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ARTICLE INFO	R.V. Goedegebuure (2006). The Effects of Outward Foreign Direct Investment on Domestic Investment. *Investment Management and Financial Innovations*, *3*(1)
RELEASED ON	Wednesday, 01 March 2006
JOURNAL	"Investment Management and Financial Innovations"
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES
0

NUMBER OF FIGURES
0

NUMBER OF TABLES
0

The Effects of Outward Foreign Direct Investment on Domestic Investment

R.V. Goedegebuure[1]

Abstract

This article examines the relationship between outward foreign direct investments and domestic investments. It has been argued in the literature that such analysis should make a distinction between R&D intensive (Schumpeterian) and traditional (Heckscher-Ohlin) type of industries. In line with this argument, two types of domestic investments have been distinguished: investments in R&D and capital investments (equipment; machinery). The paper provides strong empirical evidence that investments in R&D are positively correlated to outward FDI, especially in high-tech industries and companies. In addition, there is evidence that capital investments are also positively correlated to outward FDI, which indicates that the positive effects – related to the marketing seeking and strategic asset seeking motives for FDI – outweigh the negative effects of efficiency seeking. The expectation that within low-tech industries and companies R&D investments are unrelated to outward FDI, and capital investments are negatively related to outward FDI is not confirmed. Overall, the analyses indicate that there is no justification for scepticism regarding the impact of outward FDI on domestic activity.

Key words: Multinational enterprises, domestic investments, foreign direct investment (FDI), Schumpeterian industries, traditional industries.

JEL classification: F21, F23

1. Introduction

In the industrialized world, several small economies serve as the home base for a number of sizeable multinational enterprises (MNEs). The scale of FDI by MNEs from countries such as Sweden, Switzerland and the Netherlands, puts them among the largest investor nations in the world. But in addition to that, MNEs are also the main providers of domestic investments in these small countries. Due to this *double dominance* (Belderbos, 1992), the worry especially in small countries is that the increasing levels of outward foreign direct investment (FDI) at some stage might substitute for domestic investments. Given the importance of this possible substitution effect, surprisingly little has been written about the relationship between outward FDI and domestic investment.

Most literature has focused on the relationship between inward FDI and domestic investment, and the relationship between outward FDI and exports (Swedenborg, 1979; Blomström *et al*., 1988; Lipsey and Weiss, 1984; Kravis and Lipsey, 1988; Fontagné, 1998). The latter strand is quite important since it is indirectly linked to the topic at hand. If outward FDI leads to an increase in exports, then most likely it leads to a concomitant increase in domestic investment. Most of the empirical studies on the effect of outward FDI on exports conclude that the effect is overall positive, even though the strength of the effect differs across studies, and some of the studies have found that the effect may be negative in certain periods of time.

This time dependency is interesting for theoretical and empirical reasons. It is in line with theories (Vernon, 1966; Johansen & Wiedersheim-Paul, 1975; Daniels & Radebaugh, 2004) that suggest that there is a logical pattern of international expansion. Although Vernon assumed that industrialized countries, and especially the US, have a competitive advantage in R&D and innovation over other countries, it seems that in the beginning of the new millennium, many MNEs have started to adopt global strategies, and it is becoming ever more harder to predict what the consequences of internationalization strategies will be for the domestic economy.

[1] The author likes to thank Statistics Netherlands, and in particular Bert Diederen, for his indispensable help in completing this project.

In a study on Dutch MNEs, Goedegebuure (2000, 2002) concluded that although there is a trend toward further internationalization of all activities including R&D, internationalization strategies in this respect vary widely. A main reason for the decreased unpredictability is that the motives for FDI are rapidly shifting from market seeking and efficiency seeking toward strategic asset seeking, whereby – in the context of regionalization as distinct from internationalization – MNEs are seeking for economies of scale and scope in order to cope with increased global competition.

In its report *Globalization through trade and FDI*, Eurostat (1988) cites an UNCTAD report (Unctad, 1996) in explaining why the discussion on the linkages between international trade and FDI is still at the beginning: "one of the principal reasons [..] is that the theoretical explanations of these two distinct yet interlinked activities have largely gone their separate ways". The report summarizes a number of substitutive and complementary forces, and then concludes that, since there is no distinct theoretical answer to the question whether FDI is either a substitute of, or complementary to international trade, an empirical assessment is needed. However, the report notes that the lack of data at the disaggregated level has undermined the quality of empirical analyses on the relation between FDI and international trade.

This article will take a look at the relationship between outward FDI and domestic investment. In section 2, an overview of the scarce literature on the matter will be given. On the basis of this literature, a number of hypotheses will be formulated (section 3). Before testing these hypotheses in section 5, section 4 will describe the project that is carried out within the Netherlands and that provides the data needed in order to analyse the relationship between outward FDI and domestic investment. Section 6 will summarize the findings.

2. Overview of literature on the relationship between outward FDI and domestic investment

Belderbos (1992), in a study on a number of Dutch industries (food; metal/electronics) provides evidence of a substitution effect. If the Netherlands as an investment site becomes less advantageous relative to foreign locations, then Dutch MNEs will allocate more capital abroad and invest less domestically, and vice versa. According to Belderbos, the small economy is more vulnerable in case of the presence of large MNEs. When external shocks affect the profitability of investment in the domestic economy, then MNEs might aggravate mild recession by responding in reallocating investment abroad. On the other hand, the ability of large MNEs to allocate global investments according to relative profitability will facilitate a more rapid transition of the domestic economy to an industry structure that is in accordance with its comparative advantages.

Braunerhjelm & Oxelheim (2000) examine the effects of European integration on the location of investments by Swedish MNEs. They present evidence about the extent to which European integration has attracted investment by Swedish MNEs, and whether foreign direct investment is being undertaken at the expense of home country investment. The authors conclude on a significant difference across industries. A strong substitutionary relationship between outward FDI and domestic investment was found for more R&D-intensive production, whereas the opposite pattern seems to prevail for production based on traditional comparative advantages.

From a financial point of view, the existence of a substitutionary relationship has been claimed, since domestic investment has to compete with FDI for scarce funds in terms of retained corporate earnings (cf. Belderbos, 1992). Braunerhjelm & Oxelheim argue that in a world of close-to-perfect financial integration, these arguments should be of minor importance. They do stress that the analysis of the effect of outward FDI on domestic investment needs to be done at the disaggregated level of industries, since an overall positive relationship might draw the attention away from the negative relationship in R&D-intensive, *Schumpeterian* industries. A substitutionary relationship may be a signal that the country is losing in its attractiveness, or competitiveness, relative to other countries.

Feldstein (1994), in a macro-oriented paper, has found on the basis of data for the major countries in the OECD, that each dollar of cross-border flow of foreign direct investment reduces domestic investment by approximately one dollar. In other words, there is a dollar-for-dollar, full substitution. In contrast to most other studies, Feldstein's analysis is based on total flows, implying that it does not suf-

fer from the partial flavour that characterizes those studies in which the information emanates from a limited number of industries or firms (cf. Braunerhjelm & Oxelheim, 2000, p. 202).

Noorzoy (1980) reports that the outflows of capital will stimulate domestic investment. His conclusion that the results mildly support the hypothesis on the positive effect of capital outflows is based on the analysis of longitudinal data in the period of 1959-1971.

Stevens & Lipsey (1992), argued that the positive correlation found by Noorzoy (1980) and others (e.g. Herring & Willett, 1973) should not be understood as a causal relationship, since the causal role falls to demand conditions in domestic and foreign markets and to the level of internal financing. The effect of the latter variable is dominant in explaining the positive correlation. Since both domestic and foreign expenditures are positively related to the firm's worldwide supply of internal funds, they will tend to be positively correlated. Like Belderbos (1992) they indicate that an exogenous shock to demand in a given location will induce a negative correlation between fixed investment at home and abroad. More favourable investment opportunities in one area tend to reduce investment in the other, because *ceteris paribus* the firm's debt/asset ratio and cost of capital tend to rise.

3. The study

Based on the literature, the relevance of the relationship between outward FDI and domestic investment – especially for small economies – is beyond doubt. Probably due to the scarcity of data in this field, the number of empirical studies to date is quite limited. Some of the studies date back decades ago (Noorzoy, 1980; Herring & Willett, 1973), while others are based on aggregate data (Feldstein, 1994), or a limited sample of micro-level data (Stevens & Lipsey, 1992). Moreover, as is the case in empirical studies on the relationship between outward FDI and international trade, the findings point in opposite directions. The discussion is probably hampered by the fact that outward FDI in most countries raises the fear of a loss of jobs. In addition, the matter is complex because the proper question to the counterfactual question – what would have happened to domestic investment in the absence of outward FDI – is hard to answer.

In this study, the relationship between outward FDI and domestic investment is examined for the Netherlands. The Netherlands is a small country with a number of sizeable home MNEs that have – directly and certainly indirectly – a dominant impact on the domestic economy. Since decisions on foreign and domestic investment are made at the level of individual firms, the approach has extracted data from a large micro-level data project run by Statistics Netherlands. The parts of the project that have provided the input for this study are described in the next section.

One of the features of the project is that a distinction can be made between several types of domestic investment. Broadly speaking, even though they are likely to be mutually dependent, a distinction is made in investments in R&D, and investments in capital. The distinction is relevant because, apart from the conclusion of Braunerhjelm & Oxelheim (2000) that the either traditional (Heckscher-Ohlin) or R&D-intensive (Schumpeterian) nature of the industry is important, it is argued that capital investments depend differently on FDI than investments in R&D do. Basically, the framework for the study can be depicted as follows.

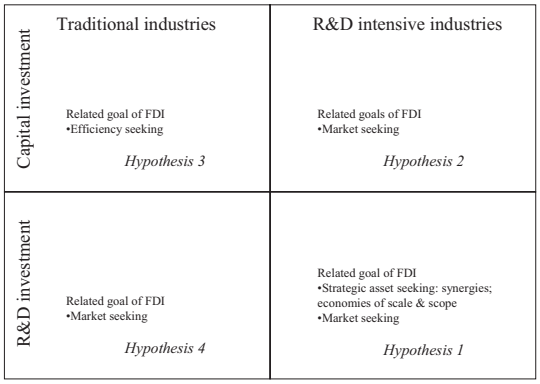

Fig. 1. Framework for the study

In R&D-intensive industries, investments in R&D are necessary in order to warrant competitiveness. It is commonly agreed upon that globalization, and in its wake increased global competition, and the dynamics of technology are leading to shortened product life cycles. In this highly dynamic environment, investments in R&D can only be recovered if the company has access to the larger regional or even global markets. In principle, foreign markets can be accessed by either direct exports or licensing agreements. However, given the crucial role of both explicit and tacit knowledge, especially in these industries there is a need for having close control over the foreign operations. The optimal way for guaranteeing that control is maintained is to internalise the operations by investing directly in the foreign markets. Therefore, outward FDI is assumed to support both international and domestic R&D activities. Since there is strong empirical evidence that even among the most internationalised MNEs, R&D activities are relatively concentrated at the home base, it is expected that outward FDI is especially supportive for domestic R&D investments. The first hypothesis therefore is:

H_1 In R&D intensive industries, investments in R&D are positively correlated to outward FDI

For domestic capital investments, the argument is more complex. On the one hand, one would expect some capital investments that are concomitant to the R&D investments. In addition, the larger pool of retained earnings from global operations might stimulate domestic capital investments. This effect may be limited in small countries, where opportunities for absolute growth or market share growth diminish once high levels have been reached. On the other hand, R&D-intensive firms work in very competitive environments, which forces them – according to Vernon's product life cycle theory – to relocate production processes of more or less standardized products to low-wage countries.

The problem with data on outward FDI is that it is hard, if not impossible, to make a distinction by motives. Given the empirically found high and positive correlation between outward FDI and exports on the one hand, and R&D-intensity on the other, it is likely that the largest parts of FDI outflows and FDI outward stock are more strongly linked to the motives of market seeking and strategic asset seeking, rather than efficiency seeking. Overall, negative and positive influences may very well cancel out, leaving no *a priori* assumption with regard to the overall relationship between domestic capital investment and outward FDI.

H_2 In R&D intensive industries, capital investments are uncorrelated to outward FDI

For traditional industries with low R&D-intensity, competitiveness hinges on the flexibility of companies to locate production processes in those locations where production costs are lowest. This implies that within those industries, where the efficiency seeking motive is likely to be relatively strong, high levels of outward FDI will lead to lower levels of domestic capital investment.

Domestic R&D investments are unlikely to be affected very much by outward FDI. However, if economies of scale are important and, hence, market seeking is an additional important motive for FDI, then it is expected that R&D-investments are stimulated due to the need to adapt products to foreign markets.

H_3 In traditional industries, capital investments are negatively correlated to outward FDI

H_4 In traditional industries, R&D investments are uncorrelated to outward FDI

4. The data

Data on production and investment

In order to test the hypotheses, data have been drawn from a project set up by Statistics Netherlands. The aim of this project, called *Micronoom*, is to have an integrated data set with coordinated variables on production, employment and investment. The project is a secondary project, since all the data that are integrated stem from the primary surveys held by Statistics Netherlands. Micronoom is an ongoing project that started with reference year 1994.

Data on R&D

A satellite project to Micronoom was the set-up of a longitudinal data set on (investments in) R&D and innovation. In Europe, these data are collected by means of a harmonized survey, the

Community Innovation Survey (CIS). After a trial survey in the early 1990s, two editions of CIS (CIS2 in 1996; CIS3 in 2000) have been completed. In the Netherlands it was decided to repeat the survey every two years. The 2002 edition was still in progress. In addition, there is a yearly survey on R&D-investments, among those firms and organizations that are heavily involved in Dutch R&D.

For this study, a longitudinal data set spanning the years 1996-2000 has been used. The data set contains quantitative and qualitative data on R&D and innovation 23.807 firms in the Netherlands. The sample size for CIS-surveys is usually between 10 and 12 thousand business units.

Data on outward FDI (stocks and flows)

As is the case in most countries, in the Netherlands statistics on FDI are compiled by the central bank. Due to confidentiality reasons, data cannot be exchanged between the Dutch Central Bank and Statistics Netherlands (SN). However, SN holds a yearly survey among the largest companies (companies with balance sheet totals exceeding 25 million €), which gives a detailed picture of the assets, activities and performance from a national perspective. For instance, instead of the value of assets held worldwide, as stated in the consolidated annual report, this survey makes a distinction between assets held in the Netherlands and assets held abroad. Theoretically, the value of assets held abroad should be identical to the outward FDI stocks measured by the Dutch Central Bank. This has been tested in an ad-hoc project in 1997, and the results confirmed that the correspondence between the figures was close to perfect. Therefore, data on outward FDI can be reliably extracted from this survey. The disadvantage is that the figures do not contain geographical detail. It has been decided to use the longitudinal CIS data set as the starting point.

All additional information needed for the analysis, mainly outward FDI and domestic capital investments, were collected from the other surveys in the integrated database of Micronoom. The principal data set contains data on 23.807 business units. In order to focus the study on those business units that are account for most R&D investments and most outward FDI, a selection was made of the 6.722 business units that belonging to domestic companies or MNEs that have their home base in the Netherlands (home MNEs). According to Table 1, this group of companies accounts for a relatively low percentage of domestic capital investments, but a relatively high share of R&D investments. In contrast, business units that belong to host MNEs account for a small proportion of the sample (3%), but their contribution to domestic investment, especially investments in R&D (20%), is relatively large.

The role of host enterprises in the Netherlands is part of a separate study. The reason for not including host enterprises in this study is not that they are not involved in outward FDI. It turns out that host enterprises in the Netherlands are important in that respect, but, allegedly, the motivations for this type of simultaneously inward and outward FDI (platforms for regional exports and finance) are very specific for this group.

Table 1

Selection of business units, and their contribution to domestic investments

Home or host company	N		Average domestic capital investment		Investment in R&D	
	Abs.	%	Abs.	%	Abs.	%
Manufacturing and extractive industries						
Home	**6722**	**28,2%**	**8.750.947**	**18,3%**	**6.032.846**	**58,0%**
Host	763	3,2%	4.349.959	9,1%	2.108.423	20,3%
Other industries						
Home	15.217	63,9%	29.909.473	62,4%	1.811.005	17,4%
Host	1.105	4,6%	4.910.477	10,2%	454.235	4,4%
Total	23807	100,0%	47.920.856	100,0%	10.406.508	100,0%

5. Analysis

The impact of outward FDI on domestic investment in R&D-intensive industries

For testing the hypothesis that in R&D intensive industries, investments in R&D are positively correlated to outward FDI, the classification of the OECD (OECD, 1999) has been used. The classification distinguishes high tech, medium high tech, medium low tech and low-tech industries. R&D intensive industries in this study are defined as medium high tech and high tech *manufacturing* industries, although in order to check whether the conclusions are influenced by the decision, the analysis has been repeated for high tech manufacturing industries only.

Manufacturing industries are defined as the industries with two-digit NACE codes in the range 15 to 37. The variables have been operationalized as follows. R&D intensity was extracted from the longitudinal data from the Community Innovation Survey. As an indicator of R&D expenses, the sum of expenditures on both R&D carried out within the organization and outsourced R&D was taken. Due to sampling, especially for small and medium sized firms, many firms show missing data for the some of the reference years (1996, 1998, 2000). For all firms, R&D expenditures for the most recent year available were taken. In order to adjust for differences in firm size, R&D expenditures per employee have been rather than total expenditures have been taken as the dependent variable. A similar procedure has been followed for capital investments. In this case, capital investment per employee was based on the most recent available year in the period of 1996 to 2000.

The degree of internationalization refers to the size of the international network of the group to which the firm belongs. Since these data are only available for the largest companies in the Netherlands, this information is missing for many firms that are relatively small. It is likely that these firms are relatively autonomous, with a low degree of internationalization (DOI) in terms of FDI. However, since we cannot be sure, rather than assuming that their DOI is close to zero, they are treated as missing in the analysis. The main reason is that the firms that remain in the analysis do represent a large proportion of FDI, R&D, capital investment and employment, while still varying in terms of their DOIs.

Most of the over 23 thousand (77%) do not belong to a larger company for which data on internationalization are available. This sizeable group accounts for relatively small proportions of R&D (12%), capital investment ((19%) and employment (40%). Based on the empirical distribution, firms have been divided into four categories. First, firms belonging to MNEs headquartered abroad have been filtered out. Of the remaining domestic firms, the least internationalised firms belong to companies that have outward stocks of FDI less than 7,5% of the balance sheet total. The second group belongs to home MNEs with a ratio up to 25%, the third one up to 50% and the most internationalised group of firms have ratios exceeding 50%.

Table 2 shows that the mean of the R&D expenditures per employee increases with the degree of internationalization. Comparison of the mean column with the median column shows that, evidently, the distributions in all categories are strongly skewed to the right, since the median values are much lower than the mean values. This effect is especially strong among firms with high degree of internationalization.

Table 2

Expenditures on R&D in medium high tech and high tech industries, by degree of internationalization

Degree of internationalization	N	Mean	Median	Std. Dev
Low	178	7.887	3.002	15.140
Medium	90	10.261	3.595	17.873
High	64	19.645	3.624	40.744
Very high	47	292.427	21.961	1.153.494
Total	379	45.722	3.708	413.562

Since it was suspected that some of the outliers are due to a mismatch of R&D expenditures (which are in some cases measured at the corporate level, being a holding company) and the number of employees (the number of employees directly employed by the holding company), a nonparametric Kruskal Wallis test has been applied as an alternative to analysis of variance. The mean ranks turn out to be significantly different among the groups, and therefore, hypothesis 1 is accepted.

Table 3

Results of Kruskal-Wallis test, for the relationship between R&D expenditures and degree of internationalization

Degree of internationalization	N	Mean Rank
Low	178	168.14
Medium	90	187.36
High	64	198.34
Very high	47	266.49
Total	379	

The Chi-square, with 3 degrees of freedom, is 30,7, which is significant at the 99% level.

The second hypothesis is that the correlation with outward FDI does not hold for capital investment. The table shows that, indeed, there is no systematic pattern. Although capital investments seem to be slightly lower among firms with low degrees of internationalization, capital investments actually decrease from the low to the medium DOI, and from the high to the very high DOI. The Kruskal-Wallis test suggests that the differences among the four categories are significant. But if we leave out the third category (firms with a high degree of internationalization), then the difference is not significant. Therefore, the outcomes do confirm the second hypothesis. Capital investments are not correlated to outward FDI. As we have explained, this is probably due to the fact that negative and positive influences of outward FDI on domestic investment cancel out.

Table 4

Capital investments in medium high tech and high tech industries, by degree of internationalization

Degree of internationalization	N	Mean	Median	Std. Deviation
Low	202	17.313	9.185	34.131
Medium	98	14.632	8.852	18.433
High	68	49.526	15.997	142.547
Very high	50	19.044	10.872	46.254
Total	418	22.132	10.104	65.610

Table 5

Results of Kruskal-Wallis test, for the relationship between capital investment and degree of internationalization

Degree of internationalization	All observations		Leaving out category with outliers	
	N	Mean Rank	N	Mean Rank
Low	202	196.26	202	173.22
Medium	98	198.38	98	175.46
High	68	264.76		
Very high	50	209.61	50	184.80
Total	418			
	The Chi-square, with 3 degrees of freedom, is 17,5 which is significant at the 99% level		*The Chi-square, with 2 degrees of freedom, is 0,53 which is not significant at the 90% level*	

Since one may feel somewhat uncomfortable in including firms that belong to the medium high tech industries, the analysis has been repeated for the relatively small number of firms that belong to high tech industries. The Kruskal-Wallis test confirms the findings for the relationship between R&D expenditures and the degree of internationalization (Tables 6 and 7).

Table 6

Expenditures on R&D in high tech industries, by degree of internationalization

Degree of internationalization	N	Mean	Median	Std. Deviation
Low	23	12.575	8.057	17.740
Medium	25	16.736	5.553	25.330
High	10	26.606	4.653	59.552
Very high	14	903.014	60.418	2.030.738
Total	72	189.109	9.835	938.411

Table 7

Results of Kruskal-Wallis test, for the relationship between R&D expenditures and degree of internationalization, in high-tech industries

Degree of internationalization	N	Mean Rank
Low	23	30.65
Medium	25	34.06
High	10	35.05
Very high	14	51.50
Total	72	

The Chi-square, with 3 degrees of freedom, is 9,4, which is significant at the 99% level.

However, our earlier conclusion that capital investments are not related to the degree of internationalization evidently does not hold for this group of firms. There is a quite strong relationship between the degree of internationalization on the one hand, and capital investment on the other. The contrast is sharpest between firms with a low or medium degree of internationalization, and firms with high or very high degrees of internationalization. The effect of internationalization on capital investment dies down at very high degrees of internationalization. In those cases, the negative effects of internationalization, like the drive to relocate production processes, might outweigh the benefits. Nevertheless, even here the net effect seems to be positive: firms with the highest DOIs invest more per employee in capital, than firms with low or medium DOIs (Tables 8 and 9).

Table 8

Capital investments in high tech industries, by degree of internationalization

Degree of internationalization	N	Mean	Median	Std. Deviation
Low	32	10.275	8.263	9.693
Medium	28	13.046	8.008	15.713
High	11	20.268	18.983	10.970
Very high	14	18.209	16.982	9.549
Total	85	13.787	11.881	12.495

Table 9

Results of Kruskal-Wallis test, for the relationship between capital investment and degree of internationalization, in high-tech industries

Degree of internationalization	N	Mean Rank
Low	32	36
Medium	28	39
High	11	59
Very high	14	56
Total	85	

The impact of outward FDI on domestic investment in traditional industries

Table 10 shows the R&D expenditures in low-tech industries, by degree of internationalization. As in the case of high-tech industries, there is – counter to our expectations – a strong positive and significant relationship between R&D expenditures and the degree of internationalization (DOI). R&D expenditures systematically increase as the DOI increases, if we look at the median value in each category. The mean value in industries with a high DOI is actually higher than in industries with a very high DOI, but this is evidently due to outliers, given the median value and the standard deviation in industries with a high DOI. The Kruskal-Wallis test reveals that the differences are significant.

Table 10

Expenditures on R&D in low-tech industries, by degree of internationalization

Degree of internationalization	N	Mean	Median	Std. Deviation
Low	551	2.155	630	6.395
Medium	166	3.884	1.250	12.797
High	111	12.916	1.724	40.744
Very high	65	8.283	2.074	18.410
Total	893	4.260	909	17.257

Table 11

Results of Kruskal-Wallis test, for the relationship between R&D expenditures and degree of internationalization, in low-tech industries

Degree of internationalization	N	Mean Rank
Low	551	413
Medium	166	469
High	111	528
Very high	65	543
Total	893	

The Chi-square, with 3 degrees of freedom, is 32,0, which is significant at the 99% level.

Table 12 shows that for low-tech industries, there is slight support for the assumption that the capital investments indeed decrease with higher DOIs. Both the mean and the median values are somewhat higher in industries with low or medium DOIs, than in industries with high or very high DOIs. However, according to the Kruskal-Wallis test, the differences are not significant.

Table 12

Capital investments in low- tech industries, by degree of internationalization

Degree of internationalization	N	Mean	Median	Std. Deviation
Low	657	20.775	12.310	32.345
Medium	182	20.424	14.789	24.883
High	115	21.814	12.747	49.873
Very high	69	18.785	11.386	21.000
Total	1.023	20.695	13.003	32.991

Table 13

Results of Kruskal-Wallis test, for the relationship between capital investment and degree of internationalization, in low-tech industries

Degree of internationalization	N	Mean Rank
Low	657	504
Medium	182	543
High	115	516
Very high	69	501
Total	1023	

The Chi-square, with 3 degrees of freedom, is 2,5, which is not significant at the 90% level.

A group-of-enterprises perspective

In testing the previous hypotheses, information on the group of enterprises (the degree of internationalization) has been used in order to test whether enterprises in certain industries show different investment patterns. The implicit assumption is that the degree of internationalization of the group affects all enterprises in the group. This assumption may not hold in all instances, as the level of autonomy of separate enterprises differs between groups. The approach is in line with the traditional perspective in official statistics, which classifies enterprises according to their main type of industrial activity.

A weakness of this perspective is that it does not taken into account the fact that many enterprises across industries may be part of a multinational hierarchy, that may take decisions that have an impact on the separate enterprises. By superimposing data from the MNE to which the enterprise belongs, we have enriched the traditional approach (Figure 2.a).

A different perspective is not to look at the behaviour of the separate enterprises, but, instead, at the behaviour of the MNE. Normally, decisions on internationalization are taken at the highest level of the company, even though of course mgt of the separate enterprises might have a say in it. However in the end, the FDI outflows that represent foreign greenfield investments, mergers or acquisitions, are recorded at the level of the MNE, not at the level of the separate enterprises. Therefore, if we want to analyse how changes in internationalization over time affect domestic operations – in our case investments in R&D and capital – then it makes sense to work bottom up rather than top down, by aggregating the investments in R&D and capital that are recorded at the level of the enterprise, and match these aggregates to FDI outflows that already are recorded at the level of the MNE. This is the approach we have taken in this section (see Figure 2.b).

A slight difficulty is that we still want to make a distinction between different levels of technology used. To this end, MNEs were categorized as high-tech, medium-high-tech, medium-low-tech or low-tech, according to the classification of the technologically most advanced enterprise that is part of the MNE. In the majority of cases, this does not create any problems in the interpretation of the findings. In a small number of cases concerning highly diversified MNEs, this way of defining the technological complexity of the company implies that MNEs are regarded as high-tech, even though some of the enterprises are low-tech. Replication of the results based on

leaving out these cases shows that the analysis is quite robust. In comparison with the analyses in the previous sections, we have added a longitudinal element.

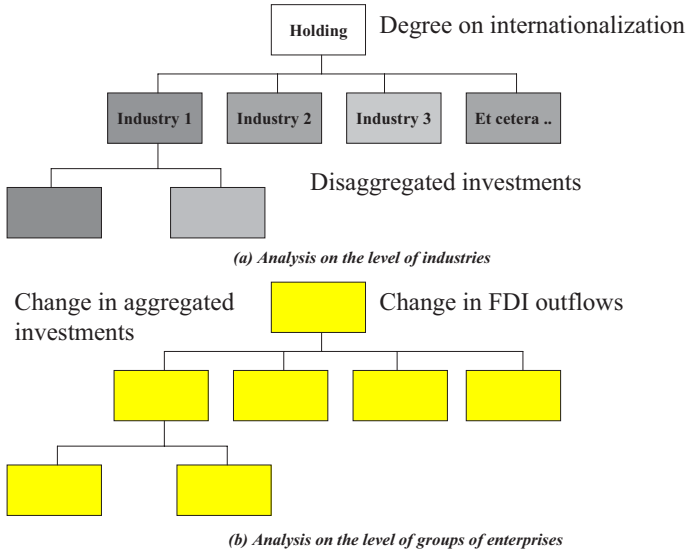

Fig. 2. Two approaches for analysing the relationship between outward FDI and domestic investments

Rather than looking at the impact of a certain level of internationalization, the data on MNEs enabled us to see how changes in the level of internationalization correlate with changes in domestic investments. Since the database contains, due to sampling (capital investment), non-response (all surveys), and biannual surveying (CIS), missing data, it was decided to base the changes in the variables on a comparison between the periods 1996-1998 versus 1998-2000. Aggregation implies that even one missing observation for an enterprise would lead to a missing value for the MNE of which the enterprise is a part. For that reason, missing values were imputed on the basis of the most recent data available. This definitely has some impact on the results, but as the largest enterprises in the databases showed complete data, we feel that this impact is limited and that the results are robust.

Table 14 shows the first results, in the form of a correlation matrix. As expected, changes in R&D are significantly positively related (R=+0,33) to changes in outward FDI flows, indicating that higher degrees of internationalization are needed for supporting R&D investments. Changes in capital investments are also significantly and positively correlated to changes in outward FDI flows, although the correlation is lower (R=+0,18).

Table 14

Pearson correlations between changes in FDI outflows, capital investment and R&D expenditures, 1996-2000

		Change in FDI outflows	Changes in capital investment	Changes in R&D expenditure
Change in FDI outflows	Correlation	1,0000	0,1844**	0,3284**
	N	918	909	730
Changes in capital investment	Correlation		1,0000	0,1431
	N		1.147	879
Changes in R&D expenditure	Correlation			1,0000
	N			887

Correlation is significant at the 99% level (2-tailed).

Our main interest is however determining how these correlations are influenced by the technological complexity of the companies. In order to test this, the two following equations have been estimated using ordinary least squares (OLS) techniques:

$$\Delta RD = \beta_0 + \beta_1 * \Delta FDI + \beta_2 * HT + \beta_3 * MT , \quad (1)$$

$$\Delta CI = \beta_0 + \beta_1 * \Delta FDI + \beta_2 * HT + \beta_3 * MT , \quad (2)$$

where:
ΔRD = the change in R&D expenditures, in the period 1996-2000;
ΔCI = the change in capital investments, in the period 1996-2000;
ΔFDI = the change in FDI outflows, in the period 1996-2000;
HT = Dummy (0/1) for high-tech companies;
MT = Dummy (0/1) for medium high-tech companies.

Table 15 confirms our expectations that the impact of FDI outflows on R&D expenditures is positive. The positive effect is significantly stronger in the group of high-tech companies. In medium high tech firms, the impact is slightly higher than for the average company, but the difference is not significant. The low-tech dummy did not enter the stepwise regression procedure.

Table 15

Results for model (1), the relationship between changes in R&D expenditures and changes in outward FDI, and technological complexity

	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
	B	Std. Error	Beta		
(Constant)	-97.745	739.444		-.132	.895
MT	1140.399	1276.284	.031	.894	.372
HT	10396.131	2049.242	.179	5.073	.000
ΔFDI	1.898E-03	.000	.326	9.471	.000

Dependent variable: ΔRD; R=0,37 (R^2=14%).

Table 16 shows the model for capital investments. It turns out that the structure of the model is quite different from the model for R&D expenditures. Capital investments are significantly lower in high-tech companies, indicating that in those cases the positive effects of capital investments go hand in hand with R&D the negative effects that are linked to the efficiency motives of outward FDI outweigh investments. In contrast, the on average positive impact of outward FDI on capital investments is, counter to expectations, even stronger in low-tech companies. The fear for the negative impact due to relocation of relatively simple production processes is therefore unjustified.

Table 16

Results for model (2), the relationship between changes in capital investments and changes in outward FDI, and technological complexity

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	230.671	1477.181		.156	.876
MT	1307.538	2615.007	.017	.500	.617
HT	-9967.113	4217.263	-.078	-2.363	.018
ΔFDI	2.566E-03	.000	.184	5.664	.000

Dependent Variable: ΔCI; R=0,20 (R^2=4%).

The reason behind this finding might be that the most common type of international expansion in low-tech industries is in horizontal rather than vertical linkages. Economies of scale and

the market seeking motive evidently dominate the relocation and efficiency seeking, among low-tech companies.

6. Summary & conclusions

Based on data for the Netherlands in the period of 1996-2000, this paper examines to what extent domestic investments in R&D and capital are influenced by the degree of internationalization. It was found that in both high-tech and low-tech industries, internationalization supports domestic R&D. The effect is especially strong in high-tech industries and in high-tech companies. For capital investments, the evidence is not conclusive.

From analyses both at the industry level (cross-sectional) and at the company level (longitudinal), there is a slight tendency for capital investments to decrease with higher degrees of internationalization. From the latter approach, the analysis at the company level, it seems that this effect is strongest among high-tech companies. However, it seems that the positive effects and the negative effects of outward FDI on capital investments more or less cancel out. Overall, the net contribution of outward FDI to the domestic economy that stems mainly from its supportive role for domestic R&D is positive. Negative effects due to relocation (efficiency seeking) are minor, and occur mainly in high-tech industries and companies due to their specialization in high value added activities.

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