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Foreign Direct Investment, Competitive Pressure and Spillovers. An Empirical Analysis on Spanish Firm Level Data

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Abstract

A short review of the theoretical and empirical evidence indicates that Foreign Direct Investment (FDI) has the potential to increase the intensity of competition as well as to act as a channel for technology transfers. One would expect, all else equal, an increase in average productivity following a wave of FDI, as multinational corporations (MNCs) enjoy higher levels of efficiency. At the same time, the entry of foreign firms has also been associated with an increase in competitive pressure on the domestic market. Using a large firm level data set covering all sectors of Spanish manufacturing during the period 1983-1996, we attempt to disentangle these two effects by estimating a dynamic model of firm level profitability. We find that FDI has a positive long-run effect on the profitability of target firms, but this is limited to firms belonging to R&D intensive sectors. In addition, the results indicate that foreign presence dampens margins. However, this effect appears to be more than compensated by positive spillovers in the case of knowledge intensive industries.

JEL Codes: F23; L40; L60.

Keywords: Foreign Direct Investment; Technology Transfer; Efficiency; Competition; Panel Data; GMM.

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1 Introduction

The explanations put forward to account for the observed patterns of foreign investment (FDI) are drawn from trade theory, industrial organisation, and the international business literature. Dunning's (1981) eclectic paradigm attempts to bring these different strands of the literature together, and it remains a standard reference for scholars studying FDI. His approach, typically referred to as the Ownership-Localisation-Internalisation (OLI) paradigm, stresses that three factors must be present for FDI to occur.

First, the potential or actual multinational must be endowed with some firm-specific ownership advantage not available to host country firms. The original idea is due to Hymer (1976), and it is commonly accepted as a necessary condition for FDI to occur. Second, there must be localisation advantages associated with foreign production. Third, internalisation advantages determine the choice of FDI as opposed to arm's length market transactions, such as licensing agreements, which may entail the diffusion of the multinational's assets to actual or potential competitors.[1]

The effect of FDI on host economies has been the subject of extensive research. As pointed out by Hanson (2001), both theory and empirical evidence provide mixed results on the net welfare effect of inward FDI on recipient countries. This is not so surprising, as theoretical models have identified a large number of FDI induced effects on product and factor markets that all contribute to alter welfare. In an early pioneering contribution, Caves (1974) conjectured that FDI influenced host country conditions through two main channels. On the one hand, FDI ought to result in technology transfers to host country firms. On the other hand, an important foreign presence could also increase the intensity

[1] See Markusen (1995) for a discussion.

of competition in the recipient country. By and large, the empirical literature has focused on the first of these two effects, possibly because unearthing the pro-competitive effect of FDI is not trivial.

The fact that MNCs are endowed with firm specific advantages that can easily be transferred across locations suggest that subsidiaries ought to enjoy higher levels of efficiency, and therefore profitability, compared to domestic firms. It is also a common observation that MNCs have the potential to generate positive spillovers in the host location (see Blomström and Kokko (1998) for a survey). This suggests that industries that are characterised by a high degree of knowledge spillovers and an increase in the degree of foreign presence should display higher levels of profitability. However, recent empirical evidence has cast doubts on the importance of these spillovers (see Hanson (2001) for an overview, and Aitken and Harrison (1999) for evidence pertaining to Venezuela).

As mentioned above, increased competition also figures among the many effects attributed to FDI (Caves (1974)). Depending on the mode of foreign entry and industry structure, the presence of MNCs may well increase competitive rivalry. While this conjecture is intuitively appealing, direct empirical evidence of the pro-competitive effect of FDI is limited, if not non-existent.[2]

The purpose of this paper is to attempt to disentangle empirically the efficiency, spillovers, and competition effects of FDI on firms' profitability. The issue is not trivial, as the these forces operate in opposite directions. On the one hand, the existence of firm specific intangible assets on the part of MNCs should result in higher profitability for foreign subsidiaries. In addition, the

[2] In his industry level study, Caves (1974) found that the profitability of Canadian domestics plants during the period 1965-67 was negatively correlated with the average share of foreign plants in industry sales. This finding was interpreted as evidence of the pro-competitive effect of FDI. Clearly, this finding can not be given a causal interpretation. Aitken and Harrison (1999) address a different, but closely related issue, namely the relationship between the degree of MNC activity and the productivity of domestically owned concerns. Their findings is that MNC "crowd-out" domestic concerns, leading to *lower* productivity.

possible existence of positive FDI related spillovers in an industry should increase the average profitability of host country firms (these two hypothese are discussed in more detail in the next section). The first effect is direct: MNCs transfer their intangibles internally, thus increasing the efficiency of subsidiaries, while the second is indirect as it works its way through spillovers. By contrast, the pro-competitive effect of FDI ought to depress the margins of firms that operate in industries that are characterised by an important foreign presence. Thus, distinguishing the relative importance of these opposing forces requires a careful empirical analysis. Furthermore, these effects may not necessarily be felt contemporaneously.

The main innovations contained in this paper are as follows. First, we use dynamics as our main identification argument. Concretely, we conjecture that the effects identified above will work their way through at a different pace. Second, we split our sample using R&D intensity, which provides an additional identifying hypothesis. Third, we use the identity of firms as a further check on the robustness of our results. Since Spanish owned firms typically lag foreign subsidiaries along the technological dimesion, domestic firms (as opposed to foreign subsidiaries) are likely to be the main beneficiaries of spillovers. Fourth, we apply the Generalised Method of Moments (GMM) in order to deal with endogeneity biases. This also allows us to properly account for industry and firm level fixed effects. As shown by Aitken and Harrison (1999), failing to control for industry and firm level fixed effects can yield spurious results.

We find that after controlling for potential endogeneity biases, FDI has a positive long-run effect on the profitability of target firms, but this is limited to R&D intensive sectors. In addition, domestically owned firms are the main recipient of spillovers in knowledge intensive industries. Last, the results indicate

that an important foreign presence dampens margins, at least in the short run. However, in the case of R&D intensive industries, this appears to be more than compensated by positive spillovers.

The rest of the paper is organised as follows. The next section indicates why, under fairly general conditions, FDI could be expected to act as a channel for technology transfers as well as influence the intensity of competition. Section 3 presents the data and describes how we constructed the variables. Section 4 contains the econometric specification as well the main results. Section 5 concludes.

2 Motivation and testable hypotheses

2.1 Technology transfers

The fact that MNCs possess firm-specific assets that confer them a competitive edge is well established in the literature (Markusen (1995)). By their very nature, these assets can be easily transferred back and forth across space. As such, this suggests that foreign owned firms will be more efficient and, as a general rule, more profitable.[3] It could of course be the case that the change in ownership from domestic to foreign leaves efficiency unchanged. This would occur if the MNC decides not to transfer any firm specific assets to its subsidiary.

There are nonetheless situations in which a change in ownership may result in a drop in profitability, at least in the short-run. If there are important costs associated with the change in management, profitability may initially drop. Lichtenberg and Siegel (1987) report that plants changing owners experienced a drop in productivity compared to plants that did not. In addition, the liter-

[3] In a wide class of models, a drop in costs leads to an increase in margins. A firm's Lerner index $((p-c)/p)$ is determined by the elasticity of the residual demand it faces. Except in the particular case of an iso-elastic residual demand, a drop in costs accompanied by a downward adjustment in prices (leading to larger sales) results in a fall in the elasticity of the residual demand faced by the firm.

ature on mergers and acquisitions also provides evidence that merged entities (irrespective of whether they involve a foreign partner) sometimes underperform their rivals. If these "teething problems" are real, a change of ownership from domestic to foreign is likely to be more costly compared to a situation only involving domestic entities. This may result from differences in culture, language, access to public authorities, or an inadequate knowledge of consumer preferences, that is, there may be specific disadvantages associated to "foreignness" (Harris and Robinson (2002)).[4]

The empirical literature on these issues is mixed. On the one hand, the superior performance of foreign owned firms has been widely documented and has become a "stylised fact" in the literature on MNCs (Conyon *et al.* (2002)). However, recent empirical work where endogeneity problems are controlled for casts more than a passing doubt on whether this "stylized fact" can be given a causal or structural interpretation. For instance, using a panel of Italian firms Benfratello and Sembenelli (2002) report evidence that, in the aggregate, a change in ownership from domestic to foreign has no effect on the productivity of the target. However, they also find that nationality matters since subsidiaries under US ownership tend to be more productive than firms under domestic ownership. In turn, this result points out that the transfer of knowledge implied by internalisation theory materialises only if the gap between the recipient and the investing country is sufficiently pronounced.

As mentioned above, FDI is believed to generate positive spillovers for domestically owned concerns (see Blomström and Kokko (1998) for an extensive

[4] A fall in the target firm's profitability may also occur when FDI is driven by a technology sourcing. This conjecture has received both theoretical and empirical support (for theoretical results, see Fosfuri and Motta (1999), Siotis (1999), and for empirical evidence Neven and Siotis (1996), Driffield and Love (2002)). However, while sourcing may be a realistic motive, its importance is likely to be very limited compared to "traditional" FDI, particularly in the context of Spain.

survey). Under this scenario, FDI would act as a channel for technology transfers for all firms operating in the industry (and not only the ones that are foreign owned).[5] However, this conjecture has received mixed empirical support in a number of recent papers using firm level data (see, among others, Haddad and Harrison (1993), Aitken and Harrison (1999), and Hanson (2001) for a discussion).

2.2 Competition

Conceptually, identifying the pro-competitive effect of FDI is more complex, as it is possible to imagine a myriad of different situations. In what follows, we limit ourselves to cases that can be interpreted within the framework of our empirical estimations. Empirically, the bulk of FDI is "horizontal" and concentrated in sectors were product differentiation is pervasive, i.e. imperfectly competitive industries characterised by entry barriers such as fixed costs that are often sunk (and may be endogenous or exogenous). Since MNCs are firms that already operate in a foreign market, and have presumably already incurred fixed costs, they are in a privileged position to compete with established domestic concerns. >From that perspective, an MNC is better positioned compared to a potential entrant with no previous experience (which explains why it is MNCs, and not a domestic entrant, that successfully erode the rents enjoyed by established domestic concerns). This conjecture applies to both vertically and horizontally differentiated industries.

A related and compelling argument pertaining to the pro-competitive effect of FDI is provided by Boone (2000). His analysis focuses on different parametrisations of competition. He shows that one of the few robust results is that

[5] As long as spillovers do not affect all firms simultaneously and uniformly within an industry, an increased foreign presence ought to result in higher margins, at least for some firms. In section 4, we provide evidence indicating that the effect of spillovers differs across firms.

competition ought to increase monotonically with marginal cost asymmetries across firms. More precisely, as long as efficiency gaps map into profitability differences, then an increase in cost asymmetry across firms will have a pro-competitive effect. His results obtain under a wide variety of parametrisations (e.g. Cournot *vs.* Bertrand). As a consequence, if FDI results in efficiency gains from the subsidiary, then it will generate a *ceteris paribus* increase in competition, at least in the short-run. Clearly, if MNCs lead to large scale exit of domestically owned firms, the pro-competitive effect on firms' profitability may vanish over time.

These results hold even if the MNC was exporting to the domestic market prior to the investment decision. In that case, the pro-competitive effect will be lessened, but it will not disappear altogether. The reason is that the elimination of transport costs allows the MNC to engage in more competitive pricing compared to a situation where it has to export.[6]

In addition, the change in ownership from domestic to foreign may result in important changes in the behaviour of the subsidiary. If prior to FDI there existed some degree of explicit or tacit collusion within the industry, the arrival of the MNC may endanger the stability of collusion. For instance, monitoring behaviour may become more difficult, particularly since the MNC has no previous "history" in the domestic market. Collusion may be re-established after a learning period, but foreign entry is likely to disrupt collusive outcomes, at least initially. Clearly, if the ownership transfer is followed by an output expansion on the part of the subsidiary, then the intensity of competition should also increase.

It is nonetheless possible to imagine polar situations in which FDI will result

[6]The existence of fixed costs is one of the determinant behind the choice of serving the foreign market through exports or by establishing a subsidiary. In case the MNC decides for the latter option, pricing will be determined by marginal costs (and not total costs).

in a dampening of competitive pressures.[7] FDI may lead to a crowding-out of domestic firms, followed by exit. In such a situation, successful predation will only dampen competition if re-entry costs are high. Also, FDI may reduce competition in the event that entry into the foreign market facilitates collusion. The reason is the following: FDI may increase multi-market contact, and thus make collusion easier to sustain (see Bernheim and Whinston (1990), and Neven and Siotis (1993) for a discussion in the context of FDI). Last, MNCs may be better placed to extract rents from host country governments, for instance by successfully lobbying for protection (Wang and Blomstrom (1982)). While these arguments are plausible (predation, multi-market contact, and rent seeking), their importance is likely to be limited in practice.

2.3 Testable hypotheses

Received theory suggests that a change in ownership from domestic to foreign should bring long-run efficiency and therefore profitability gains, especially in industries where proprietary assets such as technology and other intangibles are perceived to be important. However, there may also exist short-run costs associated with the transfer of ownership, so that the sign of the short-run effect of a change in ownership is ambiguous. If both effects are at work and our assumptions on the dynamics are correct, we expect the adjustment process to be described by an upward sloping function, possibly steeper for those industries where proprietary assets are more important.

As already mentioned, the long-run impact on profitability of MNC activity in an industry is instead unclear.[8] This is the case not only because the

[7] As mentioned above, FDI motivated by technology sourcing is likely to leave competitive conditions unchanged.

[8] Clearly, an alternative approach is to focus on what may appear at first sight as a clear-cut empirical relationship. For instance, a substantial foreign presence should be positively related with total factor productivity or labour productivity if spillovers are important. However, to the extent that competition reduces slack, or X-inefficiency in an industry, an increase in productivity is to be expected, *even if spillovers are non-existent*. In such a situation, the

competitive effect and the spillovers effect operate in opposite directions, but also because they are both unlikely to have only a transitory impact. In this perspective, we will let the data rank the relative long-run importance of the two channels. However, it seems reasonable to assume that the competitive effect is likely to become effective quickly after the change in ownership, whereas spillovers are more likely to take time to materialise.[9] Again, this suggests that the transition to the long-run impact (which can be positive or negative) should follow an upward sloping adjustment process.[10] Furthermore, this slope should be steeper for industries where proprietary assets are important, at least to the extent that these assets cannot be fully internalized by foreign affiliates.

An additional ambiguity regarding the effect of foreign presence in an industry may emerge in sectors where slack, or X-inefficiency, is present. Under such circumstances, the disciplining effect of FDI would principally affect costs, rather than pricing behaviour. The idea is that entry by an MNC makes markets more "contestable" (Baumol, Panzar, and Willig (1988)). The theory of contestability has been extensively discussed, and its empirical applications found to be limited. However, one insight that has emerged is that firms faced with actual or potential entry will have a very strong incentive to reduce their costs, without necessarily altering pricing behaviour in a significant manner (see Neven, Nuttall, and Seabright (1993) for a discussion). Last, if FDI results in the crowding-out of domestic concerns followed by large scale exit, profitability may well recover among surviving firms in the medium-term.

increase in productivity would be incorrectly attributed to spillovers. Furthermore, Aitken and Harrison (1999) provide evidence that, contrary to priors, a large MNC presence may reduce productivity among domestically owned concerns. This occurs when MNCs crowd-out their host-country counterparts.

[9] Common examples of spillovers found in the literature include: movement of skilled personnel, MNC subsidiaries acting as "role models" that are emulated by domestic firms, spillovers via common input suppliers etc... All of the above are likely to take time before their effect can be discerned in the data.

[10] While addressing a different issue (the effect of airline mergers on prices), Kim and Singal (1993) point out that the "efficiency" and "market power" effects of mergers work their way through at a different pace.

Finally, market shares, concentration and intangibles' intensity are the standard variables which enter a profitability equation. Both received theory and evidence indicate that all variables should be positively associated with profitability. As it is well known (see Martin, (2002)), previous firm-level studies find that the coefficient on market share is substantially larger and more significant than the coefficient on market concentration. This in turn seems to suggest that the strong positive effect of market concentration commonly found in industry-level studies reflects mainly firm characteristics and firm-specific market power, and not the joint exercise of market power.

3 Data and variable definition

3.1 Data

Our results are obtained by making use of an extensive survey of firms carried by the Bank of Spain since 1983, gathered in the database *Central de Balances*.[11] The data collected is comprehensive, each annual cross-section exceeds three thousand observations, and it covers all sectors of economic activity (except for financial institutions). Working with such a rich data set permits a proper treatment of endogeneity and firm-level fixed effects. This annual survey is made up of two questionnaires, one for large firms (number of employees greater than 100), and a shorter version for smaller firms.[12] The data used in this paper is to be found in both questionnaires, so that the entire sample of responding firms is available. Moreover, the variables that we use are all ratios, so that the

[11] Spain's recent experience represents an interesting case of liberalisation. In the early 1980's, the country was still in the midst of its political transition to democracy, and the economy had not yet been freed from the corporatist and interventionist policies of the previous regime. Shortly after, in 1986, the country joined the European Union (EU). This led to the progressive opening of the Spanish economy. In parallel, EU membership triggered a wave of domestic liberalisation meant to bring the Spanish economy into the European mainstream. Moreover, entry into the EU coincided with the most important liberalisation exercise in Europe since the 1960's, namely the implementation of the Single Market Programme. All these factors contributed to a large increase in FDI in Spain.

[12] In addition to the number of employee, there another two financial criteria (on turnover and assets). These thresholds are periodically revised and do not affect sample construction.

unavailability of sectorial deflators is not a major issue.

The original data file contains more than ninety one thousand observations (with one observation corresponding to data pertaining to one firm in a given year). The data is annual, for the time period 1983-1996. Given sample size, it is possible to impose strict filters, aimed at eliminating extreme observations (replies), or questionnaires for which some of the essential data is missing. The filters that are applied are detailed in the data appendix. The latter are those typically used by researchers familiar with *Central de Balances* (see, for instance, Vallés and Hernando (1994)).

Each firm is classified according to a nomenclature established by the Bank of Spain. This affiliation ranges from 2 digit broad sectors (26 for the whole economy) to intermediate (3-digit, 82 sectors). In this paper, we focus exclusively on manufacturing. In addition, we apply panel data techniques that require a minimum of four consecutive observations which results in a reduction in sample size. We dropped the few firms that changed sectorial affiliation, as well as observations pertaining to 3-digit sectors with less than 100 observations for the entire time period.[13] The final sample consists of 29318 observations. Tables 1 to 3 provide some basic statistics pertaining to our sample.

Insert Tables 1 to 3 about here

3.2 Variable definition

Our dependent variable is profitability, proxied by accounting price-cost margins. Accounting price-cost margins have been heavily criticised (Bresnahan (1989)). Nonetheless, there is increasing evidence indicating that this measure

[13] The three digit sectors that were dropped are: tobacco (66 obs.), weapons (34 obs.), and office equipment (63 obs.).

is not so flawed after all (Martin (2002)). Moreover, in a panel dataset, using accounting price cost margins as proxies for economic profitability is adequate as long as the bias that they incorporate is constant over time (Boone (2000)). Last, we are confident that for our dataset, accounting price cost margins are a reasonable proxy for economic profitability. Siotis (2002) estimates sectorial mark-ups by applying a modified version of Hall (1986) to this dataset. He reports that, apart from a scaling factor, sector wide accounting margins are very similar to mark-ups that are econometrically estimated. Typically, the correlation between sectorial accounting margins and estimated mark-ups stands above 0.8.

To get an accounting estimate of price cost margins, we adopt the methodology proposed by Domowitz, Hubbard and Petersen (1986). Price cost margins are defined as:

$$\left(\frac{p-c}{p}\right)_{it} = \left(\frac{\text{Value of sales} + \Delta \text{ inventories} - \text{payroll} - \text{cost of materials}}{\text{Value of sales} + \Delta \text{ inventories}}\right)_{it}$$

where Δ stands for "changes in", and i and t respectively index firms and time. The inclusion of inventory changes ensures that adjustment for business cycle fluctuations are catered for in our measure of price cost margins. According to the accounting definitions adopted in the *Central de Balances* survey, this is equivalent to:

$$\left(\frac{p-c}{p}\right)_{it} = PCM_{it} = \left(\frac{\text{Value added} - \text{payroll}}{\text{Value added} + \text{net cost of materials}}\right)_{it}$$

Central de Balances includes data on foreign ownership. We have defined the degree of foreign control by the percentage of foreign equity held by non-residents. This variable is labelled FOC ("C" denoting the fact that the variable

is continuous, and ranges from 0 to 1).[14]

In order to proxy the degree the of MNC activity in a given sector, we define the following variable that we label "foreign presence":

$$FP_{ijt} = \frac{\sum_{k=1,k\neq i}^{n} q_{kjt} * FOC_{kjt}}{\sum_{i=1}^{n} q_{ijt}}$$

where i, j, t respectively index the firm, sector, and time. In words, FP measures the proportion of output that is foreign controlled within a sector. The variable is computed at *Central de Balances'* three-digit level classification. This implies that we are only able to gauge the importance of intra-industry spillovers.

Central de Balances also provides data on the book value of intangible assets held by firms. We construct the variable $ITGS$ as follows:

$$ITGS_{it} = \frac{ITG_{it}}{q_{it}}$$

where ITG represents the value of intangibles. This variable serves to proxy the degree product differentiation.

Market share is defined as:

$$MS_{ijt} = \frac{q_{ijt}}{\sum_{i=1}^{n} q_{ijt}}$$

According to most oligopoly models, size differences within an industry reflect differential efficiency. MS is also defined at *Central de Balances'* three-digit level classification.

[14] We also defined another proxy that takes value zero if foreign equity stands below 10%, and 1 above this threshold (10% is the usual threshold used by national statistical agencies to determine whether the foreign company exercises effective corporate control). Another dummy is obtained by applying a correction to the 0-1 dummy. Concretely, some observations in the database could possibly contain coding errors. For instance, some firms report the following yearly pattern of foreign equity: 0%, 0%, 0%, 100%, 0%, 0%, or the opposite, 100%, 100%, 0%, 100%, 100%. For these occurrences, we have generated a new dummy that adjusts the data. That is, the first case has been transformed into one of zero foreign ownership, while the second into a fully owned subsidiary. We re-ran all our estimations using these proxies instead of FOC. The results are qualitatively very similar.

Last, we constructed the 3-digit level Hirschman-Herfindhal index of industry concentration:

$$HHI_{jt} = \sum_{i=1}^{n} (MS_{ijt})^2$$

Table *4* presents descriptive statistics pertaining to the variables that we use in the estimation.

Insert Table 4 about here

4 Econometric specification and results

4.1 Specification

In order to be able to recover both the short-run and long-run effects of our variables of interest, we estimated the following autoregressive distributed lag model:

$$\begin{aligned} PCM_{it} &= \beta_1 PCM_{i,t-1} + \beta_2 MS_{it} + \beta_3 HHI_{jt} + \beta_4 ITGS_{it} \\ &+\beta_5 FOC_{it} + \beta_6 FOC_{i,t-1} + \beta_7 FOC_{i,t-2} \\ &+\beta_8 FP_{it} + \beta_9 FP_{i,t-1} + \beta_{10} FP_{i,t-2} \\ &+\alpha_t + \alpha_i + v_{it} \end{aligned} \tag{1}$$

where α_t represents profitability shocks common to all firms in a given year, α_i is a firm-specific time-invariant component (possibly correlated with the other right hand-side variables) measuring among other things unobservable management quality, and v_{ijt} is a random disturbance.

All equations are estimated in first differences to remove the firm-specific effect α_i. A set of three-digit industry dummies is however kept in estimation

to allow for industry specific linear time trends in the levels of the dependent variable. Estimation is carried out by the Generalized Method of Moments (GMM) proposed by Arellano and Bond (1991). Since all regressors in our model are likely to be correlated with the idiosyncratic component of the error term v_{it}, OLS (as well as GLS) estimates would be biased and inconsistent, while GMM methodology provides consistent estimates of the parameters by making use of appropriate instruments. Provided that the idiosyncratic component is white noise, twice or more lagged variables in levels are legitimate instruments for the first differenced right hand-side variables. Since the assumption of no serial correlation in v_{it} is essential for the consistency of the GMM estimator, we report the results of first-order and second-order serial correlation tests and the Sargan tests of over-identifying restrictions.

One econometric issue which is worth commenting upon at this stage is that recent work by Blundell and Bond (1998) has shown that the standard GMM first difference procedure may be prone to the weak instrument problem, especially when some of the regressors tend to be highly persistent over time. For this reason, all equations presented in the next section have also been estimated by using the so-called GMM system. Our findings are virtually unaltered. However, the Sargan test strongly rejects the validity of the extra-orthogonality conditions required for the consistency of the GMM-system estimator. For this reason, in what follows we only comment upon the results obtained by using the GMM first difference procedure.

The specification presented in (1) has some attractive characteristics. First, the dynamic structure allows for a distinction between short-run and long-run effects. As argued in section 2.3, this dichotomy is important in the context of the research issues addressed in this paper. Second, estimation by GMM first-

differences ensures that the results are not driven by firm and industry level fixed effects. As shown by Aitken and Harrison (1999), the presence of fixed effects that are not controlled for yields spurious results. Third, the specification presented (1) encompasses a wide class of theoretical models. For instance, (1) is compatible with a Cournot oligopoly comprising asymmetric firms. The market share variable controls for efficiency differences across firms, while differences in demand elasticity across sectors are represented by α_i (as long as the elasticity of demand within a sector is constant over time).[15] In a similar vein, the fact that we control for the existence of intangibles implies that (1) could be embedded in a model of product differentiation.

4.2 Results

4.2.1 Pooled sample

Four sets of results are presented in Table 5, and for the time being, we focus on column (i) of Table 5 where all three digit sectors have been pooled. Comfortingly, second order autocorrelation is not present and the Sargan test provides evidence against the endogeneity of our choice of instruments. As expected, our control variables *MS* and *ITGS* are both positively signed even if the market share variable is less precisely estimated (but still significant at the 10% level). Concentration is wrongly signed and nowhere near significant.[16] The estimates for the time dummies are not reported. We simply note that the estimates are consistent with prior, that is, these dummies do a good job of picking-up cyclical factors. For instance, the dummies for 1992 and 1993 are significantly negative,

[15] Note that α_i accounts for *all* time invariant fixed effects. The latter may be idiosyncratic to the firm (e.g., management quality), or common to all firms within a sector (e.g., entry barriers or the elasticity of demand).

[16] In order to check that the "usual" associations between market share, concentration and margins were present in our sample, we re-ran our estimations with *MS* and *HHI* being treated as exogenous. The point estimates turned out to be positive and highly significant for MS, and small and insignificant for *HHI*. We have also re-estimated equation (1) with one and two-period lag *MS* and *HHI*; the results are qualitatively identical. See Ravenscraft (1983) on the relationship between concentration and margins, and Salinger (1990) for a general overview of profitability estimations.

years in which the Spanish economy was experiencing a deep recession. As for the 3-digit industry dummies, they are not jointly significant.

With respect to our central regressors, the following picture emerges. The variable associated with the degree of foreign ownership (FOC) indicate that in the short-run FDI has a negative and significant effect on profitability. This contemporaneous effect is negative and significant at the 5% significance level. There are a number of non-competing explanations for this finding. First, it may be the case that becoming an MNC's subsidiary involves real costs, particularly in the short-run. The latter may be the result of a re-organisation process and/or to differences between the MNCs' management style (so called "teething problems"). Second, the initial drop in margins may reflect the tendency to endogenously inflate one's results in the face of a realistic prospect of being taken over by a multinational. Whatever the reason, as it can be seen in Figure 1 where the adjustment path implied by our dynamic specification is pictured against time, this negative effect tends to vanish over the years, indicating that the fall in profitability is transient. Indeed a non-linear Wald test confirms that the long-run multiplier turns out to be not significantly different from zero.[17] Taken at their face values, our overall results point out that a change in ownership from domestic to foreign has no long-run effect on profitability, a finding in line with those reported by Benfratello and Sembenelli (2002). This probably goes against the common wisdom which associates foreign ownership with higher levels of productivity or profitability. However, it must be borne in mind that our results do not say that foreign controlled firms are not more productive

[17] Concretely, a non-linear Wald test for the effect of foreign ownership tests whether

$$\frac{\beta_5 + \beta_6 + \beta_7}{1 - \beta_1}$$

is different from zero.

than their domestic counterparts. This may still be the case if, for instance, foreign owners tend to pick up the best domestic firms and concentrate in high mark-up sectors. What our results suggest is that existing descriptive evidence (as well as econometric findings that do not address properly all endogeneity issues) should not be interpreted as a causal relation, possibly supporting policy measures in favour of foreign ownership.

Insert Table 5 and Figure1 about here

As for foreign presence, we find weak evidence that a larger foreign presence dampens margins in the short-run, possibly because it enhances the stance of competition. The coefficient on the contemporaneous variable for foreign presence (FP) is negative, but not significant at conventional levels. In addition, as it can be seen from Figure 1, this effect does not persist over time. Indeed, even if not significantly different from zero, the long run multiplier is positive. These results are not inconsistent with the conjecture that MNC activity at the industry level generate effects on profitability that go in opposite directions, and that are therefore difficult to unearth empirically.

4.2.2 R&D versus non-R&D intensive industries

In what follows, we deal with this issue by splitting the sample according to priors. Concretely, we expect direct technology transfers and spillovers to be particularly strong in knowledge intensive sectors. After all, these industries are the ones where spillovers are more likely to materialise, and where multinationals may be expected to transfer intangibles to their subsidiaries. In *Central de Balances*, only a subset of firms report their R&D spending, and the series is not available before 1986. Nevertheless, this data enables us to construct a

proxy for R&D intensity at the 3-digit level for the period 1986-1996. Sectorial R&D intensity is defined as:

$$RDI_j = \frac{\sum_{i=1}^{n} RDE_{i,j}}{\sum_{i=1}^{n} q_{i,j}}$$

where RDE is R&D expenditure at the firm level. Thus, RDI_j takes a single value for each of our 3-digit sectors. The splitting criteria that we applied to define R&D intensive sectors is an intensity greater or equal than 2%.[18] Four industries fall in this category (pharmaceuticals, electronics, precision instruments, and aerospace), and they account for 2184 observations. Two dummies were constructed accordingly:

$$\begin{cases} RD = 1 \text{ if } RDI_j \geq 0.02 \\ NRD = 1 - RD \text{ if } RDI_j < 0.02 \end{cases}$$

Both RD and NRD were interacted with FP and FOC. Three sets of results are presented in columns (ii)-(iv) of Table 5. In column (ii), the interacted regressors as well as industry dummies are introduced. Since the latter are not jointly significant, column (iii) presents the same specification without industry dummies. Last, in column (iv), concentration is dropped since it did not prove significant in any of the specifications. As before, there is no evidence of second order autocorrelation of the errors, and the Sargan mispecification tests are satisfactory in the case of columns (ii) and (iii), but less so in (iv) (still, we cannot reject the null at the 1% level).[19]

Insert Figures 2 and 3 about here

[18] Spanish firms are among the lowest R&D spenders in the OECD area.

[19] It should be borne in mind that the twp-step Sargan test has a tendency to over-reject the null hypothesis of adequate instruments (see Arellano and Bond (1998) for a discussion).

Both *ITGS* and *MS* maintain their sign. The latter variable is less precisely estimated, while the former remains highly significant. As for the variables of interest, the same picture emerges from all specifications. In non-R&D intensive sectors, a change in ownership has no long-run effect on profitability. However, the pattern described previously is maintained: margins initially fall, and this effect is significant at the 1% level. After one lag, margins recover, and this effect is significant at the 5% level. With the 2-period lag also being positive (though not significant), the long-run effect is negative, but not significantly different from zero as indicated by the Wald test and the dynamic adjustment path depicted in Figure 2 (derived from specification (iv)). Regarding foreign presence in non-R&D intensive sectors, the contemporaneous effect is significantly negative in the case of columns (ii) and (iv) (while it is only so at the 15% level in the case of specification (iii)). We take this as evidence that an increase in MNC presence increases competitive pressure in the short-run. However, with exception of specification (iv), this effect vanishes over time, as indicated by the adjustment path and the Wald test. This is consistent with the conjecture that FDI both increases competitive pressure and generates positive externalities for host country firms (see Figure 3, also derived from specification (iv)).

The results for the four R&D intensive industries are significantly different from the results we find for the sample which includes all other industries. In fact, the tests on the equality of the long-run effects between the two samples of industries always reject the restrictions of equal coefficients both for the foreign ownership (FP) and for the foreign presence (FOC) variables. Also, our findings are consistent with the theoretical predictions put forward in the testable hypotheses section. With regard to foreign ownership, we find a statistically significant positive effect that takes time to materialise (the 2-period lag coefficient

is the most significant). This is in line with the idea that MNCs do transfer firm specific assets to their subsidiaries in these industries, and also that there is a learning period before these assets are successfully exploited (see also Figure 2). While not individually significant at standard confidence levels, the coefficients associated with foreign presence indicate that the long-run effect on profitability of MNC presence is always positive and significant. This finding suggests that the positive spillover effect dominates the pro-competitive effect in the case of R&D intensive industries.[20] Furthermore, as expected, the adjustment path pictured in Figure 3 is upward sloping, thus pointing out that it indeed takes time for spillovers to materialise.

4.2.3 Competition versus spillovers in R&D intensive industries

We further explore these issues by exploiting an additional identification condition. If technological spillovers are indeed present in R&D intensive industries, we would expect domestic firms to be the main beneficiaries. This hypothesis is motivated by the fact that Spanish firms are more likely to lag foreign subsidiaries. While the origin country of MNCs is unavailable in *Central de Balances*, aggregate FDI figures indicate that the main investors come from the US and more advanced Western European economies (e.g., from France, Germany and the UK). It is therefore likely that spillovers will primarily stem from subsidiaries to domestic entities. Clearly, this does not preclude positive technological externalities flowing across foreign subsidiaries; our conjecture is simply that the spillover effect will be felt more acutely by domestic firms.

[20] We are faced with a potential identification problem in interpreting these findings. In the four R&D sectors that we identified, it could be the case that the increase in profitability experienced by domestic firms is a by-product of an increase R&D effort on their part, partially spurred by the increased presence of foreign firms. Data limitations prevent us from directly tackling this issue. However, OECD data (ANBERD database, 2000 release) do not suggest that Spanish firms belonging to the four sectors labelled as R&D intensive significantly increased their R&D outlays during our sample period. The same holds true for firms that reported R&D expenditure in *Central de Balances*.

We therefore constructed two additional variables. First, we define a foreign and domestic dummy as:

$$\begin{cases} DOD = 1 \text{ if } FOC = 0, \text{ 0 otherwise} \\ FOD = 1 \text{ if } FOC > 0, \text{ 0 otherwise} \end{cases}$$

That is, a firm with any positive amount of equity held by non-residents is deemed foreign owned. We then interacted these dummies with our measure of foreign presence (FP) in R&D intensive sectors. In order to check the robustness of our results, used an alternative definition of "foreignness", that is:

$$\begin{cases} DOD = 1 \text{ if } FOC < 0.1, \text{ 0 otherwise} \\ FOD = 1 \text{ if } FOC \geq 0.1, \text{ 0 otherwise} \end{cases}$$

which implies that only firms whose foreign owned equity was 10% or more are considered as subsidiaries. These additional results are presented in Table 6. In column (i) we applied the first definition of multinationality, while we used the alternative measure in column (ii). As before, the traditional determinants of profitability have the expected sign. As for our variables of interest, their sign, significance, and long vs. short run effects are the same as before in non-R&D intensive sectors.[21] We take this as evidence that our results are robust across specifications. In R&D intensive sectors, the direct effect of foreign ownership ($FOC*RD$) continues to positive and significant in the long-run. Regarding foreign presence, we find that its long-run effect is positive and significant for both domestic firms and foreign subsidiaries. However, it appears that domestic firms are the main beneficiaries of an increase in multinational activity: the point estimate for $FP*RD*DOD$ is about twice as large as that of $FP*RD*FOD$ (see also Figure 4 where the adjustment process based on the results in column

[21] We also re-ran our estimations by interacting the foreign and domestic dummy variables in non-R&D intensive sectors. No marked difference emerged between domestically owned concerns and foreign subsidiaries.

(ii) is plotted for domestic firms and foreign subsisiaries). These results are consistent with the conjecture that, as compared to their foreign-owned counterparts, domestic firms belonging to R&D intensive sectors have been the main beneficiaries of spillovers.

5 Conclusions

In this paper, we have attempted to disentangle some of the effects usually attributed to FDI. On the one hand, the fact that MNCs possess firm specific advantages that can be transferred back and forth across locations suggest that subsidiaries ought to enjoy greater levels of efficiency, and therefore profitability. Overall, we find support for this conjecture, but this is limited to R&D intensive sectors. For the rest of manufacturing, the long-run effect of a change from domestic to foreign ownership is nil. In line with the existing literature, we do find evidence of transient costs associated with a change in ownership. With regard to the impact of foreign presence on profitability, the dichotomy between R&D and non-R&D sectors is also present. For non-R&D sectors, we find that increased multinational presence dampens margins. However, this effect tends to vanish over time, a finding that can be interpreted as evidence that MNCs also generate positive externalities for host country firms. This conjecture is further supported by the results pertaining to the impact of foreign presence in R&D intensive sectors. In the latter case, the positive spillover effect dominates, a result consistent with priors. Finally, we find evidence consistent with the idea that domestic firms belonging to R&D intensive sectors are the main beneficiaries of spillovers. This should come as no surprise, given that Spanish entities are likely to lag their foreign-owned counterparts.

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Data Appendix

The data was filtered in order to systematically eliminate observations of dubious value.

Labour input: firms reporting non positive values for this variable were dropped.

Gross output: firms reporting non-positive values for this variable were eliminated.

Accounting price-cost margins (PCM): observations for which this variable took a value greater or equal to one were dropped. We also dropped margins lower or equal than -1.

We also dropped observations that reported a negative value for net fixed assets.

We dropped the upper and lower 0.01 percentiles of *MS* and *PCM*.

Firms that changed their 3-digit sectorial affiliation during the sample period were dropped from the sample.

Table 1: Number of Consecutive Observations

Cons. Obs.	Firms
4	529
5	475
6	420
7	307
8	310
9	251
10	276
11	257
12	178
13	200
14	364
Total	3567

Table 2: Number of Observations by Year

Year	Observations
1983	1178
1984	1573
1985	1920
1986	2333
1987	2597
1988	2613
1989	2596
1990	2489
1991	2346
1992	2258
1993	2185
1994	1980
1995	1821
1996	1429
Total	29318

Table 3: Number of Observations by Sector

Sector	Observations
Food, Beverages and Tobacco	5833
Chemicals	3832
Mineral Products	2355
Metal Goods	2314
Mechanical Engineering	2596
Electrical and Instrument Engineering	1945
Transport Equipment	1563
Textiles and Clothing	3206
Leather and Leather Products	907
Wood and Wooden Products	911
Paper, Printing and Publishing	2373
Rubber and Plastics	1483
Total	29318

Table 4: Descriptive Statistics

Variables	Mean	St. Dev.	1 Pct	Med.	99 Pct
Price Cost Margins (PCM)	0.104	0.089	−0.155	0.098	0.360
3-digit Market Share (MS)	0.015	0.039	0.000	0.004	0.185
3-digit HH index (HHI)	0.063	0.065	0.016	0.052	0.363
Intangibles over Sales ($ITGS$)	0.014	0.078	0.000	0.000	0.237
Foreign Ownership (FOC)	0.153	0.331	0.000	0.000	1.000
Foreign Ownership Dummy (FOD)	0.199	0.399	0.000	0.000	1.000
Adj. Foreign Own. Dummy ($FODA$)	0.200	0.400	0.000	0.000	1.000
3-digit Foreign Presence (FP)	0.294	0.187	0.015	0.227	0.792

Table 5: Equation Results

	(i)	(ii)	(iii)	(iv)
PCM_{t-1}	0.445(0.00)	0.441(0.00)	0.447(0.00)	0.442(0.00)
MS_t	0.275(0.08)	0.252(0.13)	0.242(0.17)	0.161(0.36)
HHI_t	−0.013(0.87)	0.047(0.53)	0.126(0.20)	
$ITGS_t$	0.098(0.00)	0.098(0.00)	0.098(0.00)	0.096(0.00)
FOC_t	−0.084(0.03)			
FOC_{t-1}	0.080(0.01)			
FOC_{t-2}	0.012(0.15)			
FP_t	−0.031(0.26)			
FP_{t-1}	0.014(0.54)			
FP_{t-2}	0.032(0.09)			
$FOC_t * RD$		0.058(0.11)	0.042(0.31)	0.053(0.20)
$FOC_{t-1} * RD$		0.055(0.22)	0.040(0.39)	0.046(0.34)
$FOC_{t-2} * RD$		0.046(0.07)	0.044(0.09)	0.043(0.11)
$FOC_t * NRD$		−0.125(0.01)	−0.125(0.01)	−0.133(0.01)
$FOC_{t-1} * NRD$		0.100(0.01)	0.092(0.02)	0.090(0.03)
$FOC_{t-2} * NRD$		0.009(0.34)	0.007(0.46)	0.006(0.50)
$FP_t * RD$		0.051(0.21)	0.036(0.38)	0.031(0.43)
$FP_{t-1} * RD$		0.021(0.52)	0.050(0.31)	0.118(0.12)
$FP_{t-2} * RD$		0.080(0.11)	0.043(0.32)	0.048(0.31)
$FP_t * NRD$		−0.050(0.07)	−0.045(0.15)	−0.078(0.07)
$FP_{t-1} * NRD$		0.014(0.60)	−0.001(0.97)	−0.042(0.43)
$FP_{t-2} * NRD$		0.017(0.28)	0.015(0.30)	0.007(0.66)
m_1	−14.82(0.00)	−14.23(0.00)	−14.35(0.00)	−14.01(0.00)
m_2	1.47(0.14)	1.39(0.16)	1.48(0.14)	1.40(0.16)
$Sargan$	140.79(0.17)	190.67(0.08)	193.09(0.06)	182.88(0.01)
Test on joint sig.of ID	32.49(0.39)	36.05(0.24)		
FOC LR effect	0.011(0.77)			
RD FOC LR effect		0.284(0.03)	0.228(0.12)	0.254(0.08)
Non-RD FOC LR effect		-0.029(0.62)	-0.047(0.42)	-0.066(0.28)
Test on FOC restriction		0.313(0.06)	0.275(0.07)	0.320(0.01)
FP LR effect	0.027(0.64)			
RD FP LR effect		0.272(0.08)	0.234(0.10)	0.353(0.05)
Non-RD FP LR effect		-0.045(0.53)	-0.056(0.45)	-0.203(0.08)
Test on FP restriction		0.317(0.02)	0.290(0.07)	0.556(0.04)

Note: All estimates include a full set of time dummies as regressors and instruments. Estimates in columns (i) and (ii) also include a set of three-digit industry dummies as regressors and instruments. Additional instruments are:

in column (i) $PCM(2,3)$, $MS(2,3)$, $HHI(2,3)$, $ITGS(2,3)$, FOC(2,3), FP(2,3);

in columns (ii) and (iii) $PCM(2,3)$, $MS(2,3)$, $HHI(2,3)$, $ITGS(2,3)$, $FOC*RD(2,3)$, $FOC*NRD(2,3)$, $FP*RD(2,3)$, $FP*NRD(2,3)$;

in column (iv) $PCM(2,3)$, $MS(2,3)$, $ITGS(2,3)$, $FOC*RD(2,3)$, $FOC*NRD(2,3)$, $FP*RD(2,3)$, $FP*NRD(2,3)$.

P-values in round brackets. The null hypothesis that each coefficient is equal to zero is tested using one-step robust standard errors. $m_1(m_2)$ is a test of the null hypothesis of no first (second) order serial correlation. Sargan is a test of the validity of the overidentifying restrictions based on the efficient two-step GMM estimator.

Table 6: Additional Equation Results

	(i)	(ii)
PCM_{t-1}	0.439(0.00)	0.439(0.00)
MS_t	0.197(0.28)	0.213(0.24)
HHI_t		
$ITGS_t$	0.097(0.00)	0.094(0.00)
$FOC_t * RD$	0.064(0.22)	0.079(0.19)
$FOC_{t-1} * RD$	0.076(0.19)	0.065(0.30)
$FOC_{t-2} * RD$	0.048(0.20)	0.051(0.19)
$FOC_t * NRD$	−0.133(0.01)	−0.132(0.01)
$FOC_{t-1} * NRD$	0.093(0.03)	0.093(0.02)
$FOC_{t-2} * NRD$	0.007(0.46)	0.007(0.46)
$FP_t * RD * FOD_t$	−0.002(0.96)	−0.028(0.66)
$FP_{t-1} * RD * FOD_{t-1}$	0.092(0.15)	0.098(0.17)
$FP_{t-2} * RD * FOD_{t-2}$	0.042(0.44)	0.037(0.51)
$FP_t * RD * DOD_t$	0.039(0.51)	0.059(0.37)
$FP_{t-2} * RD * DOD_{t-1}$	0.133(0.17)	0.127(0.21)
$FP_{t-2} * RD * DOD_{t-2}$	0.053(0.31)	0.056(0.28)
$FP_t * NRD$	−0.078(0.07)	−0.076(0.08)
$FP_{t-1} * NRD$	−0.038(0.48)	−0.035(0.51)
$FP_{t-2} * NRD$	0.008(0.62)	0.008(0.60)
m_1	−14.14(0.00)	−14.15(0.00)
m_2	1.39(0.16)	1.39(0.17)
$Sargan$	191.67(0.05)	193.98(0.04)
RD FOC LR effect	0.335(0.02)	0.348(0.01)
Non-RD FOC LR effect	−0.059(0.33)	−0.056(0.34)
Test on FOC restriction	0.394(0.01)	0.404(0.01)
RD FP DOD LR effect	0.401(0.06)	0.431(0.03)
RD FP FOD LR effect	0.225(0.11)	0.191(0.20)
Test on RD FP restriction	0.169(0.32)	0.240(0.16)
Non-RD FP LR effect	−0.193(0.10)	−0.184(0.11)

Note: in column (i) FOD is equal to one if FOC>0, and zero otherwise. In column (ii) FOD is instead equal to one if FOC>0.1, and zero otherwise. All estimates include a full set of time dummies as regressors and instruments. Additional instruments are: PCM(2,3), MS(2,3), $ITGS$(2,3), FOC*RD(2,3), FOC*NRD(2,3), FP*RD*FOD(2,3), FP*RD*DOD(2,3),FP*NRD(2,3).

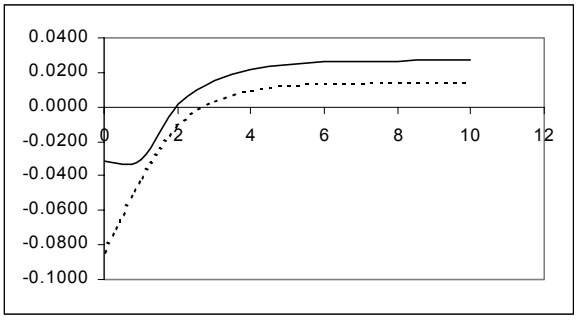

Figure 1: Aggregate Dynamic Effect on Profitability of Foreign Ownership (dotted line) and Foreign Presence (continuous line)

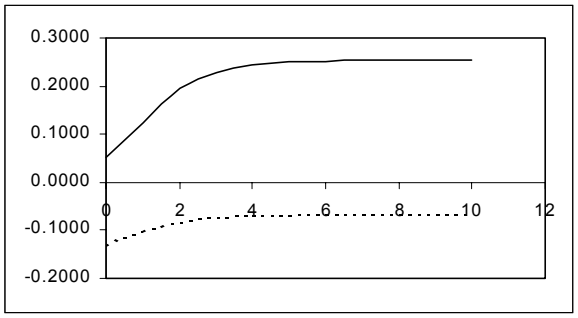

Figure 2: Dynamic Effect on Profitability of Foreign Ownership - R&D (continuous line) versus non-R&D (dotted line) Intensive Industries

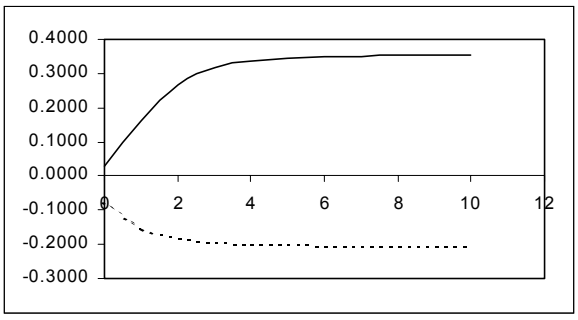

Figure 3: Dynamic Effect on Profitability of Foreign Presence - R&D (continuos line) versus non-R&D (dotted line) Intensive Industries

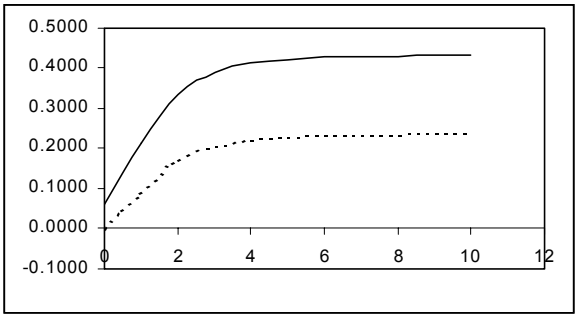

Figure 4: Dynamic Effect on Profitability of Foreign Presence in R&D Intensive Industries - Domestic Firms (continuous line) versus Foreign Firms (dotted line)