Topias Leino – Jyrki Ali-Yrkkö

How well does foreign direct investment measure real investment by foreign-owned companies? – Firm-level analysis

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Suomen Pankki
Bank of Finland
PO Box 160
FI-00101 HELSINKI
Finland
☎ +358 10 8311

http://www.bof.fi
E-mail: Research@bof.fi

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How well does foreign direct investment measure real investment by foreign-owned companies? – Firm-level analysis

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Topias Leino* – Jyrki Ali-Yrkkö**
* *Bank of Finland*
** *The Research Institute of the Finnish Economy*

Abstract

We study Foreign Direct Investment (FDI) as a measure of real investment (gross fixed capital formation) in foreign-owned companies. Our data include firm-level information on FDI in-flows and real investment of foreign-owned companies located in Finland. Our results suggest that the recorded annual inflows of FDI do not constitute an accurate measure of annual real investments in foreign-owned companies. Since the beginning of the global recession in 2008, FDI inflows have significantly underestimated real investments in foreign companies in Finland. We seek to explain these findings by describing Finnish FDI target enterprises and subgroups and the nature of their FDI flows from several perspectives. We show how FDI target enterprises use other sources of funding, in addition to FDI, and how a few large transactions, often related to cross-border mergers and acquisitions, can explain a great deal of the recorded annual FDI flows. We also describe how Finland's FDI stock and flow data increasingly consist of funds that merely pass through the FDI enterprises and subgroups, arguably with little or no real economic linkage to the Finnish economy, and we present a method for estimating such pass-through funding.

Keywords: Foreign Direct Investment, Gross Fixed Capital Formation, Investment, Measurement, Pass-through Investments

JEL classification numbers: F210, F23, E220

Kuinka hyvin ulkomaiset suorat sijoitukset mittaavat ulkomaisten yritysten tekemiä reaali-investointeja?

Suomen Pankin keskustelualoitteita 12/2014

Topias Leino* – Jyrki Ali-Yrkkö**
** Suomen Pankki*
*** Elinkeinoelämän tutkimuslaitos*

Tiivistelmä

Tässä artikkelissa tarkastellaan miten hyvin suorat sijoitukset mittaavat ulkomaisten yritysten Suomessa tekemiä investointeja. Tutkittu yritystasoinen aineisto on muodostettu yhdistämällä Suomen Pankin tiedot suorista sijoituksista yritysten tilinpäätöstietoihin vuosilta 2002–2011. Tulokset osoittavat, että suorien sijoitusten tilastot eivät kuvaa kovinkaan hyvin ulkomaisten yritysten investointeja. Erityisesti vuoden 2007 jälkeen suorat sijoitukset ovat aliarvioineet ulkomaisten yritysten reaali-investointeja Suomeen. Tässä työssä osoitamme useita syitä sille, miksi suorat sijoitukset eivät välttämättä kuvaa ulkomaisten yritysten tekemiä reaali-investointeja. Yksi syy tähän on se, että maassa jo toimivat ulkomaiset yritykset käyttävät investointiensa rahoitukseen muita rahoituskanavia kuin omaa konserniyhtiötä. Toinen syy on se, että kasvava osa maahan tulevista suorista sijoituksista virtaa Suomessa olevien sijoituskohteiden kautta takaisin ulkomaille. Kolmas merkittävä syy löytyy yrityskaupoista ja fuusioista. Niissä maahan tulee suoraksi sijoitukseksi tilastoituvaa pääomaa, mutta se ei päädy itse ostokohteelle vaan aiemmille omistajille. Tutkimuksessa tuli esiin myös suorien sijoitusten voimakas keskittyneisyys Suomessa. Joinakin vuosina 10 suurinta maahan tulevaa suoraa sijoitusta vastaavat yli 80 prosentista kyseisen vuoden suorien sijoitusten kokonaisarvosta.

Avainsanat: Ulkomaiset investoinnit, investointi, kiinteän pääoman bruttomuodostus, suorat sijoitukset, läpivirtaussijoitukset,
mittaus, mittari

JEL-luokittelu: F210, F23, E220

Contents

1 Introduction

This study focuses on the question of to what extent Foreign Direct Investment (FDI) describes real investment (Gross Fixed Capital Formation, GFCF) by foreign companies.

Inward FDI data are often used to describe how much foreign-owned companies have invested in real assets in order to produce goods and services in the host country. Furthermore, this view also includes idea that more inward FDI leads to fixed capital formation which in turn is a component of GDP. This is often one of the major motivations for governments to use a variety of policy instruments in order to improve the attractiveness of the country as a location for operations of foreign-owned companies. In line with this mindset, inward FDI data are often used to measure the success of these policies and also as an important indicator of country competitiveness (see World Competitiveness Yearbook 2013).

But FDI is a financial concept and does not correspond directly to any measure of real investment (or fixed capital formation). In addition to funding received from foreign direct investors, real investments of foreign-owned companies can be funded locally or by other foreign entities than direct investors[1]. In such cases, inward FDI data may underestimate the real investment of foreign-owned companies. Inward FDI might also be upward biased, as well. Cross-border mergers and acquisitions (M&A) account for a substantial share of FDI (UNCTAD, 2012, p.6) but M&As are merely transfers of ownership of existing assets without fixed capital formation. Furthermore, recorded FDI inflows may consist of funds that FDI target enterprises invest abroad or use to cover their operating expenses. Thus in sum, it is an open question to what extent FDI leads to new capital formation.

The majority of previous studies focusing on the relationship between FDI and fixed capital formation have analysed the relationship between investments made by foreign-owned and domestic-owned companies (e.g. Agosin & Machado 2005; Titarenko 2006; Ramirez 2011). These studies have focused on the *crowding in* or *crowding out* effect of foreign investment. The data used in these studies have been aggregate-level data. In contrast, in this study we use official firm-level FDI data combined with investment data calculated from financial statements data of FDI target enterprises, which enable us to analyze the relationship between the two variables at firm level.

We have organised the paper as follows. In Section 2, we review the relevant literature concerning the relationship between FDI and real investment. In Section 3, we describe the data used in the empirical analysis. In section 4, we first present our basic results on the relationship between FDI and real investment. We then describe some characteristics of Finland's FDI flows, show how the nature of these flows has changed in recent years, and discuss how our observations help to explain the relationship between FDI and real investment.

It should be noted that, in addition to capital formation, FDI may have other impacts on the economy. Multinational enterprises can use foreign investment to transfer technological and other know-how to host countries. Through these transfers, FDI has potential spillover effects which are not limited to firms receiving foreign capital. The existing empirical evidence on this issue is mixed, and this issue is beyond the scope of our study.

[1] In the context of balance of payments statistics such funding from foreign entities other than direct investors is recorded as *portfolio investment* or *other investment*.

2 Literature Review

To our knowledge, virtually all previous studies on FDI and real investment have used aggregate data. Firm-level data have not been used to study this issue.

As mentioned before, one of main motives for studying FDI is that it potentially leads to new capital formation which in turn is a part of GDP. To our knowledge, there exists only a few empirical studies focusing on the relationship between FDI and domestic investment, and the evidence is mixed.

Some studies have found a positive relationship. One of such is an early study by Francis Van Loo. His aggregate level data from Canada covered the years 1948–1966. His results suggest that FDI inflow impacts positively on capital formation (Van Loo, 1977). Krkoska (2001) analysed 25 transition countries using country-level data between 1989–2000. The results suggest that a 1 per cent increase in FDI is related to 0.7 per cent increase in real investment (gross fixed capital formation). A similar result was obtained by Agosin and Machado (2005) when they analysed FDI to Asia and Africa. In those regions, FDI increased domestic investment one-to-one. This positive relationship in Asia was echoed by Xu and Wang (2007) who focused on FDI to China. A positive relationship has also been found in Latin America (Ramirez 2011). Based on an analysis of nine Latin American countries in 1981–2002, he concludes that lagged FDI positively affects the domestic investment ratio. However, this positive effect is reduced significantly when the reverse flows of profits and dividends are taken into account.

But there are also studies that have found a negative relationship between FDI and domestic investment. Agosin and Machado (2005) concluded that in 1971–2000, FDI displaced domestic investment in Latin America. A similar substitutive effect has also been found in Latvia (Titarenko 2006).

In addition to capital formation, FDI can potentially give rise to other positive effects. These have been analyzed in a number of empirical studies, with varying results. From the viewpoint of the domestic economy and horizontal spillovers (firms operating in the same industry), the largest benefits accrue when foreign investors either form joint ventures or are from countries with a modest technology edge (Irsova and Havranek 2013). In addition to horizontal effects, FDI has potential effects via vertical relationships, i.e., from foreign firms to local firms operating in upstream or downstream sectors. The results of numerous empirical studies can be summarized as follows: in terms of vertical spillovers, larger spillovers are generated when the technological gap between foreign investors and domestic firms is not too large (Havranek and Irsova 2011). In sum, positive spillover effects of FDI depend on the level of innovation level of the host region. Thus, in order to benefit from FDI, local firms should have sufficient technical capabilities.

3 Data

In this study, we analyze inward FDI and real investments (gross fixed capital formation) made by these foreign-owned companies, using Finnish firm-level data.

Our dataset is constructed by combining four firm-level databases: inward FDI data from the Bank of Finland[2], financial statement data from the Finnish Tax Administration and Asiakastieto Oy and a set of auxiliary variables from the national business register maintained by Statistics Finland. The combined dataset covers the ten-year period 2002–2011. Our data form a unique firm-level dataset that has not been used before to study the relationship between FDI and Gross Fixed Capital Formation.

Our primary investment measure will be Gross Fixed Capital Formation for firm *i* in year *t,* $GFCF_{it}$. This variable ($GFCF_{it}$) is calculated by subtracting Fixed Assets in year *t* from Fixed Assets in *t-1* added by Depreciations in year *t*[3]. Another key variable is inward Foreign Direct Investment (FDI_{it}) for firm *i* in year *t,* obtained directly from FDI database of the Bank of Finland. The primary FDI data used in our analysis were calculated according to the *directional principle* as defined by the *OECD Benchmark Definition of Foreign Direct Investment, 3rd Edition*. In some parts of our analysis, we also utilize FDI data calculated according to the alternative *asset/liability principle*[4]. We utilize both FDI flow and stock data.

The Bank of Finland's survey-based data collection covers only FDI flows and stocks of large and medium-sized enterprises; hence the FDI data of small enterprises have been estimated in official FDI statistics[5]. To include firm-level FDI data also on small enterprises in our dataset, we estimated the data by utilizing business register data[6], balance sheet data and FDI data reported by medium-sized enterprises. These estimations were based on the assumption that the weights of FDI in selected liability items in the balance sheets of small FDI enterprises sufficiently correspond to those observed in medium-sized FDI enterprises (on which both FDI and balance sheet data are available).

In addition, we imputed occasional missing values of *FDI*, *GFCF* and some auxiliary variables using interpolation. The impacts of these imputations on *FDI* and *GFCF* aggregates are presented in appendix (Table A.3 and Table A.5).

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[2] The Bank of Finland (BoF) acts as the central bank and national monetary authority of Finland and is a member of the European System of Central Banks. The BoF was responsible for collecting, compiling and publishing the official FDI statistics for Finland up to the beginning of 2014. The firm-level FDI data that we utilize in this paper are those that the Bank of Finland has used in compiling Finland's official FDI statistics.

[3] GFCF(i,t) = FA(i,t) – FA(i, t-1) + D(i, t), where GFCF denotes Gross Fixed Capital Formation in year t for enterprise i, FA denotes balance sheet's fixed assets (excluding financial assets) and D depreciation in the profit and loss account.

[4] The difference between *directional* and *asset/liability data* is explained in Leino (2011).

[5] In Finland's official FDI statistics, the data reported by large and medium-sized FDI enterprises constitute around 95 % of the aggregate inward FDI stock. The remaining 5 % of the stock (i.e. the smallest enterprises in terms of inward FDI stock) has been covered by weighting the data of medium-sized enterprises (whose inward FDI stock fall roughly between the cumulative thresholds of 90 % and 95 %) by a factor of around 2. Despite the mere 5–10 % contribution of small FDI enterprises to the aggregate inward FDI stock, they constitute almost 80 % of the total number of FDI enterprises.

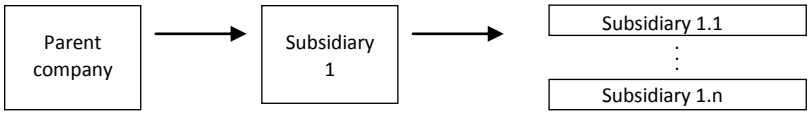
[6] National business register data were used to determine small FDI enterprises in our dataset.

Our panel type dataset constitutes some one million annual observations of each variable used in this study. Out of these, 17 999 relate to immediate inward direct investment enterprises. In terms of FDI and real investment data, our dataset covers almost the entire business sector of Finland[7].

3.1 The structure of multinationals and real investments at subgroup level

Due to the complex structures of multinational companies, an analysis of the relationship between FDI and real investment is far from straightforward. An enterprise that receives an immediate FDI flow is not necessarily the one that makes the real investment because the enterprise that receives FDI capital may have its own subsidiaries (Figure 3.1).

Figure 3.1. The complexity of multinational companies' structures



In Figure 3.1, a parent company makes an FDI investment to its Subsidiary 1 locating in a different country. This subsidiary may own subsidiaries (Subsidiaries 1.1. - 1.n.) that are located either in the same country as Subsidiary 1 or in other countries.

Instead of spending the FDI funds itself, Subsidiary 1 may pass-through some or all of the funds to its subsidiaries that then use these funds for a real investment or for other purposes. Thus, in this case, Subsidiary 1 receives the FDI flow but Subsidiaries 1.1 - 1.n are those who finally spend the FDI funds.

As these examples show, the firm that receives FDI flow may differ from the actual investor firm. To take this into account, we have summed GFCF figures to a local enterprise group level by utilizing the group ID code that is available in the national group register maintained by Statistics Finland.

However, a simple aggregation of real investments at local enterprise group level is likely to overestimate FDI-related real investments if the direct investment enterprise and its subsidiaries belong to a group that is ultimately controlled by a Finnish parent enterprise (i.e. the ultimate parent of the direct investment enterprise is Finnish, even though the immediate parent is foreign)[8]. In such cases a group level aggregate would include not only FDI-related units but also locally-controlled units of the group. To take this into account, we calculated a second measure of real investment at subgroup level that includes 1) all ultimately foreign-controlled enterprise units in Finland and 2) those ultimately Finnish-controlled enterprise units that are either directly or indirectly foreign-controlled[9].

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[7] The *business sector* is here intended to correspond to the *Non-financial corporations excluding housing corporations* as defined in the Finnish national accounts and other official statistics. Entities that belong to *Financial corporations and insurance corporations* in the official statistics (e.g. banks) or to the other sectors of the economy are not covered in our analysis.

[8] We show in section 4.5 that some of the investments that are recorded in Finland's official FDI statistics as inward FDI are investments by foreign subsidiaries of Finnish-controlled enterprise groups.

[9] Our data allow us to determine which units of ultimately Finnish-controlled groups are in direct foreign control, but unfortunately we cannot directly determine which other units in the group are subsidiaries to these foreign-controlled units. Therefore, to calculate our second measure of real investment at subgroup level, we

The annual volumes of real investments in Finnish direct investment enterprises and in Finnish FDI subgroups are presented in section 4.

3.2 Descriptive statistics

Our unbalanced data consist of 2 949 immediate direct investment enterprises, with varying time series. Mean FDI inflow is only EUR 1.6 million, but with wide variation (see Table 3.1). Similar variation occurs also in other variables. In terms of real investment, these firms invest annually, on average, EUR 1.3 million, but the maximum investment exceeds EUR 1 500 million.

By extending our analysis to cover all units of the local subgroups, the number of observation units increases from 17 999 to 31 883. There is also an increase both in means and standard deviations of net sales, fixed assets and real investments, as indicated in table 3.1 below.

Table 3.1. Data description

	N	Mean (mEUR)	Std.dev. (mEUR)	Min. (mEUR)	Max. (mEUR)
FDI inflow	17 999	1.6	70.0	-4 890	4 550
Net Sales	17 999	33.5	181.0	-3	8 140
Fixed Assets (excl. financial assets)	17 999	8.0	5.77	0	2 190
Real investments (GFCF)	17 999	1.3	23.0	-909	1 520
Net Sales in the local subgroup[10]	31 883	35.4	353.0	-3	30 090
Fixed assets in the local subgroup (excl. financial assets)	31 883	9.7	76.4	0	4 090
Real investments (GFCF) in the local subgroup	31 883	1.5	23.7	-909	1 520

estimated the sum of real investments in the subgroup of ultimately Finnish-controlled direct investment enterprise i as: $I_{FinConFDI_i} = I_{FinConGroup_i} \times \frac{B_{FDI_i}}{B_{FDI_{all}} + B_{UCP}}$, where $I_{FinConGroup_i}$ is the sum of real investment in all Finnish units that belong to the same group as enterprise i, B_{FDI_i} is the balance sheet total of enterprise i, $B_{FDI_{all}}$ is the sum of balance sheet totals of all Finnish-based direct investment enterprises that belong to the same group with enterprise i, and B_{UCP} is the balance sheet total of the Finnish-based ultimate controlling parent of the group of enterprise i.

[10] *Net Sales, Fixed assets* and *Real investments (GFCF) in the local subgroup* include all enterprise units in those Finnish subgroups where at least one of the enterprise units is a direct investment enterprise. Affiliated enterprises have been identified by using the group code that is available in the national group register maintained by Statistics Finland.

4 Empirical Analysis

4.1 Basic Results

We start our analysis by considering FDI inflows and real investment of immediate inward direct investment enterprises (Table 4.1). In each year, our sample consists of enterprises that were defined as direct investment enterprises in that year.

Table 4.1. Inward FDI flow and real investment of immediate inward direct investment enterprises, EUR billion and percentages

	(a) FDI inflow, EUR bill.	(b) Real investment*, EUR bill.	(c) FDI Inflow/Real Investment, %	(d) Annual change of FDI inflow (between *t* and *t-1*), EUR bill.	(e) Annual change of real investment (between *t* and *t-1*), EUR bill.
2002	6.62	2.08	319 %		
2003	3.27	2.54	129 %	-3.35	0.46
2004	1.92	0.22	877 %	-1.35	-2.32
2005	2.42	2.68	90 %	0.50	2.46
2006	4.20	3.81	110 %	1.79	1.13
2007	7.58	2.57	295 %	3.38	-1.24
2008	-2.72	4.23	-64 %	-10.30	1.67
2009	0.81	2.62	31 %	3.53	-1.61
2010	4.33	1.13	384 %	3.51	-1.50
2011	0.31	2.15	15 %	-4.01	1.02
Average 2002–2011	2.87	2.40	120 %	-0.70	0.01
Average 2002–2006	3.68	2.27	163 %	-0.60	0.43
Average 2007–2011	2.06	2.54	81 %	-0.78	-0.33

* real investment of immediate inward direct investment enterprises.
N=17 999

FDI inflows and real investment of these same foreign-owned companies do not coincide. The amounts differ considerably from each other. Moreover, annual changes in these amounts often have opposite signs. Thus, not surprisingly, the correlation between FDI and real investment is only 0.07.

One potential explanation for these observations is that an immediate FDI target enterprise is not necessarily the firm that does the actual investment. As we explained in section 3, in many cases FDI target enterprises are in fact subgroups consisting of immediate FDI target enterprise and its local subsidiaries. The asset data for immediate FDI target enterprises show that their financial investments in local and overseas group companies are significant (Table 4.2 below).

In 2002, investments in local and overseas group companies accounted for nearly 50 % of total assets (column *c* in Table 4.2). Nine years later, in 2011, the share had risen to 58 %. At the same time the share of fixed assets in immediate FDI enterprises had contracted from 20 % to 13 % (column b). These figures indicate that proportionally less of 'real investment activity' occurs in immediate FDI enterprises than before. They also suggest that the figures on real investment presented in Table 4.1,

where we did not take into account the local subsidiaries, may be downward biased, and offer at least a partial explanation for the low correlation.

Table 4.2. Asset accounts of immediate FDI target enterprises

Year	(a) Total assets, EUR bill.	(b) Fixed assets, %	(c) Investments in local and overseas group companies[11], %	(d) Other items, %
2002	60.9	20.2 %	49.4 %	30.4 %
2011	116.8	13.0 %	58.0 %	29.1 %

In Table 4.3 we present real investment figures calculated at subgroup level, as described in section 3.1. The figures in column b include real investments in Finnish local enterprise groups where at least one enterprise unit was a direct investment enterprise. The figures in column c include real investments in Finnish direct investment enterprises and our estimates of real investments in their Finnish-based subsidiaries.

Table 4.3. Inward FDI flow and real investment including local subsidiaries belonging to the same subgroup, EUR billion

	(a) FDI inflow, EUR bill.	(b) Real investment in the Finnish subgroup*, EUR bill.	(c) Real investment in FDI-related units in the Finnish subgroup**, EUR bill.	(d) FDI Inflow/Real Investment (column a / column c), %	(e) Annual change of real investment (between *t* and *t-1*), EUR bill.
2002	6.62	5.56	3.54	187 %	
2003	3.27	6.13	5.03	65 %	1.49
2004	1.92	3.54	1.46	131 %	-3.57
2005	2.42	3.74	2.80	86 %	1.33
2006	4.20	5.43	4.57	92 %	1.78
2007	7.58	6.24	4.36	174 %	-0.22
2008	-2.72	6.61	5.56	-49 %	1.21
2009	0.81	4.09	3.12	26 %	-2.44
2010	4.33	2.56	1.59	273 %	-1.54
2011	0.31	3.41	2.48	13 %	0.90
Average 2002-2011	2.87	4.73	3.45	83 %	-0.12
Average 2002-2006	3.68	4.88	3.48	106 %	0.26
Average 2007-2011	2.06	4.58	3.42	60 %	-0.42

* real investment of immediate direct investment enterprises and all other Finnish units in the same enterprise group
** real investments of immediate direct investment enterprises and their Finnish subsidiaries (estimate)
N=31 883

As can be seen from columns *b* and *c*, the level of real investment at subgroup level is very high as compared to the figures in Table 4.1. Even though there is a clear contraction in average annual in-

[11] An estimate based on certain items in the balance sheet data.

flows of FDI from 2002–2006 to 2007–2011, the real investments at subgroup level contracted only slightly (this applies to both of our measures). The correlation between FDI inflow and real investment is also higher at subgroup level, but remains rather low (0.13).

The results above suggest that, as a proxy indicator, FDI on average overestimates real investment at enterprise level but significantly underestimates them at subgroup level. This shows how important it is to analyse the relationship between FDI and real investment at the subgroup level. Therefore, for our analyses in the following sections of this paper, we choose to use the real investment measure that takes into account real investment in all FDI-related units of Finnish local enterprise groups (column *c* in Table 4.3).

The results also show that, up until 2007, FDI flows and real investments did share some similarities in developments over time; but since the global recession began in 2008 this pattern has more or less disappeared, and the annual changes in FDI flows and real investment have had the opposite signs in every year. Moreover, since 2008, FDI data have on average significantly underestimated the level of real investment by foreign-companies in Finland, regardless of how real investment is measured.

Figure 4.1. FDI and real investment at enterprise and subgroup levels, EUR billion

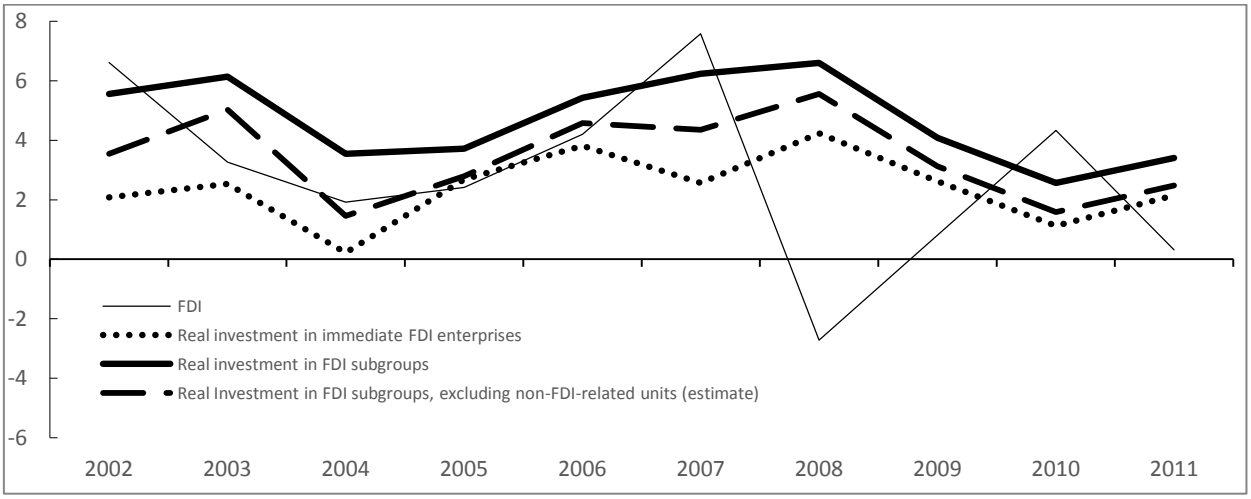


Figure 4.1 summarizes the results presented in Tables 4.1 and 4.3. Overall, our results indicate that annual FDI flows do not constitute an accurate measure of annual real investments in foreign-owned companies. On average, Finland's FDI inflows seem to underestimate real investment by foreign owned companies, and this tendency is particularly clear in the data from 2007 onwards.

To explain these findings, we proceed by examining Finnish FDI target enterprises and subgroups and the nature of their FDI flows from several perspectives.

4.2 Use of other sources of finance

The results presented in previous section (column *c* in Table 4.3) suggest that on average FDI inflows have accounted for around 83 % of real investment. This suggests that foreign companies use other sources of finance for funding their investment in Finland, in addition to FDI.

By studying the balance sheet liabilities of FDI target enterprises (Table 4.4), we observe that in fact only around half of the total liabilities of Finnish FDI target enterprises are *FDI liabilities*[12]. Thus, a significant portion of foreign-owned companies' activities are funded by other means than direct investments. It is also noteworthy that the total amount of liabilities of FDI target enterprises almost doubled between 2002 and 2011 (column *a)*.

Table 4.4. Liability accounts of immediate FDI target enterprises in Finland

Year	(a) Total liabilities, EUR bill.	(b) FDI liabilities total, %	(c) Other liabilities, %
2002	60.9	41.7 %	58.3 %
2011	116.8	51.8 %	48.2 %

The fact, that FDI constitutes only around half of total finance of FDI enterprises, explains our results on how FDI inflows underestimate real investments by foreign companies in Finland.

4.3 The concentrated nature of FDI

One interesting observation from the aggregate FDI figures (Table 4.1 and Table 4.3) is that in 2008 the FDI inflow to Finland was negative. The explanation for this is that the figures presented in FDI statistics are in fact net flows[13]. These flows have been calculated by summing up all firm or unit level FDI figures, which often include both positive and negative flows. Thus, the net flows mask the fact that also in years with negative FDI flow, there may also be positive FDI flows.

In Table 4.5, we present FDI flows separately for firms with positive and negative flows (columns *a* and *d*). Moreover, it is often ignored that the annual aggregate FDI flows to some country may be driven by just a few companies. To reveal the extent of concentration, Table 4.5 also includes shares of TOP10 and TOP20 firms with the biggest FDI flows in each year. Because FDI flows can be either negative or positive, we calculate the share of TOP10 and TOP20 separately for firms with positive and negative flows.

Table 4.5 (columns *a* and *f*) reveals that in every year FDI net flows include both large positive flow and large negative flows. In 2008 Finland received EUR 7.25 billion of positive FDI inflows, but because in the same year the negative inflows totalled EUR 9.96 billion, the net flow was EUR 2.72 billion negative.

The largest 10 FDI receivers account for, on average, more than half of the annual aggregate figures (columns *b* and *e* in Table 4.5). This holds for both positive and negative flows. When the largest 20 receivers are considered, the share rises, on average, to two thirds (columns *c* and *f*). The concentration, however, varies significantly. While in 2002 TOP20 FDI receivers with positive flow accounted

[12] FDI liabilities are the sum of liabilities vis-à-vis all FDI counterparties (i.e. foreign direct investors, foreign direct investment enterprises and foreign fellow enterprises).

[13] FDI flows are calculated here, and in Finland's official FDI statistics up to year 2014, according to the *directional principle* as defined in the *OECD Benchmark Definition of Foreign Direct Investment, 3rd edition* (OECD 1996). In directional FDI data *reverse investments* are treated as negative investments.

for almost 90% of all positive FDI flows, in 2011 the share of TOP 20 was only 54%. Similar variation occurs in the group of firms with negative FDI flows.

Table 4.5. Positive and negative FDI inflows and the concentration

	(a) FDI inflow of firms with positive flows, bill. €	(b) The share of TOP10 firms with positive flow	(c) The share of TOP20 firms with positive flow	(d) Number of firms with positive flows	(e) FDI inflow of firms with negative flows, bill. €	(f) The share of TOP10 firms with negative flow	(g) The share of TOP20 firms with negative flow	(h) Number of firms with negative flows
2002	10.53	81 %	87 %	772	-3.92	60 %	74 %	569
2003	6.53	59 %	71 %	696	-3.26	47 %	62 %	584
2004	4.66	49 %	62 %	671	-2.74	42 %	58 %	562
2005	7.03	53 %	67 %	763	-4.62	53 %	70 %	505
2006	8.79	48 %	61 %	890	-4.59	57 %	72 %	477
2007	11.30	45 %	59 %	1126	-3.72	53 %	66 %	475
2008	7.25	49 %	61 %	1104	-9.96	73 %	82 %	679
2009	7.11	47 %	62 %	1003	-6.29	50 %	62 %	895
2010	9.99	57 %	71 %	1177	-5.67	45 %	61 %	819
2011	5.98	41 %	54 %	1121	-5.66	54 %	66 %	787
Average	7.92	54 %	66 %	932	-5.04	56 %	69 %	635

These results suggest that annual aggregate figures are driven by large companies. To analyse the role of firm size more thoroughly, Table 4.6 presents FDI inflows and real investment by firm size.

Not surprisingly, large firms dominate both inward FDI flows and real investments by foreign-owned companies. Around 90% of FDI flows and real investment are made by large firms even though there are significantly less of them than the small and medium-size companies.

There is also variation in correlations of FDI and real investment by firm size. Whereas for small firms the correlation is 0.01, for medium-size and large firms the corresponding figures are 0.05 and 0.13, respectively.

Because such large positive and negative firm-level flows dominate the aggregate annual flows, the annual FDI flow figures may give rather biased picture of the prevailing attractiveness of the Finnish economy as regards foreign real investment.

Table 4.6. Inward FDI flow and real investment by firm size, EUR billion[14]

	Small FDI enterprises			Medium FDI enterprises			Large FDI enterprises		
	FDI inflow, € bill.	Real investment*, € bill.	n	FDI inflow, € bill.	Real investment*, € bill.	n	FDI inflow, € bill.	Real investment*, € bill.	n
2002	0.118	0.060	916	0.142	1.233	351	6.370	3.121	226
2003	-0.170	0.017	880	0.091	0.655	336	3.331	4.815	244
2004	0.097	-0.472	922	0.189	0.152	316	1.633	1.782	244
2005	0.000	-0.030	938	0.139	0.202	347	2.256	2.596	264
2006	0.287	0.048	1004	-0.121	0.400	393	4.086	4.348	294
2007	0.459	0.028	1037	0.655	0.514	446	6.467	4.066	319
2008	0.117	0.097	1081	0.156	0.618	491	-2.999	4.846	338
2009	0.974	-0.312	1330	0.335	0.274	486	-0.493	3.155	331
2010	0.051	-0.131	1358	0.432	0.264	518	3.818	1.461	350
2011	-0.392	-0.156	1336	0.079	0.484	533	0.613	2.265	370
Total	1.542	-0.392		2.097	4.795		25.083	32.454	
Share	5.4 %	-0.8 %		7.3 %	13.2 %		87.3 %	89.2 %	

note: n= Number of direct investment enterprises *) Real investments in FDI-related units of the subgroup

4.4 M&A-related FDI flows and real investment

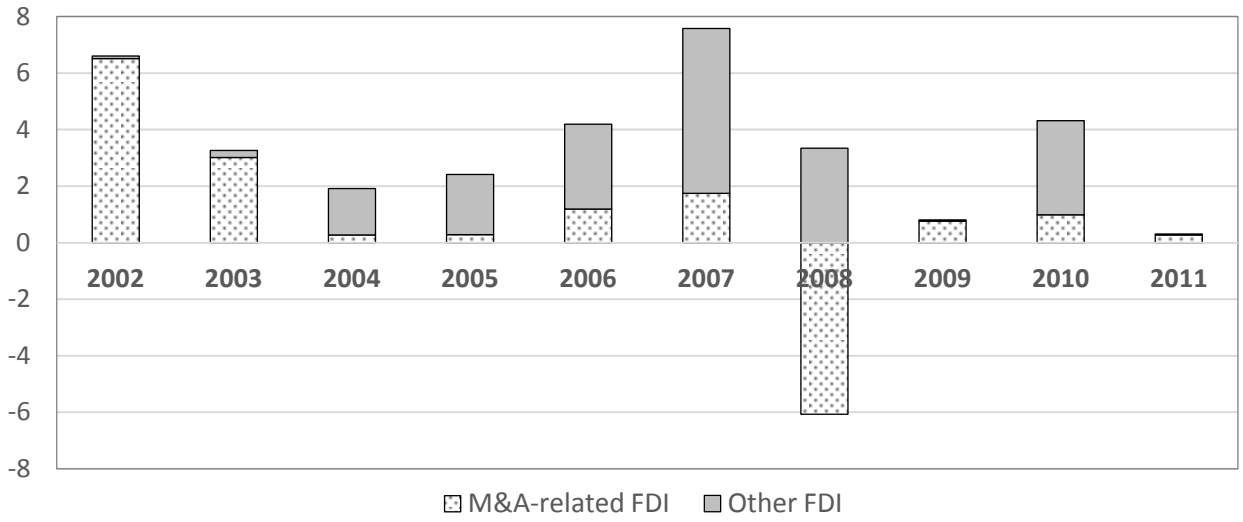
The official FDI statistics also include financial flows that are related to cross-border mergers and acquisitions (M&As). But since there are reasons to assume that the real impacts of M&A-related FDI flows differ significantly from other FDI flows, we consider them here separately.

To do this, we classified all FDI observations in our data either as *M&A-related FDI* or as *other FDI*. If a firm was acquired or merged in year *t*, we classify the FDI flow of the firm for that year as M&A-related. If no mergers or acquisitions took place in year *t*, we classify the observation as *other FDI*. We also regard as M&A-related those cross-border acquisitions and mergers that have taken place within multinational enterprise groups (i.e. intra-group ownership restructurings), as they may also induce cross-border financial flows that are recorded in official statistics as FDI[15]. Figure 4.2 shows how these two types of FDI contribute to annual inflows of FDI in our data.

[14] The category of *small enterprises* is made up of enterprises with annual turnover not exceeding EUR 10 million and year-end balance sheet total not exceeding EUR 10 million. *Medium-size enterprises* are those whose net sales do not exceed EUR 50 million and annual balance sheet total does not exceed EUR 43 million.

[15] Even though the M&A-related FDI transactions are included in Finland's FDI statistics, they are not segregated in the data in any way. Nor are there any official data on M&As in Finland that we could use to identify M&A-related observations. Therefore we proceeded as follows. First we utilized a dataset that was provided to us by *Invest in Finland* (IIF), a governmental bureau that promotes investments into Finland and also monitors inward investments. The IIF data provide for each year a list of Finnish-based enterprises which were either acquired or established that year by a foreign investor and which are identified in the data by national business ID. Using these data, we determined as *M&A related FDI* those annual firm-level FDI flows where the FDI enterprise was 'acquired' in that year based on the IIF data. Next we utilized metadata from the Bank of Finland's FDI database to supplement the IIF data and to cross-check all the major M&A-related observations. In this connection we noticed that some of the enterprises which, in the IIF data, were labelled as 'established' were in fact established only for the purpose of acquiring another enterprise, so we labelled them also as *M&A-related*. Finally, we used the FDI metadata and data from the national group register (by Statistics Finland) to

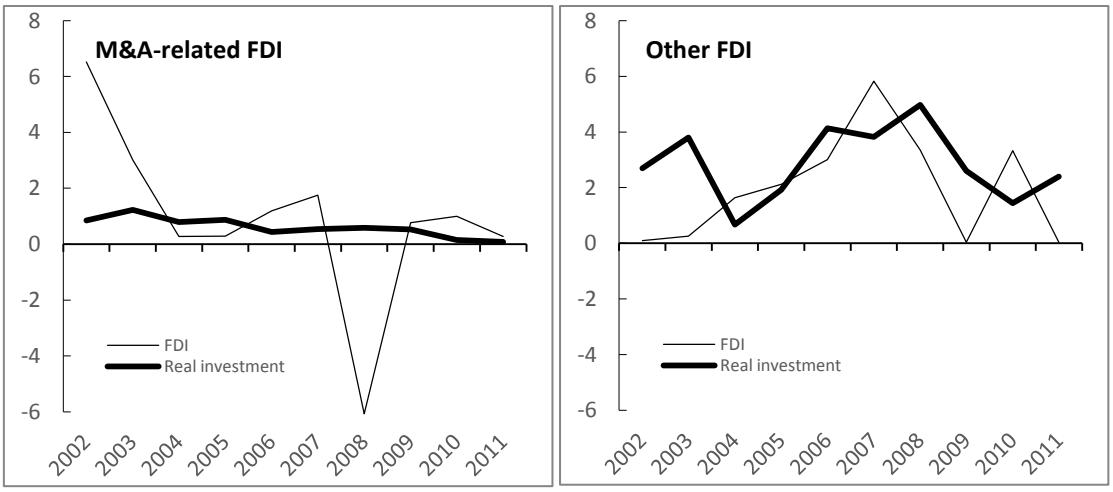
Figure 4.2. Annual inflows of FDI in Finland's business sector by type of FDI, EUR bil.



It is first of all noteworthy how strongly M&A-related FDI flows dominate the aggregate flows in some years. This gives us yet one important explanation for the wide fluctuations in the annual FDI flows. We conclude, based on our analysis this far, that a few very large M&A-related transactions are in fact the single most important explanation for the large fluctuations in Finland's FDI data.

In Figure 4.3, we illustrate how M&A-related FDI may help to explain the (non)relation between FDI and real investment. The large M&A-related FDI flows in 2002 and 2008 are not reflected in real investment figures for the group of *M&A-related FDI*. However in the group of *other FDI*, some similarities are visible in the patterns of the two time series.

Figure 4.3. Inward FDI flow and real investment in FDI target subgroups by type of FDI flow, EUR bil.



However, an examination of correlations between FDI and real investment at enterprise level does not provide clear evidence on the directional impacts of the two types of FDI. In the group of *M&A-related FDI* the correlation between the two variables is 0.2565, while in the group of *other FDI* it is

identify major intra-group M&As. We acknowledge that our list of M&A-related FDI is not exhaustive; thus our results more likely underestimate than overestimate the share of M&A-related FDI flows.

0.052. If we also consider real investment in the years following an FDI flow (table 4.7), our results suggest a more consistent positive correlation in the group of *other FDI*, although this pattern is not clear-cut.

Table 4.7. Correlations between FDI inflows in year *t* and real investment in year *t + x* by FDI type

	M&A-related FDI	Other FDI
Real investment in year t	0.2565*	0.0520*
Real investment in year t + 1	0.5272*	0.2088*
Real investment in year t + 2	-0.0633	0.2530*
Real investment in year t + 3	0.0373	0.0960*
Real investment in year t + 4	0.7799*	0.2204*
Real investment in year t + 5	0.5224*	0.1580*

*) Significant at 1 % level

We conclude that M&A-related flows can cause aggregate FDI data to overestimate or underestimate real investments by foreign-owned companies.

4.5 Pass-through funding of FDI

The funding that a direct investor provides to its direct investment enterprises may not end up in any real economic activity in the host country of the direct investment enterprise. Instead, the direct investment enterprise may use the funds for making direct investments in yet other countries. Consequently, the funds involved in such two-stage FDI transactions merely pass-through the direct investment enterprise without much or any contribution to funding real economic activities in its host economy. In this paper, we call such FDI transactions *pass-through funding of FDI* [16].

Pass-through funding is a problematic phenomenon to analysts and compilers of FDI statistics alike. From analytical viewpoint, problems are first and foremost related to the comparability of FDI statistics in situations where pass-through funding is more prevalent in some of the compared countries than in others. Can we really say that a country is attractive to foreign investors in real economic sense, if its large inflows of FDI merely reflect large volumes of funds passing through?

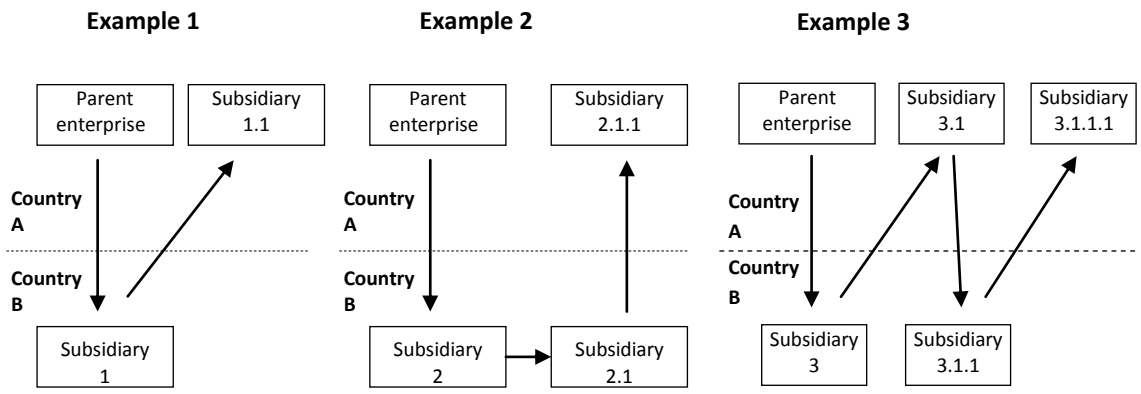
As for the compilers of FDI statistics, the problems are related to difficulties in identifying pass-through funding – linking specific sources of funding to specific uses. The statistical standards suggest certain methods for segregating pass-through investments from FDI data[17]. The FDI statistics that are calculated according to the so-called *directional principle*, which most statistical authorities in developed economies nowadays apply in calculating FDI, take into account some type of pass-through

[16] Typically such pass-through transactions occur when a multinational enterprise channels funds to its foreign subsidiaries through an intermediate subsidiary in the pass-through economy. The underlying motivations for pass-through funding can be manifold. However in this paper we do not focus on particular motives of pass-through transactions but on the more general statistical and analytical implications of the phenomenon. Even though pass-through funding does not directly contribute to funding any real economic activities in the pass-through economy, it may create economic spillovers that can be significant also in a real economic sense.

[17] For a summary of these methods, see Leino (2011).

funding by 'netting out' the so-called *reverse investments*[18]. However, even such FDI data do not capture a type of pass-through funding that turns out to be very important, as we show below.

Figure 4.4. Pass-through of inward FDI to other countries



In Figure 4.4 we present three examples of such cases. In example 1, a parent company in country A makes a direct investment in its subsidiary in country B. The country B records this transaction as *inward FDI*. The subsidiary then uses these funds for a direct investment in its subsidiary abroad, which is recorded by country B as *outward FDI*. In the end, both the inward and outward FDI statistics of country B include funds that merely pass through country B. Example 2 is equivalent to example 1 except that there are now two subsidiaries in chain in country B that participate in channelling the funds *from abroad to abroad*. In example 3, the ownership chain to the last subsidiary in the ownership chain enters and leaves the country several times. The funding that is carried out in such ownership chains inflates the inward and outward FDI figures of country B every time the funds cross the border. Examples 1–3 all represent real cases in Finnish FDI data.

To identify and segregate the above-described pass-through funding, the statistical standards of FDI suggest first identifying *Special Purpose Entities* (SPEs), whose primary purpose is to participate in such pass-through funding activity, and then presenting the FDI statistics so that their data are excluded (or by 'looking-through SPEs'). The OECD Benchmark Definition of FDI also features general criteria for identifying SPEs. The most important of these is that *almost all the assets and liabilities of the enterprise represent investments in or from other countries*[19].

By applying the above-described 'SPE-method' to our data, we conclude that a maximum of 10 % of the inward FDI in Finland's business sector represent FDI funds that pass through SPEs (table 4.8 below). But in some years none of the inward FDI stock gets classified as such, because none of the Finnish direct investment enterprises fulfils our (loose) criterion for an SPE[20]. Indeed the main weak-

[18] *Reverse investment* refers to direct investment that is made in the opposite direction from the direction of influence in the relationship between investor and investment target. An example of this is an investment by a subsidiary (direct investment enterprise) in its parent enterprise (direct investor).
[19] The other criteria concerns the legal status, ultimate controlling entity, number of employees, volume of production, physical presence and industrial activity classification of the enterprise subject to SPE-evaluation.
[20] We here categorise a direct investment entity as an SPE if 90 % of its liabilities and assets represent direct investments from or in other countries. We intentionally apply this rather loose criterion on the share of foreign liabilities and assets and also ignore other SPE-criteria, so that as much pass-through funding as possible would be captured by the SPE-method.

ness of the SPE-method is that it does not allow for pass-through funding that occurs in enterprises that do not meet strict SPE-criteria. Therefore, to assess the total magnitude of pass-through funding that occurs in SPEs *and* non-SPEs alike, we suggest an alternative approach.

The idea[21] here is to 1) compare inward and outward FDI figures of each enterprise, 2) choose for each enterprise the one out of those figures that is closer to zero and then 3) designate that amount, or a portion of it, as pass-through funding in that enterprise. These steps are applied to all enterprises where both the inward and outward FDI figure are greater than or equal to zero or both negative[22]. If the signs of inward and outward FDI are different, the amount of pass-through funding cannot be reasonably defined, so we set it at zero. Finally, the enterprise-level data on pass-through funding are aggregated for an estimate of the total amount of pass-through funding of FDI in the economy.

More formally, we can express the total stock of pass-through funding of FDI, denoted by X_t, at time point *t* (or in time period *t*, if we use FDI flow data) as follows:

$$X_t = \sum_i f(I_{i,t}, O_{i,t}, \lambda_{i,t})$$

$$f(I_{i,t}, O_{i,t}, \lambda_{i,t}) = \begin{cases} \min(I_{i,t}, O_{i,t}) \times \lambda_{i,t}\ , & I_{i,t} \geq 0 \ and\ O_{i,t} \geq 0 \\ \max(I_{i,t}, O_{i,t}) \times \lambda_{i,t}\ , & I_{i,t} < 0 \ and\ O_{i,t} < 0 \\ 0 \qquad , & otherwise \end{cases}$$

, where for each enterprise *i* variable $I_{i,t}$ denotes inward FDI stock (or flow), variable $O_{i,t}$ outward FDI stock (or flow) and $\lambda_{i,t}$ is a coefficient expressing the assumed portion of pass-through funding in the selected FDI figure.

We apply this idea in four variations. In method 1, we use firm-level data of immediate FDI target enterprises and determine the chosen outward or inward FDI figure entirely as 'pass-through funding' (i.e. $\lambda_{i,t} = 1$). This method is simple to apply, and we think it is useful for rough estimations of pass-through funding. However, method 1 relies on the unrealistic assumption that the FDI enterprise had no sources of funding other than FDI (see table 4.4 in chapter 4.1).

In method 2, we again use firm-level data of immediate FDI enterprises but now calculate

$$\lambda_{i,t} = \frac{F_{i,t}}{B_{i,t}}$$

, where $F_{i,t}$ denotes FDI liabilities[23] and $B_{i,t}$ balance sheet liabilities total for each enterprise *i*.

In methods 3 and 4 we take into account that pass-through funding can also occur in chains of pass-through entities (as we described above in examples 2 and 3). To do this, we calculate the amount of

[21] The idea was originally developed in discussions between economists Airi Heikkilä and Topias Leino for estimating the share of pass-through funding in Finland's official FDI data.

[22] *Negative pass-through investments* can occur when existing pass-through funding arrangements are dissolved or when foreign direct investment enterprises provide funding to their foreign direct investors via pass-through entities that are resident in the compiling economy.

[23] *FDI liabilities* are the sum of all funding received by the Finnish direct investment enterprise from its affiliated enterprises abroad (i.e. direct investors, direct investment enterprises and fellow enterprises)

pass-through funding by using data that has been aggregated to local enterprise group level[24]. In method 3 we determine $\lambda_{i,t} = 1$ and in method 4 we determine it like in method 2 but now using the balance sheet data of the largest direct investment enterprise within the local enterprise group measured by inward FDI stock.

As our results in the table 4.8 indicate, the alternative method produces significantly different estimates of pass-through funding than the SPE-method. By applying the alternative method to firm-level data in method 1 and 2, we conclude that, instead of 10 %, around 30 % of inward FDI stock at end-2011 can be regarded as pass-through funding. The application of our calculation methodology to group-level data in methods 3 and 4 produces even higher estimates. We regard the results of method 3 as an upper limit estimate of pass-through funding. The results of method 4 we regard as our best estimate, since they allow for pass-through funding 'in chains' as well as finance other than FDI. We conclude that, according to our best estimate, 28 % of Finland's inward FDI stock at end-2011 should be regarded as pass-through funding.

Table 4.8. Share of pass-through funding in Finland's inward FDI stock[25]: alternative estimations

Year	(a) Inward FDI Stock, EUR bill.	(b) Pass-through funding in SPEs, %	(c) All pass-through funding, method 1, %	(d) All pass-through funding, method 2, %	(e) All pass-through funding, method 3, %	(f) All pass-through funding, method 4, %
2002	22.10	C	15 %	6 %	18 %	8 %
2003	26.16	0 %	20 %	11 %	24 %	14 %
2004	27.19	0 %	21 %	13 %	24 %	14 %
2005	31.47	0 %	21 %	14 %	25 %	17 %
2006	35.90	0 %	23 %	18 %	27 %	21 %
2007	45.26	0 %	22 %	16 %	30 %	20 %
2008	42.70	C	25 %	18 %	32 %	21 %
2009	40.95	C	24 %	16 %	32 %	20 %
2010	47.99	10 %	32 %	25 %	41 %	29 %
2011	48.61	10 %	31 %	24 %	40 %	28 %

C = Confidential data

It is also important to note the steady and strong growth in the share of pass-through funding in the past decade. Using the official FDI stock figures for Finland, we conclude that the inward FDI stock has increased from 2002 to 2011 by 120 % (column *a* in Table 4.8). But if we instead use figures where pass-through funding are excluded, we conclude that the increase was only 72 % (based on columns *a* and *f*).

[24] The firm-level inward and outward FDI stocks are aggregated to local enterprise group level by using the group codes that are available in the national group register maintained by Statistics Finland.

[25] Note that the stocks here cover only the Finnish business sector, as defined in footnote 4, and that the inward FDI stocks have been calculated according to the *directional principle* (thus these figures have already been cleaned out from certain type of pass-through funding).

Figure 4.5. Share of pass-through funding in annual inflows of FDI to Finland, EUR billion

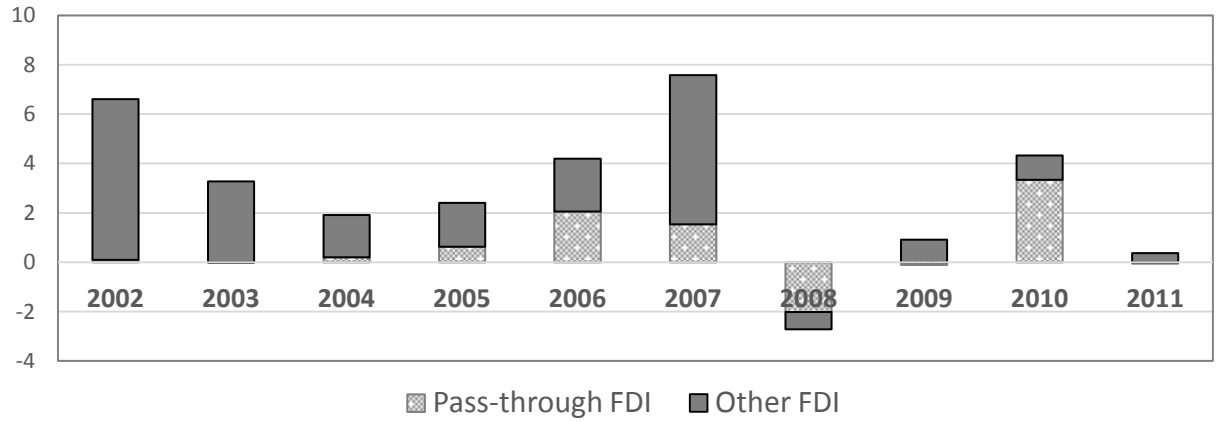


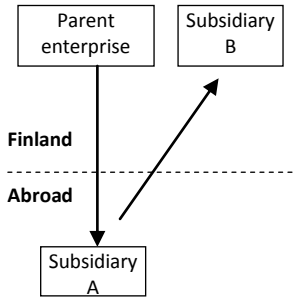
Figure 4.5 shows the contribution of pass-through investments in annual FDI flow data, where pass-through investments have been calculated by applying method 4 to annual flow data. In some years pass-through funding constitutes over 50 % of the annual aggregate flow. If we exclude pass-through investments from the official FDI figures, we find that the net inflows of FDI to Finland have been virtually zero in time period from 2008 to 2011. The results show that in just the past few years pass-through investments have become more important also in the flow data.

It is noteworthy that the sum of pass-through investment flows between 2002 and 2011 is only EUR 5.7 billion, while the increase in the stock of pass-through investments from 2002 to 2011 is almost EUR 12 billion. This difference is largely explained by intra-group ownership arrangements that have followed cross-border mergers and acquisitions in Finland. Acquisitions of Finnish-based enterprises seldom involve only Finnish enterprise unit(s) but also the foreign subsidiaries of the acquired unit. Such M&As are not reflected in the pass-through FDI flow data, but the resulting ownership structures are reflected in the pass-through FDI stock data. Indeed, pass-through transactions and pass-through positions are conceptually quite different.

4.6 Finnish-controlled inflows of FDI to Finland

Some of the investments that are recorded in official statistics as inward FDI may be made by foreign investors which are actually under control of local investors.

Figure 4.6. Finnish-controlled inflows of FDI to Finland



In figure 4.6 we give an example of this type of locally-controlled inward FDI. A Finnish parent enterprise, the ultimate controlling parent of an enterprise group, has a foreign subsidiary A. This foreign

subsidiary has yet another subsidiary B located in Finland. As a consequence of this ownership arrangement, all investments by subsidiary A in subsidiary B are recorded in Finland as inward FDI, even though the Finnish parent has actual control over A's investment decisions.

In Figure 4.7 we present annual flows of FDI to Finland broken down by whether the ultimate parent was resident in Finland or abroad. We conclude that, overall, the flows with Finnish ultimate parent are rather small. However year 2007 is exceptional in that almost half of the annual inflow was ultimately controlled by Finnish parent enterprises.

Table 4.9 shows the shares of Finnish-controlled FDI in inward FDI stock figures at the end of year. These figures indicate that such ownership arrangements as described in Figure 4.5 have gradually increased during the past decade. Analysts who aim to assess the attractiveness of Finnish economy (or any other economy) to foreign investors by using FDI data should take this phenomenon into account.

Figure 4.7 Inflows of FDI by the residency of the ultimate controlling parent (UCP), EUR bill.

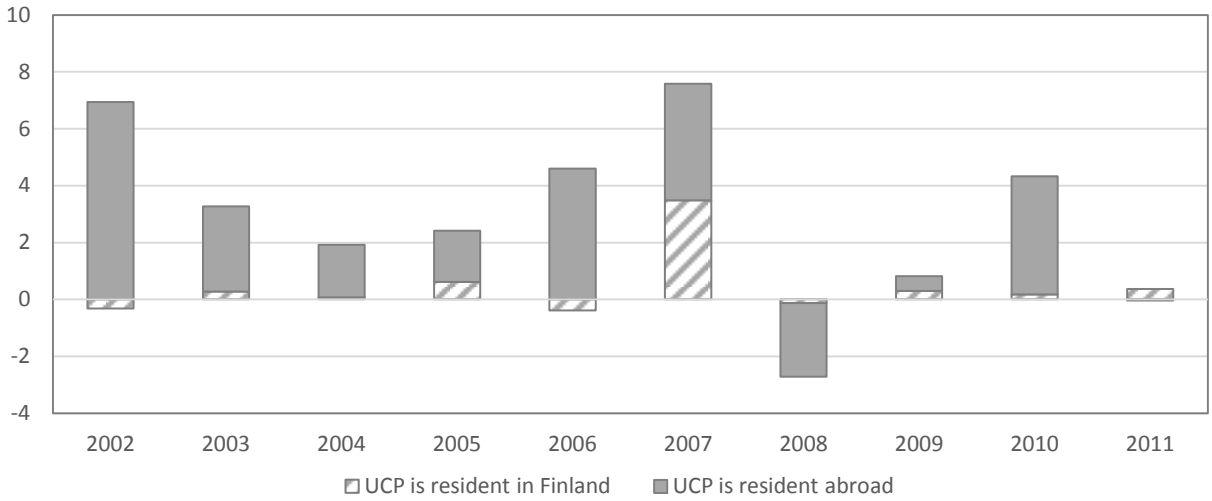


Table 4.9. Finland's inward FDI stock by residency of the ultimate controlling parent

Year	(a) Inward FDI stock, EUR bill.	(b) UCPs resident abroad, %	(c) UCPs resident in Finland, %
2002	22.10	93.5 %	6.5 %
2003	26.16	91.2 %	8.8 %
2004	27.19	91.7 %	8.3 %
2005	31.47	89.1 %	10.9 %
2006	35.90	90.5 %	9.5 %
2007	45.26	86.6 %	13.4 %
2008	42.70	87.8 %	12.2 %
2009	40.95	83.8 %	15.2 %
2010	47.99	80.5 %	19.5 %
2011	48.61	85.4 %	14.6 %

5 Conclusions

This study analyzed the link between inward FDI and real investment (gross fixed capital formation) by foreign-owned companies using Finnish data for 2002–2011. To our knowledge, this is the first study in which this issue has been examined using firm-level data. Our data allowed us to analyze the heterogeneity of inward FDI targets and their real investments.

Our empirical analysis suggests that annual inward FDI statistics do not provide a very precise measure of annual real investment by foreign companies. The loose relationship between FDI and real investment is particularly evident in the data from 2007 onwards. Since the beginning of the global recession, Finland's annual FDI flows have on average significantly underestimated the level of real investment by foreign-owned companies in Finland. These are important findings because inward FDI statistics are often interpreted as if they reflected a country's attractiveness to real investment.

We explained these basic results by describing Finnish FDI target enterprises and their FDI flows from several perspectives. This approach generated five additional findings.

First, in addition to FDI, direct investment enterprises use other sources to fund their investment and other activities. Our results indicate that such other means of finance account for about half of all financing received by foreign-owned companies in Finland.

Second, Finland's annual FDI flows are often heavily driven by just a few positive or negative firm-level flows. The share of the TOP10 (largest) FDI transactions account on average for more than 50 % of the annual FDI inflow. In some years, their share exceeds 80 %. This may mean that annual FDI flows provide a rather biased picture of the prevailing attractiveness of the Finnish economy to real investments.

Third, cross-border mergers and acquisitions (M&As) often constitute a substantial share of annual FDI flows to Finland. But M&A-related FDI flows do not necessarily make any contribution to new capital formation in the target enterprises, and may either overestimate or underestimate the level of real investment.

Fourth, pass-through investments, in which multinational enterprise groups channel funds through their subsidiaries in Finland to other group units abroad, have become increasingly significant in Finland's FDI stock and flow data. Our calculations show that funds involved in such transactions accounted for around 30 % Finland's inward FDI stock at the end of 2011. However, their impacts on fixed capital formation, and on the Finnish economy overall, may be negligible.

Fifth, as much as 15 to 20 percent of Finland's inward FDI stock consists of investments that, in fact, are ultimately controlled by Finnish enterprises.

The above findings show that using FDI as a proxy indicator may result in the underestimate or overestimate of real investments and other 'real activities' of foreign-owned companies. These results are based on descriptive analyses. In the future, our aim is to continue the work using more rigorous methods.

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Appendix

Table A.1. Annual FDI flows relative to Gross Fixed Capital Formation in the economy

	Finland	EU-15	United States	Israel	China
1990	2 %	7 %	5 %	1 %	1 %
1991	-1 %	7 %	2 %	1 %	1 %
1992	2 %	6 %	2 %	1 %	1 %
1993	6 %	7 %	5 %	1 %	2 %
1994	10 %	8 %	4 %	1 %	2 %
1995	5 %	9 %	4 %	2 %	2 %
1996	5 %	8 %	6 %	2 %	2 %
1997	9 %	10 %	7 %	2 %	2 %
1998	48 %	22 %	11 %	2 %	2 %
1999	18 %	32 %	16 %	5 %	1 %
2000	36 %	44 %	16 %	9 %	1 %
2001	15 %	22 %	8 %	2 %	1 %
2002	32 %	27 %	4 %	2 %	1 %
2003	11 %	20 %	3 %	4 %	1 %
2004	8 %	12 %	7 %	3 %	1 %
2005	12 %	18 %	5 %	5 %	1 %
2006	18 %	43 %	9 %	14 %	1 %
2007	24 %	10 %	8 %	7 %	2 %
2008	-2 %	23 %	12 %	9 %	1 %
2009	2 %	31 %	7 %	4 %	1 %
2010	15 %	39 %	10 %	4 %	1 %
2011	5 %	31 %	10 %	7 %	1 %
2012	-4 %	24 %		5 %	
Average (1990–1995)	4 %	7 %	4 %	1 %	1 %
Average (1996–2000)	23 %	23 %	11 %	4 %	1 %
Average(2001–2005)	15 %	20 %	5 %	3 %	1 %
Average(2006–2012)	8 %	29 %	10 %	7 %	1 %
Average(1990–2012)	12 %	20 %	7 %	4 %	1 %

Source: OECD

Table A.2. Data description of all observations (including domestic-owned units) in the dataset

	N	Mean (mEUR)	Std.dev. (mEUR)	Min. (mEUR)	Max. (mEUR)
Net Sales	1 020 907	3,0	91,7	-3,4	32 200
Fixed Assets	1 020 907	1,0	20,9	-8,7	4 090
Real investments (GFCF)	1 020 907	0,2	5,7	-909	1 520

Table A.3. Impact of imputations on inward FDI data, EUR bill., current prices

Year	Non-imputed FDI inflows	Non-imputed inward FDI stock	Number of non-imputed observa-tions	Imputed FDI inflows	Imputed FDI stocks	Number of imputed observa-tions
2002	6.38	19.57	418	0.23	2.46	1 066
2003	2.76	23.53	394	0.51	2.63	1 064
2004	1.90	25.61	417	0.02	1.58	1 064
2005	2.04	28.97	278	0.38	2.48	1 264
2006	3.96	33.42	312	0.24	2.48	1 376
2007	6.64	41.06	315	0.94	4.25	1 483
2008	-3.65	37.08	321	0.94	5.61	1 588
2009	0.36	36.41	349	0.45	4.55	1 796
2010	3.88	41.55	374	0.44	6.43	1 852
2011	-0.17	43.86	382	0.48	4.76	1 854
Average 2002–2006	3.41	26.22	364	0.28	2.33	1 167
Average 2007–2011	1.41	39.98	348	0.65	5.12	1 715
Average 2002–2011	2.41	33.10	356	0.46	3.72	1 441

Table A.4. Gross fixed capital formation (GFCF) of immediate direct investment enterprises without imputations, EUR bill.

Year	GFCF
2002	2.14
2003	2.46
2004	0.25
2005	2.70
2006	3.79
2007	2.59
2008	4.08
2009	2.76
2010	1.16
2011	2.16

Table A.5. Liability accounts of immediate FDI target enterprises

Year	Total liabilities, EUR bill.	FDI liabilities total, %	Pass-through FDI liabilities, %	Other liabilities, %
2002	60.9	41.7 %	5.0 %	58.3 %
2003	69.9	44.5 %	8.0 %	55.5 %
2004	69.9	45.9 %	8.5 %	54.1 %
2005	75.7	47.7 %	8.7 %	52.3 %
2006	81.6	51.5 %	12.2 %	48.5 %
2007	103.1	53.5 %	12.4 %	46.5 %
2008	109.2	50.5 %	14.3 %	49.5 %
2009	107.2	49.4 %	12.9 %	50.6 %
2010	118.3	51.7 %	17.9 %	48.3 %
2011	116.8	51.8 %	15.6 %	48.2 %

Suomen Pankki
Bank of Finland
P.O.Box 160
FI-00101 HELSINKI
Finland

. 2343