Consumption Price Index CPI (%)	2.22E-05	8.82E-06	-5.64E-05
Income (abs. val.)	1484.192	1484.202	1484.234
Income (%)	2.580	2.580	2.580
Total savings (abs. val.)	423.382	423.378	423.382
Total savings (%)	2.661	2.661	2.661
Household savings (abs. val.)	423.373	423.376	423.385
Household savings (%)	2.580	2.580	2.580
Aggregate Consumption (abs. val.)	1060.819	1060.826	1060.848
Aggregate Consumption (%)	2.580	2.581	2.580
Consumption Budget (abs. val.)	1060.819	1060.826	1060.848
Consumption Budget (%)	2.580	2.581	2.580
Investment (abs. val.)	423.382	423.377	423.364
Investment (%)	2.661	2.661	2.661
Utility (abs. val.)	529.523	529.527	529.523
Utility %	2.839	2.839	2.839
Public Spending (abs. val.)	49.713	106.685	-123.984
Public Spending (%)	0.367	0.788	-0.916
Tax revenues (abs. val.)	49.716	106.685	-123.994
Tax revenues (%)	0.367	0.788	-0.916
GDP (abs. Val.)	1533.908	1590.887	1360.240
GDP (%)	2.159	2.239	1.914
Aggregate Production (abs. val.)	1657.624	3269.980	480.459
Aggregate Production (%)	1.247	2.460	0.361
Intermediate Consumption (abs. val.)	123.716	1679.093	-879.781
Intermediate Consumption (%)	0.200	2.714	-1.422
Capital Stock (abs. val.)	1484.204	1484.204	1484.204
Capital Stock (%)	4.943	4.943	4.943

Notes: we gather the effects of the capital increase corresponding to a 4,94% higher stock of total capital in the economy.

Absolute value changes are in thousand millions of pesetas (166.386 = 1 Euro).

Table 12. Effects of OUTFLOWS in services and manufactures on aggregate variables (absolute values and percentage changes)

	Services	Manufactures
Return to capital (abs. val.)	2.22E-07	1.54E-07
Return to capital (%)	2.22E-05	1.54E-05
Wage rate (abs.val.)	2.73E-07	5.07E-07
Wage rate (%)	2.73E-05	5.07E-05
Consumption Price Index CPI (abs. val.)	-2.73E-07	-5.07E-07
Consumption Price Index CPI (%)	-2.73E-05	-5.07E-05
Income (abs. val.)	-1484.190	-1484.185
Income (%)	-2.580	-2.580
Total savings (abs. val.)	-423.383	-423.386
Total savings (%)	-2.661	-2.661
Household savings (abs. val.)	-423.373	-423.372
Household savings (%)	-2.580	-2.580
Aggregate Consumption (abs. val.)	-1060.817	-1060.814
Aggregate. Consumption (%)	-2.580	-2.580
Consumption budget (abs. val.)	-1060.817	-1060.814
Consumption budget (%)	-2.580	-2.580
Investment (abs. val.)	-423.383	-423.386
Investment (%)	-2.661	-2.661
Utility (abs. val.)	-529.522	-529.521
Utility (%)	-2.839	-2.839
Public Spending (abs. val.)	-99.833	-190.768
Public Spending (%)	-0.738	-1.409
Tax revenues (abs. val.)	-99.837	-190.775
Tax revenues (%)	-0.738	-1.410
GDP (abs. val.)	-1584.027	-1674.960
GDP (%)	-2.229	-2.357
Aggregate Production (abs. val.)	-2502.249	-4003.692
Aggregate Production (%)	-1.882	-3.012
Intermediate Consumption (abs. val.)	-918.222	-2328.732
Intermediate Consumption (%)	-1.484	-3.764
Capital Stock (abs. val.)	-1484.204	-1484.204
Capital Stock (%)	-4.943	-4.943

Notes: we gather the effects of the capital decrease corresponding to a 4,94% lower stock of total capital in the economy.

Absolute value changes are in thousand millions of pesetas (166.386 = 1 Euro).

