

Kaitila, Ville; McQuinn, John; Siedschlag, Iulia; Zhang, Xiaoheng

**Research Report**

## International Investment and Firm Performance: Empirical Evidence from Small Open Economies

ETLA Report, No. 6

**Provided in Cooperation with:**

The Research Institute of the Finnish Economy (ETLA), Helsinki

*Suggested Citation:* Kaitila, Ville; McQuinn, John; Siedschlag, Iulia; Zhang, Xiaoheng (2013) : International Investment and Firm Performance: Empirical Evidence from Small Open Economies, ETLA Report, No. 6, The Research Institute of the Finnish Economy (ETLA), Helsinki

This Version is available at:

<https://hdl.handle.net/10419/201288>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# International Investment and Firm Performance:

Empirical Evidence from Small Open Economies

Ville Kaitila\* – John McQuinn\*\* – Iulia Siedschlag\*\* – Xiaoheng Zhang\*\*

Corresponding author: [iulia.siedschlag@esri.ie](mailto:iulia.siedschlag@esri.ie)

\* ETLA – The Research Institute of the Finnish Economy

\*\* ESRI – The Economic and Social Research Institute, Dublin; Department of Economics, Trinity College Dublin

Suggested citation: Kaitila, Ville; McQuinn, John; Siedschlag, Iulia & Zhang, Xiaoheng (1.3.2013). "International Investment and Firm Performance: Empirical Evidence from Small Open Economies".

ETLA Reports No 6. <http://pub.etla.fi/ETLA-Raportit-Reports-6.pdf>

This paper is part of the SERVICEGAP project funded by the European Commission under the 7<sup>th</sup> Framework Programme, Grant Agreement No. 244522. We thank Mika Maliranta and participants in research presentations at a workshop and an international conference held at the Economic and Social Research Institute in Dublin for useful comments and suggestions.

ISSN-L 2323-2447

ISSN 2323-2447 (print)

ISSN 2323-2455 (online)

## Contents

	Abstract	2
<b>1</b>	<b>Introduction</b>	<b>3</b>
<b>2</b>	<b>Theoretical and empirical framework</b>	<b>3</b>
	2.1 Productivity effects	5
	2.2 Employment effects	7
<b>3</b>	<b>Testable hypotheses</b>	<b>8</b>
<b>4</b>	<b>Data and descriptive statistics</b>	<b>10</b>
<b>5</b>	<b>Empirical methodology</b>	<b>11</b>
<b>6</b>	<b>Empirical results</b>	<b>12</b>
	6.1 Propensity score equation	12
	6.2 Matching	13
	6.3 The effects of foreign acquisitions on labour productivity and employment growth	13
<b>7</b>	<b>Conclusions</b>	<b>18</b>
	Appendix A Literature review	19
	Appendix B Data imputation methodology	28
	Appendix C Summary statistics	30
	References	36

## **Abstract**

This paper examines the causal link between foreign investment and firm performance in six small open economies in the European Union. Specifically, using micro data for manufacturing and services over the period 2001–2009, we analyse the effects of foreign mergers and acquisitions on labour productivity and employment growth up to five years after acquisition. Our results indicate that foreign investors tend to acquire larger firms in both manufacturing and services. Other characteristics of acquired firms differ across countries and between manufacturing and services. Taken together, our estimates suggest that foreign investment had stronger effects on firm performance in services in comparison to manufacturing.

**Key words:** Multinational firms, productivity, employment, propensity score matching

**JEL:** F16; F23; J24

## **Tiivistelmä**

Tarkastelemme ulkomaisten sijoitusten ja yritysten kehityksen välistä yhteyttä kuudessa pienessä avotalousmaassa Euroopan unionissa. Käyttämällä mikroaineistoja teollisuuden ja palvelualan yrityksistä vuosille 2001–2009 analysoimme ulkomaisten yritysostojen (mergers & acquisitions) vaikutuksia yritysten työvoiman tuottavuudelle ja työllisyyden kasvulle viisi vuotta omistuksen siirtymisestä eteenpäin. Tulostemme mukaan ulkomaiset yritykset hankkivat omistukseensa keskimääräistä suurempia yrityksiä niin teollisuudessa kuin palvelualoillakin. Muiden ominaisuuksien osalta ostetuissa yrityksissä on maa- sekä sektori-kohtaisia (teollisuus vs. palvelut) eroja. Kokonaisuutena ottaen ulkomaisilla sijoituksilla näyttää olevan suurempia vaikutuksia yritysten kehitykseen palvelualoilla kuin teollisuudessa.

**Asiasanat:** Monikansalliset yritykset, tuottavuus, työllisyys, propensity score matching

**JEL:** F16; F23; J24

## 1 Introduction

A large theoretical and empirical literature has established that multinational firms perform better than those serving only domestic markets.<sup>1</sup> While it is widely documented that the superior performance of foreign-owned firms is linked to their large endowments of intangible assets to compensate for a lack of local information and experience<sup>2</sup>, the difficulty is to identify the causal link between foreign ownership and firm performance, given other firm-specific confounding factors.

Foreign mergers and acquisitions (M&A) imply a change of ownership and they thus provide a natural experiment which can help to identify the effects of foreign ownership on firm performance. While most existing analyses have focused on firms in manufacturing, the evidence for firms in services is scarce. To fill this evidence gap, we use two rich micro data sets<sup>3</sup> and analyse the effects of foreign mergers and acquisitions on productivity and employment growth in manufacturing and service firms in six small European Union (EU) countries.<sup>4</sup> This analysis uses propensity score matching combined with difference-in-difference estimators.

Our evidence indicates that, in both manufacturing and services sectors, foreign investors tend to acquire larger firms. Other characteristics of acquired firms differ across countries and between manufacturing and services.

Taken together, our estimates suggest that foreign investment had stronger effects on firm performance in services in comparison to manufacturing. Overall, we find that the effects of foreign investment on labour productivity and employment growth were country specific.

The rest of this paper is organised as follows. Section 2 reviews the relevant theoretical and empirical literature. Section 3 discusses testable hypotheses derived from Section 2. Section 4 presents our data and descriptive statistics. Section 5 explains our empirical methodology. Section 6 discusses our results. Finally, Section 7 concludes.

## 2 Theoretical and empirical framework

Existing theoretical and empirical evidence indicate that firms with international activities are more productive than other firms (see for example, Helpman, Melitz and Yeaple, 2004; Helpman, 2006). Exporting firms have been found to have higher productivity than firms that only serve their local market.<sup>5</sup> Further up the productivity ladder, multinational firms<sup>6</sup> which operate in more than one country are the most productive firms. Starting to export or investing abroad, *per se*, do not typically lead to faster productivity growth. Rather, higher productivity

<sup>1</sup> See for example Helpman, Melitz and Yeaple (2004), and Helpman (2006).

<sup>2</sup> See for example Caves (1974), and Dunning (1977).

<sup>3</sup> *Amadeus* and *Zephyr*, provided by Bureau van Dijk, <http://www.bvdinfo.com>.

<sup>4</sup> Austria, Belgium, Denmark, Finland, the Netherlands, and Sweden.

<sup>5</sup> See for example Bernard and Jensen (1995).

<sup>6</sup> See for example Bellak (2004) for a literature review on the performance gaps between multinational firms and their domestic counterparts. According to the theory of the multinational firm, the gaps are due to being a multinational rather than to the nationality of the firm. Empirical evidence shows that foreign ownership, *per se*, is a much less important explanatory factor than firm-specific assets and firm characteristics, such as industry, size, parent country and being multinational.

firms self-select into internationalisation of activities. This higher performance is required in order to overcome the fixed distribution and servicing costs involved by exporting or investing abroad. In some cases, there may still be a boost to productivity after the internationalisation step has been taken, a learning effect.

The motivation for foreign direct investment (FDI) varies. The simplest assumption is that the firm expects that its future profits will rise. In more general terms, four broad motives for FDI have been considered: resource seeking, market seeking, efficiency seeking, and strategic asset seeking motives (Dunning, 1998). A foreign firm may wish to expand its markets and get first-hand local knowledge thereof, remove a competitor (takeover or closedown), acquire technology, patents or a local brand name, or take advantage of some competitive advantage in other countries such as lower production costs, skilled labour force or a good location vis-à-vis third markets. For firms in developed countries with high labour and other costs, producing in low-cost countries improves the price competitiveness of its products in the world markets.

Do foreign multinational firms have superior managerial skills, R&D, technology, networks of suppliers, customers and distribution, etc., that when implemented in and extended to the acquired local company will lead to an increase in productivity? Typically this is what we expect, because firms that operate in the local market only, or even if they are exporters, are found on average to have lower productivity than multinational firms with presence abroad. Indeed, existing empirical evidence indicates that foreign-owned firms have higher productivity than domestic firms. However, if foreign multinationals acquire local firms that already have high capital intensity and productivity – so-called ‘cherry picking’, this superior productivity performance is not due to foreign-ownership *per se*. Nocke and Yeaple (2007) construct a general equilibrium model where depending on whether the firms differ in their internationally mobile or immobile capabilities, cross-border merger and acquisitions involves either the most or the least efficient firms.

On the other hand, it should not make that much of a difference whether the acquiring firm is a domestic or a foreign multinational firm if their home countries are approximately at the same level of development. However, there may be a difference if the countries are at very different levels of development. One would expect that if a firm from a more developed country acquires a local firm, productivity in the latter will rise, and vice versa. We will take a look at the existing evidence below.

In this paper, we will analyse the impact of foreign mergers and acquisitions on productivity and employment growth of acquired local firms. Especially in the short term, these may have opposite effects. If restructuring and performance-boosting measures<sup>7</sup> are needed, shedding labour will lead to lower employment in the firm and most probably to higher labour productivity.<sup>8</sup> However, if the labour and vocational training markets function properly this should not affect employment in the country in the medium term. On the other hand, higher productivity will lead to higher incomes and GDP per capita. Typically, existing studies have analysed total factor productivity which is also affected by the capital stock. Foreign-owned firms are often more capital-intensive than locally-owned firms.<sup>9</sup>

<sup>7</sup> For example Girma (2005a) found that foreign acquisitions in the UK led to an increase in labour-use efficiency.

<sup>8</sup> On the other hand, Piscitello and Rabbiosi (2005) report a positive effect on both labour productivity and employment following foreign takeovers in Italy.

<sup>9</sup> For UK manufacturing, Schiffbauer, Siedschlag and Ruane (2009) found no effect of foreign mergers and acquisitions on total factor productivity (TFP). They found that following foreign mergers and acquisitions, labour productivity rose due to capital deepening. Furthermore, they found positive TFP effects when the acquirer was in R&D-intensive industries and negative effects when the acquirer was in marketing-intensive industries.

Early empirical analyses of firm-level effects of foreign acquisitions have used OLS estimators (see for example Aitken and Harrison 1999; Conyon et al. 2002a; Gioia and Thomsen 2004; Piscitello and Rabbiosi 2005; Fukao and Murakami 2005; Hanley and Zervos 2007; Balsvik and Haller 2010) or system GMM (see for example Harris and Robinson 2002; Gugler and Yurtoglu 2004; Harris 2009). To capture the causal link between foreign ownership and firm performance, more recent studies use propensity score matching combined with difference-in-difference estimators. This empirical approach allows the comparison of firm outcomes in an acquired firm with counterfactual outcomes had the firm not been acquired. Since the counterfactual outcomes cannot be observed, they are generated using data on as similar as possible non-acquired firms (see for example, Girma 2005a, 2005b; Bellak, Pfaffermayr and Wild 2006; Girma, Kneller and Pisu 2007; Karpaty 2007; Huttunen 2007; Salis 2008; Bertrand and Zitouna 2008; Arnold and Javorcik 2009; Bandick and Hansson 2009; Schiffbauer, Siedschlag and Ruane 2009; Lipsey, Sjöholm and Sun 2010). A review of the main characteristics and results of these studies is shown in Appendix A.

While most existing analyses have focused on mergers and acquisitions of manufacturing firms, the evidence for service firms is scarce. However, the boundary between manufacturing and services have become less clear as many manufacturing firms are also major producers of services. The analysed samples vary with respect to representativeness, firm size, ownership definitions which may affect the results.

In most cases, the analysed firms are followed for at least two years before and after the acquisition. However, in some studies (Chen, 2011), acquisition effects are found only five years after the event, which suggests the need to extend the analysed period. Nevertheless, it is difficult to assess *a priori* how many years it takes for the possible effects of an ownership change to fully sink in.

## 2.1 Productivity effects

One much discussed and analysed issue is whether or not foreign firms ‘cherry pick’ the best-performing firms in terms of productivity. However, this question is not unambiguously answered in the literature. Out of 31 studies analysed (see Table A1 in Appendix A), 14 conclude that foreign firms do acquire the most productive local firms or at least firms with above-average productivity. On the other hand, two studies find evidence that foreign firms instead acquire local firms with below-average productivity,<sup>10</sup> six conclude that there was no difference in terms of productivity, and four reported mixed results. Five studies do not analyse the issue.<sup>11</sup> Further, as shown in Table A.2 in Appendix A, foreign firms typically target local firms with a highly skilled labour force. Overall, most evidence suggests that foreign investors tend to acquire high productivity firms.

Evidence from the reviewed literature indicates that productivity growth will be higher after the acquisition and that the level of productivity will then stay at a higher level.<sup>12</sup> The boost

<sup>10</sup> According to Gioia and Thomsen (2004), foreign buyers tend to buy poor performers in Denmark as measured by return on assets and factor productivity. They argue that this is because of information disadvantages leading to a double “lemons problem”. Bertrand and Zitouna (2008) find evidence of lemons picking in French manufacturing industries. Similar evidence is found by Girma and Görg (2007) for the UK electronics and food industries, and Harris (2009) for UK service industries.

<sup>11</sup> Ten of the studies referred to in Table A.1 use UK data. However, even these find different answers to the question about cherry-picking.

<sup>12</sup> Also negative productivity effects, regardless of the home country of the acquirer, have been found (see for example Hanley and Zervos 2007, for UK manufacturing).



can be due to restructuring of inefficient plants, which involves labour shedding and new capital investments.<sup>13</sup> While the productivity boost is likely to be temporary, especially in developed countries, productivity differentials may persist longer in developing countries.

A number of studies analysed both the productivity level and growth effects of foreign acquisitions (for example, Aitken and Harrison 1999; Conyon et al. 2002a). Conyon et al. (2002a) found that the level and growth effects were both positive only in the case of US-based multinational firms. Multinational firms from other parts of the world had a positive effect on the productivity level of acquired firms but no productivity growth effect. Fukao, Ito and Kwon (2005) found that Japanese firms acquired by US- and European-based multinational firms had faster TFP levels as well TFP growth rates than other owners, i.e. domestic Japanese or other foreign firms. The findings by Fukao and Murakami (2005) are mostly in line with these results. Arnold and Javorcik (2009), using micro data from Indonesia, found that the rise in productivity in the acquired plants was mostly a level effect.

However, the productivity boost of foreign acquired firms can be conditional on the country of origin of multinational firms. Empirical evidence to support this hypothesis has been provided among others, by Girma (2005b), Harris (2009) and Criscuolo and Martin (2009) for the UK, Fukao, Ito and Kwon (2005) for Japan, Piscitello and Rabbiosi (2005) for Italy, Bertrand and Zitouna (2008) for France, and Chen (2011) for the United States.

US-based multinationals are typically found to have had a bigger impact on the acquired firms than multinationals from other parts of the world. According to Bloom, Sadun and Van Reenen (2012), US multinationals in Europe experienced higher productivity from using information technologies (IT) than non-US multinationals. Furthermore, local firms taken over by US multinationals increased the productivity of their IT. This did not happen in non-US multinationals. However, other results have also been reached. Using UK data, Criscuolo and Martin (2009) found that acquisitions by US-based multinationals do not differ from acquisitions by other multinationals. Piscitello and Rabbiosi (2005) found for Italy that positive effects from acquisitions are higher when the acquirer is a multinational firm based in continental Europe. If it is a US- or a UK-based multinational firm, the effects are still positive but weaker ‘due to a larger cultural distance’, according to the authors.

What then are the effects in the US where average productivity is the highest in the world? Using data on US firms, Chen (2011) found that multinational firms from other industrialised countries had a positive impact on labour productivity in the acquired US firms, but multinational firms from developing countries had a negative impact, both relative to domestic US acquisitions. On the other hand, according to the results by Chari, Chen and Dominguez (2009), multinational firms from emerging countries will shed labour and raise profitability in acquired US firms.

Girma, Görg and Pisu (2008) found evidence of significant horizontal spillovers from export-oriented multinationals to foreign-acquired domestic exporters, but not to acquired non-exporters in the UK.<sup>14</sup> They argue that this is due to a greater absorptive capacity, as shown by higher productivity in exporting firms than in firms that only sell to the domestic market.

<sup>13</sup> Piscitello and Rabbiosi (2005) as well as Arnold and Javorcik (2009) find that there has been a rise in both labour productivity and employment in foreign-acquired Italian and Indonesian firms, respectively.

<sup>14</sup> Positive spillovers to other firms are also possible. Using Lithuanian firm-level data, Javorcik (2004) finds evidence of positive productivity spillovers arising through backward linkages in partially but not-fully-owned foreign projects.

With a greater absorptive capacity, an exporter has high enough know-how to be able to take advantage of the more extensive resources and higher productivity of its new owner.<sup>15</sup> Girma, Greenaway and Wakelin (2001) found evidence that UK firms with low initial productivity operating in low-skill sectors with low foreign competition gain less from or may even be damaged by foreign presence. According to Girma, Kneller and Pisu (2007), UK firms with higher pre-acquisition productivity first experience larger efficiency gains after the acquisition. However, two years into the acquisition, the rate of learning is instead greater the lower the pre-acquisition TFP of the acquired firm. Thereafter, growth rates converge. The authors also find that positive horizontal spillovers arise only from export-oriented multinationals. Instead, domestic-market-oriented multinational firms generate positive spillovers through backward linkages for both domestic exporters and non-exporters.<sup>16</sup> Aitken and Harrison (1999) found that in Venezuela increases in foreign ownership decreased productivity in fully domestically owned firms in the same industry. They also did not find any evidence of technology spillovers from foreign to domestically owned firms.

Aitken and Harrison (1999), Blomström and Sjöholm (1999), Chhibber and Majumdar (1999), Dimelis and Louri (2002), and more recently Greenaway, Guariglia and Yu (2009) analysed whether the degree of foreign ownership affects firms' performance. They analysed firms in Venezuela, Indonesia, India, Greece and China, respectively. According to their results, the degree of ownership matters in India, Greece, China (inverted U-shaped relationship with joint ventures performing the best), and for small firms in Venezuela, but it does not matter in Indonesia. The emerging market status of these countries may affect the results compared with similar studies in developed countries. Using OLS and difference-in-difference estimators, Ilmakunnas and Maliranta (2004) find no significant difference between a 20 per cent and a 50 per cent foreign ownership in Finland. Also Fukao, Ito and Kwon (2005) find no differences between a 33.4 per cent-owned and a majority-owned foreign firm in Japan.

Most existing studies use data on manufacturing firms, and even if non-manufacturing firms are included, no specific results for service sector firms are given. There are some exceptions. According to Fukao et al. (2008), domestic acquisitions had a negative impact on TFP growth in Japan's non-manufacturing firms. Using UK data, Harris (2009) found that there are TFP gains in US- and EU-acquired service sector plants, but that the effects dissipate over time. In 'other' foreign-owned<sup>17</sup> plants, he found a 10 per cent longer-term gain. Schiffbauer, Siedschlag and Ruane (2009) found no TFP effects in the UK service sectors.

## 2.2 Employment effects

The evidence with respect to the employment effects of foreign acquisitions vary more than the effects of foreign acquisitions on productivity. It is probably more intuitive that productivity rises following a foreign acquisition, while employment effects can be either positive or negative.<sup>18</sup>

<sup>15</sup> Also Girma (2005b) found that US- and EU-acquisitions result in higher TFP improvements the higher the absorptive capacity of the acquired firm. With high enough initial productivity rate of technology transfer due to the foreign acquisition starts to decline, however.

<sup>16</sup> Bandick (2011) found that targeted Swedish MNEs and non-MNEs have faster TFP growth after vertical foreign acquisition but no such impact after a horizontal foreign acquisition.

<sup>17</sup> That is other than the EU, the USA, Canada, Australia, New Zealand, South Africa or South East Asia.

<sup>18</sup> Of course the plant may also be shut down in which case the loss in employment is total. Sometimes the studies analyse only surviving firms. We have not referred to results for closedown in this survey.

Faster employment growth after acquisition is found by Piscitello and Rabbiosi (2005) for Italy, Gong, Görg and Maioli (2007) for privatised Chinese firms, Almeida (2007) for Portugal, Arnold and Javorcik (2009) as well as Lipsey, Sjöholm and Sun (2010) for Indonesia, Balsvik and Haller (2010) for Norway, and Bandick and Görg (2010) as well as Bandick and Karpaty (2011) for Sweden. Negative employment effects have been found by, among others, Conyon et al. (2002a) for the UK, Csengödi, Jungnickel and Urban (2008) for Hungary, and Chari, Chen and Dominguez (2009) for the United States.

In some studies, the employment effects have been found to depend on the sector, the size of the acquired firms, or the skill-level of the labour force. Girma (2005a) found negative employment effects in larger acquired British firms and positive effects in smaller ones. Using Swedish data, Bandick and Görg (2010) found that the increase in employment was larger in exporters and smaller in acquired MNEs, but both occurred only if the takeover was vertical. There were no effects if the target was a purely domestic firm or if the acquisition was horizontal.

Huttunen (2007) as well as Lehto and Böckerman (2008) found negative employment effects of foreign acquisitions in Finland albeit with some variation depending on the skill groups and sectors. Huttunen's results indicate that the share of highly-skilled workers declined in the post-acquisition period. On the other hand, Bandick and Hansson (2009) found that in Sweden, the relative demand for skilled labour rose in foreign-acquired non-multinational firms (but not in acquired multinational firms). Also Bandick and Karpaty (2011) found an increase in skilled employment in Sweden following foreign acquisitions. Girma and Görg (2004) found slower employment growth in the UK electronics industry, in particular for unskilled labour, but no significant effects in the food sector. Lipsey, Sjöholm and Sun (2010) found that in Indonesia, in foreign acquired firms, blue-collar employment grew faster than white-collar employment. Only few studies report results for service sectors. Fukao et al. (2008) report a fall, albeit temporary, in non-manufacturing employment following a foreign takeover. Lehto and Böckerman (2008) found some evidence of negative employment effects in construction and other services in Finland, but no effects in trade, hotels and restaurants. Harris (2009) found that overall, post-acquisition employment changed very little in the UK service sectors.

### 3 Testable hypotheses

The reviewed literature suggests a number of testable hypotheses with respect to the motivation and types of firms acquired by foreign investors as well as the post-acquisition performance of foreign acquired firms.

According to the *managerial hubris* hypothesis (Roll, 1986), managers may use mergers and acquisitions to fulfil their desires to maximise firm size. In this case, we cannot make an *ex ante* assumption as to the efficiency of acquired firms or their future development. According to the *management's comparative advantage* (or managerial-discipline) hypothesis, "lemons" (i.e. bad performers) are acquired and their performance should increase after acquisition. According to the *synergy effects* hypothesis, "cherries" (i.e. good performers) are acquired and their performance should increase after acquisition. The latter two hypotheses maintain that the aim of the acquisition is to maximise profits. Productivity is expected to rise when foreign investors transfer their superior firm-specific advantages to their foreign affiliates. This is the

*firm specific-advantage* hypothesis. (See for example Gugler et al., 2003; Fukao et al., 2008; and Balsvik and Haller, 2010). Profit-maximising managers versus empire-builders are also discussed by Jensen (1986) and Conyon et al. (2002b.)

It has also been suggested that FDI may not be driven by high performance firms exploiting their advantage abroad, but instead by firms trying to gain access to superior foreign technology. This is the *technology sourcing* hypothesis. (Branstetter, 2001; Keller, 2004; and Criscuolo and Martin, 2009).

Nocke and Yeaple (2007) distinguish between firms' mobile and non-mobile capabilities that determine whether cross-border mergers and acquisitions involve either the most or the least efficient firms. In industries in which the source of firm heterogeneity is due to internationally mobile (non-mobile) factors foreign acquisitions lead to a more substantial (less dramatic) improvement in the acquired firm's performance than domestic acquisitions. This implies that the possibility of *productivity spillovers to the acquired firm is the highest if the acquirer firm is in an R&D-intensive industry and the lowest or even negative if it operates in a marketing-intensive industry*.

The productivity impact on the acquired firm may depend on its *absorptive capacity*, i.e. the level of education of its employees (see for example, Nelson and Phelps, 1966). Thus, it may be that only a firm with higher productivity when acquired will be able to absorb the more advanced technology of the foreign owned firm (Lapan and Bardhan, 1973). Consequently, an acquired exporting firm may receive greater benefits than an acquired local firm, something that e.g. Bandick and Görg (2010) test. On the other hand, it has also been suggested that a large *technological gap* between the foreign owned firm and the acquired firm may lead to a larger boost in productivity of the latter (Findlay, 1978). This has been analysed for example, by Girma (2005b).

The effect of foreign acquisition on the performance of the acquired firm may vary depending on the *home country of the foreign investor*. A foreign owned firm from a more developed industrialised country may be able to transfer more up-to-date technology to the acquired firm thus leading to better productivity performance than a foreign owned firm from a developing or emerging economy. This can be tested by including information about the home country of the foreign owned firm. Also, firms acquired by developing-country multinationals may suffer decreases in employment compared with acquisitions from a developed country (Chen, 2011; and Fortanier and Moons, 2011).

*Industry type and firm size*. Following Caves (1971, 1974), horizontal FDI where the local subsidiary produces the same type of goods as its multinational firm parent, will occur in *industries with product differentiation and relatively large firm size*. Also, the more foreign subsidiaries in the sector, the higher technical efficiency will be and more technology transfers to domestic firms. This should lead to faster productivity developments.

*FDI type and labour demand*. Mattes (2010a, 2010b) analyses the following hypotheses: (i) *horizontal FDI* has a positive impact on labour demand, while *vertical FDI* has a negative one; (ii) FDI has a positive impact on the demand for high-skilled labour and a negative impact on the demand for low-skilled labour;<sup>19</sup> (iii) highly productive and unproductive firms are subject to

<sup>19</sup> The distinction between greenfield entries and acquisitions may play a role here: see for example Bartel and Lichtenberg (1987).

foreign takeovers, while average performers are not (i.e. U curve relationship); and (iv) firms with a large market share are subject to foreign takeovers.

If the foreign owned firm transfers *skill-biased technology*, this will favour the type of labour that is intensive in the required skills. The effect may or may not favour labour with advanced skills. High-skill activities, such as many headquarter and R&D activities, may well be moved out of the country. (See e.g. Bandick and Hansson, 2009; and Bandick and Karpaty, 2011.)

Lehto and Böckerman (2008) hypothesise that especially in non-labour-intensive services a domestic buyer – located in the same market as the target firm – may have a greater interest than a foreign owned firm to buy another firm to limit competition. This may have a larger negative impact on employment.

Dimelis and Louri (2002) analyse several hypotheses in relation to the effects of international investment on firm performance: (i) labour productivity is influenced by *the degree of foreign ownership*; (ii) *the degree of foreign engagement in an industry* affects the extent of productivity spillovers; and (iii) the effect of foreign involvement is different at *various points of the conditional distribution of productivity*.

## 4 Data and descriptive statistics

We use firm level data from the Bureau van Dijk's *Amadeus* and *Zephyr* datasets for firms in the following six small and open EU countries: Austria, Belgium, Denmark, Finland, the Netherlands and Sweden. The period under examination covers the years 2001 to 2009. *Amadeus* is an extensive dataset including information on firm characteristics, financial performance and legal structure while *Zephyr* has detailed information on mergers and acquisitions, notably cross-border transactions. Using common identifiers we combine these two datasets for our study. Bureau van Dijk categorises company legal form into three broad categories: limited companies, limited liability companies and other forms. We use data on unconsolidated accounts for only the first two categories to allow comparability across countries as these two categories correspond to public and private limited companies respectively. Firms are classified according to their two-digit NACE code (Rev.1), which enables us to separate service from manufacturing firms and explore heterogeneity between the two sectors.

We define a foreign acquisition as any ownership stake passing over a threshold of 10 per cent of total shareholding in line with officially recognised definitions of foreign direct investment.<sup>20</sup> We only consider medium and larger firms. These are defined by *Amadeus* as firms fulfilling at least one of the following conditions: the number of employees is greater than 15, operating revenue is greater than one million euros and/or total assets are greater than two million euros. Financial institutions and insurance companies are excluded from the *Amadeus* database due to compatibility issues with respect to the format of financial accounts. In our analysis, using available data, we construct the following variables: the age of the firm, employment, the ratio of debt to fixed assets, tangible fixed assets per employee (capital-labour ratio), turnover per employee (labour productivity), employment growth rate, turnover per employee growth rate (labour productivity growth), a foreign acquisition dummy (binary var-

<sup>20</sup> For a definition of FDI see International Monetary Fund (1993).

iable equal to one in the year where the acquirers' stake passes 10 per cent), and industry, region and year dummies. We use industry producer price indices at the two digit level to deflate manufacturing firm monetary variables with 2005 as the base year and a GDP deflator with 2006 as the base year for service firms. Finally, our sample is restricted to non-negative observations for tangible fixed assets and the number of employees while debt is restricted to values equal to or greater than zero.

The available data are limited by missing values. Assuming that missing data are randomly missing, we generate these data using a weighted hotdeck methodology. This is a multiple imputation process whereby five datasets are generated using a stochastic process and combined using the Rubin's Rule.<sup>21</sup> A detailed description of the imputation method is given in Appendix B.

Summary statistics are presented in Tables C1-C6 in Appendix C. These summary statistics show a good deal of variation both between and within countries although less variation exists between manufacturing and services.

## 5 Empirical methodology

This paper uses a propensity score matching combined with difference-in-difference estimators (Heckman et al. 1997) to examine the causal effect of foreign acquisition on firm productivity and employment. To this purpose, we first estimate the foreign acquisition (the treatment,  $D$ ) propensity conditioned by the observed firm characteristics,  $X$ , using a probit propensity score equation. We then use the propensity score to match foreign acquired and domestic non-acquired firms assuming conditional independence, i.e. that foreign acquisitions is only determined by observables  $X$  and by no any unobservable characteristics. In combination with this assumption, a substantial overlap between the propensity score of the treated and untreated firms, also referred to as the common support assumption, allows matching non-acquired (control) firms to acquired (treated) firms such that:

$$(Y_1, Y_0) \perp D \mid p(X) \text{ and } 0 < p(X) < 1. \quad (1)$$

$Y_1$  is the firm outcome following foreign acquisition and  $Y_0$  is the firm outcome under non-acquisition.  $p(X)$  is the propensity score estimated using a set of observed characteristics,  $X$ .  $D \in \{0, 1\}$  is the treatment indicator where 0 indicates non-acquired control firms and 1 indicates foreign acquired firms. Thus, assuming conditional independence, outcomes for foreign acquired and for non-acquired firms are independent of treatment when matched on the propensity score with common support.

To predict the foreign acquisition propensity, we use the following firm characteristics: the number of employees and its square term; the debt-to-fixed-assets ratio; the firm's age and its square term; the capital-to-labour ratio; and industry (3 digit NACE Rev. 1 classification), region and year fixed effects. These variables are lagged where possible by one year except for age and its square term. The sample is also weighted by size classes<sup>22</sup> which divide firms ac-

<sup>21</sup> See Andridge and Little (2010).

<sup>22</sup> Weights are calculated on the basis of information provided by the Eurostat.

ording to the number of employees working at the firm as follows: firms with: 10–19 employees; 20–49 employees; 50–249 employees and firms with more than 250 employees.

Following the estimated foreign acquisition probability, foreign acquired firms are matched to the domestic non-acquired firms on the common support. We employ one-to-one nearest neighbour matching with replacement using a 0.005 caliper to reduce the likelihood of poor matches.<sup>23</sup> We impose the common support assumption, which implies that foreign acquired firms having a propensity score higher than the maximum or less than the minimum of the propensity score of the domestic non-acquired firms are dropped. In addition, we perform balancing tests after matching to test the null hypothesis that sufficient overlap exists on the common support between foreign acquired firms and the control group. The balancing tests are similar to Arnold and Javorcik (2009) including t-tests of the equality of means based on a regression of the variable on the treatment indicator, as well as a F-test of the quartic function of the propensity score and its interactions with the treatment dummy.

Finally, we use a difference-in-differences approach to determine the causal effect of foreign acquisition on firm performance. This is achieved by calculating the difference between outcomes of foreign acquired and domestic non-acquired firms but also the difference over time within outcomes for foreign acquired and domestic non-acquired firms. This empirical approach gives the growth rate of firm outcomes as a result of foreign acquisition. Calculating the difference over time allows us to control for unobserved time-invariant characteristics having already controlled for observed heterogeneity in the propensity score stage described above. The difference-in-differences equation is given by:

$$D_{t,t-1}(X) = E(Y_{1t} - Y_{0,t-1} | X, D = 1) - E(Y_{0t} - Y_{0,t-1} | X, D = 0) \text{ for } X \in S, \quad (2)$$

where  $S$  is the common support between the treated and control groups. Equation (2) shown above gives the average treatment effect on the treated (ATT) or the causal effect of foreign acquisition.

## 6 Empirical results

### 6.1 Propensity score equation

We first consider the estimates of the propensity score equation.<sup>24</sup> These estimates indicate that foreign investors tend to acquire larger firms in Belgium, Denmark, Finland, and Sweden, in manufacturing as well as services. In contrast to services, it appears that larger firms in manufacturing are acquired at a decreasing rate. These results are in line with Gioia and Thomsen (2004) for Denmark and with findings of Bandick and Görg (2010) and Bandick and Karpaty (2011) for Sweden. We find that foreign investors “cherry picked” higher productivity service firms in Belgium and Denmark, while in Austria lower productivity services firms were more likely to be acquired by foreign investors (in contrast to findings by Bellak, Pfaffermayr and Wild, 2006). In manufacturing, we find that in Finland foreign investors “cher-

<sup>23</sup> Using the nearest neighbour matching leads to less bias as this method only uses the control observation closest in distance to match the treated observation.

<sup>24</sup> Available on request from the authors.

ry picked” high productivity firms (these results are in line with Ilmakunnas and Maliranta, 2004; and Huttunen, 2007) while in the Netherlands, lower productivity firms were more likely to be acquired by foreign investors.

Also, we find that in Belgium and Denmark, foreign investors in manufacturing were more likely to acquire firms with higher debt-to-fixed-assets ratios. In addition, older service firms were more likely to be acquired in Denmark and Finland, although at a decreasing rate while foreign acquisition of manufacturing firms was more likely for younger firms. The evidence also suggests that in Belgium and Finland, foreign investors in manufacturing tended to acquire more capital-intensive firms.

## 6.2 Matching

We discuss next the matching results using the nearest neighbour matching method. It should be noted that, while the number of foreign acquired firms in the acquisition year and the first two years following acquisition are approximately comparable in the number of matched firms, these numbers decline rapidly thereafter reducing the comparability of the group of firms under examination particularly in the third, fourth and fifth years following acquisition. The results of the balancing tests show few statistically significant differences, thus validating the common support assumption discussed above.<sup>25</sup>

Labour productivity is measured as turnover per employee as in Conyon et al. (2002a)<sup>26</sup> and Chen (2011).<sup>27</sup> In other studies, labour productivity has been measured as value added per employee (for example, Piscitello and Rabbiosi, 2005; Mattes, 2010a; Csengödi, Jungnickel and Urban, 2008). However, data on value added is not available for Denmark in the *Amadeus* data set. Previous studies using both measures of labour productivity found that foreign acquisition had a positive impact on both labour productivity level as well as productivity growth. Nevertheless, Mattes (2010), using propensity score matching found no significant effect. However, these studies focus only on manufacturing firms whereas our results show some instances where results differ between manufacturing and service firms within countries in addition to heterogeneity between countries.

## 6.3 The effects of foreign acquisitions on labour productivity and employment growth

The estimates of the effects of foreign acquisitions on labour productivity growth in service firms are shown in Table 1.

Overall, the estimates suggest no general pattern across the analysed countries. In the acquisition year, foreign acquisition led to significantly higher labour productivity growth in Denmark, significantly lower labour productivity growth in Belgium and the Netherlands and had no significant effect on labour productivity growth in Austria, Finland and Sweden. Three years after acquisition, the positive and significant effect of foreign acquisition on la-

<sup>25</sup> Results available on request from the authors.

<sup>26</sup> Conyon et al.(2002a) explore both growth and level effects.

<sup>27</sup> Chen (2011) examines growth effects only.



<b>Table 1 The effect of foreign mergers and acquisitions on labour productivity growth – service firms</b>						
<i>Country</i>	<i>Austria</i>	<i>Belgium</i>	<i>Netherlands</i>	<i>Denmark</i>	<i>Finland</i>	<i>Sweden</i>
Year 0	-0.123 (0.134) N=191	-0.186*** (0.057) N=731	-0.164* (0.085) N=643	0.212** (0.089) N=500	-0.011 (0.072) N=325	-0.047 (0.044) N=767
Year 1	0.005 (0.120) N=186	-0.234*** (0.062) N=651	0.090 -0.097 N=552	0.271*** -0.086 N=481	-0.108 -0.070 N=287	-0.032 -0.053 N=703
Year 2	0.195 (0.155) N=139	-0.151** (0.065) N=523	-0.224** (0.107) N=449	0.155 (0.102) N=380	-0.128 (0.089) N=222	-0.040 (0.053) N=572
Year 3	0.085 (0.212) N=83	-0.201** (0.087) N=378	-0.084 (0.133) N=300	0.295*** (0.111) N=275	0.033 (0.136) N=149	0.085 (0.060) N=451
Year 4	0.122 (0.287) N=60	-0.278** (0.110) N=275	-0.229 (0.180) N=228	0.218 (0.197) N=209	0.217 (0.143) N=114	0.056 (0.073) N=341
Year 5	0.504** (0.247) N=34	-0.220* (0.127) N=163	-0.339* (0.177) N=170	0.439** (0.189) N=119	0.015 (0.193) N=74	0.155* (0.087) N=220

Notes: Bootstrapped standard errors in parenthesis, 1 per cent, 5 per cent and 10 per cent levels of significance are indicated by \*\*\*, \*\*, and \* respectively.

bour productivity growth persisted in Denmark, while its negative and significant effect was still present in Belgium. Foreign acquisitions had no significant effect on labour productivity growth in the other countries. Five years after acquisition, labour productivity growth was significantly higher in Austria, Denmark and Sweden while in Belgium and the Netherlands labour productivity growth was significantly lower. In Finland there were no significant effects. Taken together, country-specific estimates suggest that foreign acquisitions led to significantly higher labour productivity growth in Denmark (in the acquisition year, and one, three and five years after acquisition), as well as in Austria and Sweden (five years after acquisition). Labour productivity growth was significantly lower in Belgium (in the acquisition year as well as in the analysed post-acquisition period) and the Netherlands (in the acquisition year, two and five years after the acquisition). In Finland, foreign acquisitions in services had no significant effect on labour productivity growth.

These results are consistent with the findings of a previous study by Gioia and Thomsen (2004) which finds that foreign acquisitions had a positive effect on the productivity of Danish firms although they do not distinguish between the effect on service and manufacturing firms.<sup>28</sup>

<sup>28</sup> Gioia and Thomsen (2004) use a selection adjustment (inverse Mill's ratio) from a probit model and control for this in the OLS regression to test the level of productivity measured by the Cobb Douglas measure of TFP.

The estimates of the effect of foreign acquisition on labour productivity growth for manufacturing firms are shown in Table 2.

In contrast to service firms, these results suggest that in most cases foreign acquisitions had no significant effect on labour productivity growth across the six analysed small open economies. Foreign acquisitions led to significantly higher labour productivity growth in Finland one year after acquisition while labour productivity growth was significantly lower in Belgium (in the acquisition year and one year after acquisition), in Denmark (three years after acquisition), in Finland (four years after acquisition) and in Sweden (five years after acquisition).

Karpaty (2007)<sup>29</sup> and Bandick (2011)<sup>30</sup> found positive effects on firm productivity in manufacturing in Sweden for the level of Törnqvist TFP as well as TFP growth (estimated following Levinsohn and Petrin 2003). In the case of Denmark, Gioia and Thomsen (2004) found that foreign acquisition had a positive effect on the labour productivity of Danish firms. However, they do not distinguish between the effects on service and manufacturing firms. Finally,

<b>Table 2 The effect of foreign mergers and acquisitions on labour productivity growth – manufacturing firms</b>						
<i>Country</i>	<i>Austria</i>	<i>Belgium</i>	<i>Netherlands</i>	<i>Denmark</i>	<i>Finland</i>	<i>Sweden</i>
Year 0	0.098 (0.254) N=81	-0.275** (0.111) N=178	0.110 (0.151) N=250	-0.141 (0.130) N=247	0.094 (0.089) N=159	0.047 (0.053) N=349
Year 1	0.002 (0.212) N=68	-0.440*** (0.121) N=161	-0.098 (0.156) N=229	0.036 (0.136) N=221	0.235** (0.095) N=144	0.046 (0.060) N=321
Year 2	-0.032 (0.323) N=50	-0.092 (0.161) N=125	0.043 (0.183) N=182	-0.225 (0.141) N=158	-0.080 (0.106) N=118	-0.086 (0.072) N=258
Year 3	0.008 (0.383) N=37	-0.228 (0.147) N=106	0.062 (0.216) N=142	-0.313** (0.142) N=128	-0.007 (0.158) N=76	-0.102 (0.068) N=197
Year 4	0.432 (0.399) N=15	-0.104 (0.214) N=75	0.183 (0.318) N=82	-0.088 (0.232) N=82	-0.431*** (0.163) N=54	-0.023 (0.103) N=106
Year 5	0.060 (0.499) N=5	-0.624 (0.457) N=23	-0.534 (0.391) N=62	-0.283 (0.231) N=62	-0.266 (0.207) N=38	-0.243** (0.111) N=79

Notes: Bootstrapped standard errors in parenthesis, 1 per cent, 5 per cent and 10 per cent levels of significance are indicated by \*\*\*, \*\*, and \* respectively.

<sup>29</sup> Both Karpaty (2007) use a propensity score matching and difference-in-difference methodology to test the level effect.

<sup>30</sup> Bandick (2011) use a propensity score matching and difference-in-difference methodology to explore the growth effect.

Ilmakunnas and Maliranta (2004) found that foreign acquisition increased the TFP level in Finnish manufacturing firms.<sup>31</sup>

The estimates of the effects of foreign acquisitions on employment growth in service firms are shown in Table 3.

Overall, these estimates indicate that, in the six analysed small open economies, foreign acquisitions led to significantly higher employment growth particularly in the first post-acquisition year. Foreign acquisitions led to significantly higher employment growth in the acquisition year in Austria and Belgium, one year after acquisition in all six countries with the exceptions of Austria and Sweden, two years after acquisition in Denmark and Finland and four years after acquisition in Belgium and Denmark. Five years after acquisition employment growth was significantly higher in the Netherlands and significantly lower in Austria and Sweden. Lehto and Böckerman (2008)<sup>32</sup> examined service industries and found mixed evidence for the level

<b>Table 3 The effect of foreign mergers and acquisitions on employment growth – service firms</b>						
<i>Country</i>	<i>Austria</i>	<i>Belgium</i>	<i>Netherlands</i>	<i>Denmark</i>	<i>Finland</i>	<i>Sweden</i>
Year 0	0.275* (0.162) N=191	0.148** (0.060) N=731	0.073 (0.090) N=643	0.125 (0.108) N=500	0.125 (0.078) N=325	-0.015 (0.050) N=767
Year 1	0.175 (0.146) N=186	0.178*** (0.067) N=651	0.213** (0.103) N=552	0.245** (0.101) N=481	0.412*** (0.097) N=287	-0.053 (0.054) N=703
Year 2	0.046 (0.182) N=139	0.011 (0.077) N=523	0.132 (0.096) N=449	0.402*** (0.122) N=380	0.299*** (0.111) N=222	0.060 (0.059) N=572
Year 3	-0.094 (0.257) N=83	0.059 (0.098) N=378	0.214 (0.146) N=300	0.022 (0.163) N=275	0.149 (0.107) N=149	-0.043 (0.079) N=451
Year 4	-0.361 (0.332) N=60	0.368*** (0.121) N=275	0.290 (0.183) N=228	0.551*** (0.184) N=209	0.126 (0.146) N=114	0.025 (0.094) N=341
Year 5	-0.731* (0.376) N=34	0.171 (0.173) N=163	0.311* (0.169) N=170	0.465 (0.294) N=119	-0.141 (0.185) N=74	-0.257** (0.105) N=220

Notes: Bootstrapped standard errors in parenthesis, 1 per cent, 5 per cent and 10 per cent levels of significance are indicated by \*\*\*, \*\*, and \* respectively.

<sup>31</sup> Ilmakunnas and Mariranta (2004) use a propensity score matching and difference-in-difference methodology to examine the level effect.

<sup>32</sup> Lehto and Böckerman (2008) use propensity score matching and difference-in-difference estimators for level effects.

effect of foreign acquisition on service firms in Finland with declines in construction and other services, however no effect in trade, hotels and restaurants.

Table 4 shows the estimates of the effects of foreign acquisition on employment growth in manufacturing.

These estimates suggest that in many cases, albeit in less cases than service firms, foreign acquisitions led to significantly higher employment growth in Belgium (in the acquisition year and four years after acquisition), in Denmark (two, three and four years after acquisition). Foreign acquisitions led to lower employment growth in Finland (in the acquisition year and one year after acquisition) and in Sweden (three and five years after acquisition). In Austria and the Netherlands foreign acquisition of manufacturing firms had no significant effects on employment growth. These results are in line with the findings of Bellak, Pfaffermayr and Wild (2006).<sup>33</sup> The estimates for Finland are in line with the findings of Lehto and Böckerman (2008). In the case of Sweden, Bandick and Hansson (2009) find that skilled employment increased following acquisition for non-Swedish MNEs with no statistically significant effect for

<b>Table 4 The effect of foreign mergers and acquisitions on employment growth – manufacturing firms</b>						
<i>Country</i>	<i>Austria</i>	<i>Belgium</i>	<i>Netherlands</i>	<i>Denmark</i>	<i>Finland</i>	<i>Sweden</i>
Year 0	0.191 (0.318) N=81	0.211* (0.112) N=178	0.126 (0.169) N=250	0.031 (0.161) N=247	-0.245** (0.121) N=159	-0.065 (0.073) N=349
Year 1	-0.02 (0.232) N=68	0.139 (0.125) N=161	0.111 (0.168) N=229	0.21 (0.179) N=221	-0.256* (0.136) N=144	0.063 (0.074) N=321
Year 2	0.413 (0.345) N=50	0.240 (0.161) N=125	0.034 (0.176) N=182	0.378* (0.210) N=158	-0.075 (0.157) N=118	-0.134 (0.090) N=258
Year 3	0.387 (0.37) N=37	0.109 (0.159) N=106	0.138 (0.223) N=142	0.572** (0.242) N=128	0.046 (0.209) N=76	-0.190* (0.098) N=197
Year 4	0.343 (0.583) N=15	0.564** (0.232) N=75	-0.034 (0.294) N=82	1.151*** (0.363) N=82	-0.260 (0.171) N=54	-0.089 (0.125) N=106
Year 5	-0.855 (2.236) N=5	0.503 (0.403) N=23	0.354 (0.288) N=62	0.020 (0.339) N=62	-0.292 (0.306) N=38	-0.230* (0.126) N=79

Notes: Bootstrapped standard errors in parenthesis, 1 per cent, 5 per cent and 10 per cent levels of significance are indicated by \*\*\*, \*\*, and \* respectively.

<sup>33</sup> Bellak, Pfaffermayr and Wild (2007) use propensity score matching and difference-in-difference estimators to examine the growth effect in Austrian manufacturing firms.

Swedish MNEs. Furthermore, Bandick and Görg (2010)<sup>34</sup> find positive employment growth in exporting firms and Swedish MNEs in vertical acquisitions only, while Bandick and Karpaty (2011)<sup>35</sup> find positive employment growth in non-MNEs with no growth effect for Swedish MNE's.

## 7 Conclusions

We analysed the causal link between foreign investment and firm performance in six small open economies in the European Union. Specifically, we used micro data from Austria, Belgium, Denmark, Finland, the Netherlands and Sweden over the period 2001–2009 and propensity score matching combined with difference-in-difference estimators to identify the causal effect of foreign investment on labour productivity and employment growth. While much of the previous literature considers foreign investment in manufacturing firms, we examine both service and manufacturing firms. To disentangle causality from correlation effects, we analyse the effects of foreign mergers and acquisitions on firm performance.

Our evidence indicates that foreign investors tend to acquire larger firms in manufacturing as well as services. Other characteristics of acquired firms differ across countries and between manufacturing and services.

Taken together, our estimates suggest that foreign acquisitions had stronger effects on firm performance in services than in manufacturing. Overall, no general pattern emerges with respect to the effects of foreign investment on firm performance across the analysed six small open economies. Foreign acquisitions in services led to higher labour productivity and higher employment growth in Denmark, lower productivity growth and higher employment growth in Belgium and the Netherlands. Foreign acquisitions in services in Finland had no significant effect on labour productivity growth but they led to higher employment growth two and three years after acquisitions. In Austria and Sweden, foreign acquisitions led to higher productivity growth and lower employment growth five years after acquisition.

In the case of manufacturing, it appears that foreign acquisitions led to lower labour productivity growth and higher employment growth in Belgium and Denmark. In Finland and Sweden, in most cases, foreign acquisitions led to lower productivity growth and lower employment growth, while in Austria and the Netherlands, there were no significant changes in labour productivity and employment growth in the post-acquisition period.

Finally, our analysis suggests that the effects of foreign investment on firm performance are likely to be conditioned by economic, social and institutional country specific characteristics. Further research linking these results to relevant country characteristics would contribute to a better understanding of the effects of foreign investment on firm performance.

---

<sup>34</sup> Bandick and Görg (2010) use propensity score matching, difference-in-differences and IV to examine the growth effect.

<sup>35</sup> Bandick and Karpaty (2011) use propensity score matching, difference-in-differences and IV to test the growth effect.

## Appendix A Literature review

Table A1: The Effects of Foreign Mergers and Acquisitions on Firm Productivity

Study	Sample	Methodology	Productivity Type	Pre-acquisition	Post-acquisition
Aitken and Harrison (1999)	Venezuelan industrial plants: 1976–1989, except 1980 when the survey was not taken.	OLS (level and growth effects).	TFP.	Tendency for multinationals to locate in more productive sectors and to invest in more productive plants.	Increase in foreign equity participation is correlated with an increase in productivity for small recipient plants. Increases in foreign ownership decrease productivity in domestically owned firms in the same industry. No evidence of technology spillovers from foreign to domestic firms.
Conyon, Girma, Thompson and Wright (2002a)	UK manufacturing firms, 1989–1994.	OLS and IV to control for the endogeneity of wages (level and growth effects).	Labour productivity (sales per employee).	Foreign firms acquire relatively small local firms with average labour productivity.	A 14 per cent increase in labour productivity. A 3 per cent-point increase in the growth rate (significant only with US-based MNEs). No effect from a domestic acquisition.
Harris and Robinson (2002)	UK manufacturing plants weighted to reflect population distribution, 1987–1992.	Systems GMM (level effects).	TFP, pooled Cobb Douglas for eight subgroups.	Foreign firms acquire the most productive plants. Domestic firms acquire firms with below-average productivity.	Evidence on productivity developments is mixed in foreign acquisitions. Post-acquisition productivity tends to decline slightly and more particularly for plants acquired by UK-owned firms (especially in metals and chemicals).
Gioia and Thomsen (2004)	Danish firms acquired in 1990–1997.	Selection adjustment (inverse Mill's ratio) from probit and control for this in OLS (level effects).	TFP, Cobb Douglas.	Foreign firms tend to acquire bigger but poorly performing firms as measured by return on assets and TFP.	Relative performance of the foreign-acquired firms improves significantly a couple of years after acquisition, and the productivity gap may disappear (at least if TFP is adjusted for industry effects).
Ilmakunnas and Maliranta (2004)	Finnish manufacturing plants with a linked employer-employee data set, 1994–2001.	Propensity score matching and difference-in-differences (level effects).	Multilateral TFP, Caves et al. (1982).	Foreign firms acquire local firms with above-average TFP.	Foreign ownership increases TFP in acquired plants by about 10 per cent.
Fukao, Ito and Kwon (2005)	Japanese manufacturing firms, 1994–2001.	OLS and binomial probit models (level and growth effects).	TFP index, Good et al. (1997).	Foreign firms acquire larger local firms with higher TFP levels than domestic firms do. TFP growth rates are not different before the	US- and European-acquired firms have faster TFP level and growth. MNEs from other regions have no effect on TFP. Domestically acquired firms have lower TFP

			acquisition.	
Fukao and Murakami (2005)	Japanese manufacturing firms, 1994–1998.	OLS (level and growth effects).	Labour productivity and TFP index, Good et al. (1997).	growth than foreign-acquired firms. Foreign-acquired firms increase their TFP and sales. No effect on productivity in domestic-acquired firms and other independent firms.
Girma (2005b)	UK manufacturing firms, 1989–1996.	Propensity score matching and difference-in-differences (level effects).	Industry-level TFP for 100 industries. MNEs are allowed to have distinct factor elasticities.	A 5–6 per cent increase in TFP after US or European acquisition; no change (borderline negative) if from RoW. Up to a point, US- and EU-acquisitions result in higher TFP improvements the higher the absorptive capacity of the acquired firm.
Piscitello and Rabbiosi (2005)	Italian manufacturing firms, 1994–1997.	OLS (level effects).	Labour productivity (value added per employee).	Improvement in labour productivity in the medium term. Positive effects from acquisitions are higher when the acquirer is a European-based MNE. If it is a US or a UK MNE, the effects are still positive but weaker (cultural distance).
Bellak, Pfaffermayr and Wild (2006)	Austrian manufacturing firms.	Propensity score matching and difference-in-differences (growth effects).		Productivity growth is not significantly affected, independent of the pre-takeover performance and the matching estimator used. ‘Lemons’ reduce the productivity gap vis-à-vis the ‘cherries’ by 13 per cent-points 4 years after the takeover.
Benfratello and Sembenelli (2006)	Italian manufacturing firms, 1992–1999.	Systems GMM (level effects).	TFP and labour productivity (gross output per worker).	No effect on TFP. Firms under US ownership outperform both their domestic counterparts and firms under other foreign ownership.
Girma and Görg (2007)	UK electronics and food industry firms, 1980–94.	Propensity score matching and difference-in-differences (growth effects).	TFP, parametric method of decomposing as a Divisa index of TFP.	Foreign-owned plants have higher TFP growth (with sectoral variation). Pre-acquisition TFP level of domestic plants affects (+ or –) the rate of technology transfer from MNEs. Productivity growth effects persist through time.
Girma, Kneller and Pisu (2007)	UK manufacturing firms, 1988–1996.	Propensity score matching and difference-in-differences (growth effects).	TFP calculated using the nonparametric index number approach, Caves et al. (1982) and Good et al. (1997).	A positive direct effect on productivity of domestic exporters. Firms with higher pre-acquisition productivity levels experience faster and larger efficiency gains. However, 2 years into acquisition the rate of

Hanley and Zervos (2007)	UK manufacturing firms, 1990–1996.	OLS and instrument for wages using 2SLS (level effects).	Labour productivity as a function of a skills proxy.	Foreign firms acquire large local firms with high labour productivity.	learning from the MNE is more marked the lower the pre-acquisition TFP of the new subsidiary. Then growth rates converge. Direct effect of acquisition is a 6–9 per cent fall in labour productivity for both domestic and foreign acquirers; adjustment costs of acquisition
Karpaty (2007)	Swedish manufacturing firms, 1986–2002.	Propensity score matching and difference-in-differences (level effects).	TFP, Törnqvist (1936) quantity index of inputs.	No evidence of cherry picking.	Depending on estimator and specification, a productivity increase of 6–14 per cent in 1–5 years after acquisition.
Bertrand and Zitouna (2008)	French manufacturing firms, 1993–2000, horizontal acquisitions.	Propensity score matching and difference-in-differences (level effects).	TFP, multilateral index Caves (1996).	Probability of being acquired either by a foreign or a domestic firm is negatively related to TFP.	Foreign extra-EU (mainly US, but all from the OECD) M&As have a larger positive impact on TFP than domestic or EU M&As. No impact on profits or market power.
Csengödi, Jungnickel and Urban (2008)	Hungarian manufacturing firms, 1992–2001.	OLS and matched control group using nearest neighbour method (level effects).	Labour productivity (value added per worker).	No sign of cherry picking.	Major rise in labour productivity.
Fukao, Ito, Kwon and Takizawa (2008)	Japanese firm-level data, 1994–2001.	Multinomial logit, propensity score matching and difference-in-differences (growth effects).	TFP chain index.	Foreign firms acquire large, export-intensive local manufacturing firms with high TFP, profits, share of non-production workers. In non-manufacturing, firms with a higher profit rate and higher advertising are chosen.	In manufacturing, foreign acquisitions result in faster TFP growth 2 years after acquisition (matching results). In non-manufacturing, domestic acquisitions had a negative impact on TFP growth. Both effects are temporary. In the unmatched sample, positive temporary effects from foreign acquisitions.
Girma, Görg and Pisu (2008)	UK manufacturing firms, 1992–1999.	OLS (growth effects).	TFP, Olley and Pakes (1996).		Export orientation of domestic and foreign MNEs is relevant to productivity spillovers. Positive horizontal spillovers only from export-oriented MNEs. Domestic-market-oriented MNEs generate positive spillovers through backward linkages for both domestic exporters and non-exporters.
Salis (2008)	Slovenian manufacturing firms, 1994–	Propensity score matching and difference-in-differences	TFP, Olley and Pakes (1996).	Foreign firms acquire the most productive local firms, along with those with the highest export pro-	No impact on TFP growth.



	1999 with acquisition in 1997.	(growth effects).	density and operating in the most concentrated industries.	
Arnold and Javorcik (2009)	Indonesian manufacturing plants, 1983–2001.	Propensity score matching and difference-in-differences (level and growth effects).	TFP, multilateral index Aw, Chen and Roberts (2001), extension of Caves et al. (1982), and labour productivity (value added per worker).	Foreign firms acquire plants with larger employment and higher TFP. TFP level rises by 14 per cent and labour productivity by +63 per cent after 3 years. The rise in TFP is larger in non-exporters than exporters. Growth effects are statistically significant only in the year of ownership change. Foreign privatisations lead to a better productivity performance than domestic ones (27 per cent TFP premium).
Crisuolo and Martin (2009)	UK manufacturing plants, 1996–2000.	A double-fixed effects approach correcting for endogeneity of becoming an MNE (level effects).	TFP, a structural production function estimation approach (modified Levinsohn and Petrin, 2003).	A strong effect on productivity after takeover by an MNE. The effects are not stronger for takeovers by US MNEs. Thus US MNEs are not better at transferring knowledge and technology to their subsidiaries than other MNEs are.
Greenaway, Guariglia and Yu (2009)	Chinese firms, 2000–2005.	First-difference GMM (level effects).	TFP, Levinsohn and Petrin, (2003), applied separately to different industrial groups.	Joint-ventures perform better than wholly foreign owned and domestic firms. Productivity rises with foreign ownership and peaks with a 47–60 per cent foreign ownership depending on the specification.
Harris (2009)	UK firms, plants that existed in 1995–2000 (1998–2002 for services).	System GMM and a matching estimator approach to deal with selection bias (level effects).	TFP, dynamic-form of Cobb-Douglas production function.	In manufacturing, little change in TFP in US- and UK-acquired plants. In EU- and 'other' foreign-owned (not EU, US, CA, AU, NZ, ZA or SE-Asia) plants TFP declined. In services, TFP gains in US- and EU-acquired plants, but effects dissipated over time. In other foreign-owned plants a 10 per cent longer-term gain.
Schiffbauer, Siedschlag and Ruane (2009)	UK firms, 1999–2007.	Propensity score matching and difference-in-differences (cumulative growth effects).	TFP, Olley and Pakes (1996); as robustness checks multilateral TFP index based on Caves et al. (1982) and TFP based on OLS production function estimations; labour productivity (value add-	No effect from foreign acquisitions on TFP in the aggregate. Positive effects when acquirer is in R&D-intensive manufacturing and negative effects when acquirer is in marketing-intensive manufacturing. Positive effect on labour productivity in manufacturing. No effects in services.

Arndt and Mattes (2010a)	German MNEs, 1997–2003	Propensity score matching and difference-in-differences.	TFP, Olley and Pakes (1996) (level effects).	Foreign firms target local MNEs with medium-sized employment, capital and outward FDI, rather low or rather high profits and sales, and bigger market share.	Performance after ownership change of MNEs is quite heterogeneous. A positive impact of cross-border M&A on TFP in acquired local firms within two years.
Balsvick and Haller (2010)	Norwegian manufacturing plants, 1992–2004.	OLS (level effects).	TFP (Cobb-Douglas) and labour productivity (gross output per employee).	Foreign firms acquire large plants with high productivity; new domestic owners choose average performers with above average size.	LP and TFP decline in domestic non-MNE targets before acquisitions, and do not recover. LP increases after foreign acquisitions. There is not much difference whether the acquiring firm is a domestic MNE or a foreign MNE.
Mattes (2010a)	All German firms, 2000–2007	Propensity score matching and difference-in-differences (level effects).	Labour productivity (value added per employee).	Foreign firms target small, export-oriented firms that have either below-average or relatively high productivity.	No productivity effects.
Bandick (2011)	Swedish manufacturing firms, 1993–2002	Propensity score matching and difference-in-differences (growth effects).	TFP, Levinsohn and Petrin (2003).	Firms with good characteristics and performance are more likely to be targeted for acquisitions by foreigners.	Targeted Swedish MNEs and non-MNEs have faster TFP growth after vertical foreign acquisition only but not after a horizontal foreign acquisition.
Chen (2011)	Public US firms, 1979–2006	Propensity score matching and difference-in-differences (growth effects).	Labour productivity (sales per employee).		Compared to US domestically-acquired firms, firms acquired by firms from other industrialised countries experience a 13 per cent increase in labour productivity within 5 years. In firms acquired by firms from developing countries growth is 23 per cent lower than in US-acquired firms after 4 years.
Vahter (2011)	Estonian manufacturing firms (1995–2004)	Fixed effects and 2SLS (growth effects).	TFP, Levinsohn and Petrin (2003).		No short-term effect on acquired firms' productivity growth. Nevertheless, FDI is associated with knowledge spillovers to the acquired firms. The distance of acquired firms from the productivity frontier has no role.

**Table A2: The Effects of Foreign Mergers and Acquisitions on Firm Employment**

Study	Sample	Methodology	Pre-acquisition	Post-acquisition
Conyon, Girma, Thompson and Wright (2002a)	UK manufacturing firms, 1989–1994.	OLS and IV to control for the endogeneity of wages (level effects).	Foreign firms acquire relatively small local firms with average labour productivity.	A 6 per cent decrease in derived labour demand during the years following acquisition. No effect from domestic acquisition.
Girma and Görg (2004)	UK electronics and food industry, 1980–1993.	Difference-in-differences using the estimate of the probability of foreign acquisition as an instrument (growth effects).	Some evidence that foreign firms acquire high productivity plants.	Slower employment growth in the electronics industry, in particular for unskilled labour. No significant effect in the food sector.
Gugler and Yurtoglu (2004)	Firms in US, UK and Continental Europe, 1987–1998.	Systems GMM; Arellano and Bond (1991) (level effects).		On average, no significant effects on labour demand in the US, but a 10 per cent reduction in the EU. No significant difference between cross-border and domestic deals.
Fukao, Ito and Kwon (2005)	Japanese manufacturing firms, 1994–2001.	OLS and binomial probit models (growth level).	Foreign firms acquire larger local firms with higher TFP levels than domestic firms do. TFP growth rates are not different before the acquisition.	No change in employment. Domestically acquired firms raise their employment.
Fukao and Murakami (2005)	Japanese manufacturing firms, 1994–1998.	OLS (growth effects).		No effects on employment.
Girma (2005a)	UK manufacturing firms, 1988–1998.	Propensity score matching and difference-in-differences (level effects).		Foreign acquisitions have led to a reduction in labour-use inefficiency. Negative employment effects in larger acquired firms, and positive ones in smaller firms.
Bellak, Pfaffermayr and Wild (2006)	Austrian manufacturing firms.	Propensity score matching and difference-in-differences (growth effects).	Below average profitability, above average productivity and exporter status explain the takeover decision.	Employment is not affected.
Almeida (2007)	Matched employer-employee data of Portuguese firms, 1991–1998.	OLS and fixed effects with a control group (level effects).	Foreign firms acquire firms with a larger, better-educated and better-paid workforce	Employment increases in foreign acquired firms.
Gong, Görg and Maioli (2007)	Chinese state-owned and privatised firms, 1999–2003.	Propensity score matching and difference-in-differences (growth effects).		Some evidence that foreign acquisitions show higher employment growth in the post-acquisition period than non-acquired state-owned enterprises.
Huttunen (2007)	Matched employer-employee panel data on Finnish manufacturing	Propensity score matching, difference-in-differences and traditional regressions	Foreign firms tend to acquire plants with bigger sales, higher export-to-sales ratios and workers with higher education	Foreign and domestic acquisitions decrease slightly the share of highly educated workers in employment.

	plants, 1988–2001. (effects on the share of skilled labour).	and longer tenure.
Csengödi, Jungnickel and Urban (2008)	Hungarian manufacturing firms, 1992–2001. OLS and a matched control group using nearest neighbour method (level effects).	No sign of cherry picking. Major reduction in employment.
Fukao, Ito, Kwon and Takizawa (2008)	Japanese firm-level data, 1994–2001. Multinomial logit, propensity score matching and difference-in-differences (growth effects).	Foreign firms acquire large, export-intensive local manufacturing firms with high TFP, profits, share of non-production workers. In non-manufacturing, firms with a higher profit rate and higher advertising are chosen.
Lehto and Böckerman (2008)	Matched establishment level data from Finland, 1989–2003. Propensity score matching and difference-in-differences (level effects).	Foreign firms target large local exporter firms with highly educated employees. Foreign acquisition leads to downsizing in manufacturing employment. Some evidence of negative employment effects in construction and other services. No effect in trade, hotels and restaurants. Substantial employment losses after domestic M&As.
Arnold and Javorcik (2009)	Indonesian manufacturing plants, 1983–2001. Propensity score matching and difference-in-differences (level effects and share of white-collar workers).	Foreign firms acquire plants with larger employment and higher TFP. Employment increases by 24 per cent after 3 years. No change in employment after foreign privatisations.
Bandick and Hansson (2009)	Swedish manufacturing firms, 1993–2002. Propensity score matching and difference-in-differences (effects on the share of skilled labour).	Relative demand for skilled labour rises in foreign-acquired non-MNEs, but not in acquired MNEs. A larger presence of foreign MNEs in an industry has a positive impact on relative demand for skills in Swedish MNEs within the same industry. Elasticity of substitution between skilled and less-skilled labour is lower in MNEs than in non-MNEs.
Chari, Chen and Dominguez (2009)	Publicly traded US firms acquired by firms from emerging markets, 1980–2007. Propensity score matching and difference-in-differences (level effects).	Foreign firms acquire local firms with relatively high levels of sales, employment and total assets. Performance (return on assets) of acquired firms improves. Employment, capital and sales decrease.
Harris (2009)	UK firms, plants that existed in 1995–2000 (1998–2002 for services). System GMM and a matching estimator approach to deal with selection bias (level effects).	Little evidence of cherry-picking in manufacturing. In services, a tendency for less productive plants to have been acquired. Foreign-owned firms targeted step-change acquisition towards higher em-

			larger UK manufacturing plants. In services, in aggregate little difference with non-acquired plants, but there are considerable differences at industry level.	employment in US- and EU-acquired plants. In services, the overall picture shows there was little change (or slightly falling employment).
Arndt and Mattes (2010)	German MNEs, 1997–2003.	Propensity score matching and difference-in-differences (level effects).	Foreign firms target local MNEs with medium-sized employment, capital and outward FDI, rather low or rather high profits and sales, and bigger market share.	No effect on employment.
Balsvick and Haller (2010)	Norwegian manufacturing plants, 1992–2004.	OLS (level effects).	Foreign firms acquire large plants with high productivity. New domestic owners choose average performers with above-average size. Employment and LP decline in domestic non-MNE's targets before acquisitions.	Employment increases after foreign acquisitions.
Bandick and Görg (2010)	Swedish manufacturing plants, 1993–2002.	Propensity score matching, difference-in-differences, and IV (growth effects).	Foreign acquired plants are large with relatively high skill and R&D intensities, labour productivity and capital-labour ratios, and are more export intensive.	A 4–5 per cent employment growth effect in case of exporters and a statistically weaker 2 per cent rise in Swedish MNEs, both only if the takeover is vertical. (IV gives larger positive effects than DID.) No effects if target is a purely domestic firm or if FDI is horizontal. Also domestic acquisition raises employment.
Lipsey, Sjöholm and Sun (2010)	Indonesian manufacturing plants, 1975–2005.	Propensity score matching and difference-in-differences (growth effects).	Foreign firms target young and large local plants with high productivity and energy intensity. Small foreign-owned plants with low productivity and energy intensity are likelier to be taken over by domestic firms.	Employment in plants that were acquired by foreigners grew about 10 per cent faster (blue-collar workers faster than white-collar workers), mostly in the year of the takeover, than employment in locally owned plants.
Mattes (2010a)	All German firms, 2000–2007	Propensity score matching and difference-in-differences (level effects).	Foreign owned firms are larger and more productive than domestic ones. Foreign firms target small, export-oriented firms that have either below-average productivity or relatively high productivity.	No employment effects.
Bandick and Karpaty (2011)	Swedish manufacturing plants, 1993–2002.	Propensity score matching, difference-in-differences, and IV (growth effects).	Foreign acquired plants are large and have relatively high skill intensity, labour productivity and capital-labour ratio.	An increase in total employment (especially for skilled labour) in non-MNEs. No effect in Swedish MNEs. IV gives larger positive effects than DID.

Chen (2011)	Public US firms, 1979–2006	Propensity score matching and difference-in-differences (level effects).	Firms acquired by MNEs from industrialised countries or the US do not differ in terms of post-acquisition employment for the first 4 years after acquisition. In the fifth year the former show a 24 per cent employment increase compared with US-acquired targets. Firms acquired by MNEs from developing-countries reduce their employment by up to 26 per cent.
-------------	----------------------------	--	---

## Appendix B Data imputation methodology

Missing values in the Amadeus dataset impose significant difficulty on the econometric analysis. For example, original data of Finnish firms only offer 24 matched targets for the evaluation of the effect of foreign acquisition in the services sector.

To deal with this issue, we apply the weighted hotdeck multiple imputation method (Mander and Clayton 2003) to impute data. The weighted hotdeck method replaces missing values with sampled observations with complete data. Observations with missing values and complete data are stratified using the same variables that indicate the characteristics of observations. Sampling is made within strata so as to achieve better matching. Weighted hotdeck improves the imputation method by incorporating the missingness of the data in the sampling. Firstly, it fits a logistic model with independent variables that explain the occurrence of having missing values. After that, the propensity score of having missing values is predicted and it serves as weight in the last step. Finally, a weighted sampling of observations with complete data is performed to create data points for the observations with missing values. The weighted hotdeck relies on the assumption that missing values are either missing completely at random (MCAR) or missing at random (MAR).

The weighted hotdeck method has the following advantages over other imputation methods (Rubin 1987, Schafer 1997). 1) It only requires very few distributional assumptions of the data (Mander and Clayton 2003). 2) It does not rely on parametric models to fit the missing values, therefore it is less sensitive to model misspecification (Andridge and Little 2010). 3) Only plausible values will be imputed (Andridge and Little 2010).

We use a Stata routine -whotdeck- (Mander 2003) to impute the following variables with missing values: turnover, employment, fixed tangible assets, depreciation, value added, debts and fixed assets. The explanatory variables of the logistic model of missingness are 3-digit industry dummies, foreign ownership dummy, size class, year dummies and a set of foreign acquisition and domestic acquisition indicators interacted with thresholds. Five sets of imputed data are independently generated and they form a multiple imputation scheme. The multiple imputation method treats the data generation process as stochastic rather than deterministic, thus accounting for the variation across datasets. Doing imputation five times is considered sufficient by the authors of -whotdeck-.

With imputed datasets, we are able to evaluate the effect of foreign acquisition in services sector of Finland for up to 65.2 (average across the five datasets) matched targets.

Each of the imputed datasets will be analysed independently using the same econometric model, e.g. the Probit model of the propensity of being acquired by foreign or domestic acquirers. However, the estimated parameters from each datasets can be combined using Rubin's rule (Rubin 1987) in order to draw inference for the overall data.

Rubin (1987) proposes formula to combine repeated-imputation summary statistics. Let  $\mathcal{G} = (\hat{\theta}_1, \hat{\theta}_2, \dots, \hat{\theta}_m)$  be the estimate of interest from  $m$  imputed datasets. The mean of  $\theta$  is given as follows:

$$\bar{\mathcal{G}}_m = \sum_{l=1}^m \hat{\theta}_l / m$$

The average of variance of the dataset estimates is  $\bar{U}_m = \sum_{l=1}^m \text{Var}(\hat{\theta}_l) / m$ .

The average of the variances between the m dataset estimates is  $B_m = \sum_{l=1}^m (\hat{\theta}_l - \bar{\theta}_l)^2 / (m - 1)$ .

The total variance is defined as  $\bar{U}_m + (1 + m^{-1})B_m$ .



## Appendix C Summary statistics

<b>Table C1 Summary statistics of foreign-acquired firms – services</b>						
<b>Country</b>	<b>Austria</b>	<b>Belgium</b>	<b>Netherlands</b>	<b>Denmark</b>	<b>Finland</b>	<b>Sweden</b>
Deflated turnover	90821.1 (216923.5) N=2300	37339.2 (168961.2) N=9950	107146.8 (566103.7) N=8100	49207.1 (177171.8) N=5800	18544.2 (99130.1) N=4600	10225.0 (33186.5) N=8550
Deflated value added	25701.8 (93280.4) N=2256	9903.4 (45424.2) N=9689	15830.3 (70903.3) N=7839	–	3100.2 (12616.1) N=4537	3658.5 (15407.0) N=8130
Employment	280.4 (858.5) N=2300	119.0 (326.8) N=9950	139.8 (370.8) N=8100	140.1 (477.3) N=5706	57.7 (254.1) N=4600	54.5 (262.4) N=8467
Deflated turnover per employee	1334.6 (11055.2) N=2300	1013.6 (4648.6) N=9950	2704.2 (18362.6) N=8100	1727.8 (19878.0) N=5706	346.9 (903.0) N=4600	345.1 (801.6) N=8467
Deflated value added per employee	393.0 (4518.9) N=2256	274.7 (6221.4) N=9689	277.7 (1627.2) N=7839	–	71.6 (106.6) N=4537	107.4 (291.1) N=8051
Age	18.8 (23.0) N=1925	19.5 (17.4) N=8555	17.8 (17.3) N=6840	16.8 (17.7) N=5040	12.7 (12.4) N=4012	17.7 (19.0) N=7325
Debt/fixed assets	2.9 (17.1) N=2299	21.2 (594.3) N=9935	57.6 (825.0) N=8063	14.8 (594.6) N=5777	6.6 (21.5) N=4590	9.8 (36.5) N=8537
Deflated total assets per employee	544.6 (5010.5) N=2293	122.0 (1170.0) N=9878	266.5 (4278.3) N=7969	412.5 (7268.2) N=5620	55.0 (604.3) N=4553	193.5 (1413.0) N=8380

Notes: The figures shown above are the mean, standard deviation (in parenthesis) and total number of observations (N). Turnover and value added are deflated by a GDP deflator with 2006 as the base year. Foreign acquisition is defined as any ownership stake crossing a threshold of 10 per cent of total shareholding.

<b>Table C2 Summary statistics of non-acquired firms – services</b>						
<b>Country</b>	<b>Austria</b>	<b>Belgium</b>	<b>Netherlands</b>	<b>Denmark</b>	<b>Finland</b>	<b>Sweden</b>
Deflated turnover	101592.8 (271747.7) N=522500	38435.8 (253376.7) N=916800	101598.2 (518048.2) N=2225600	36616.0 (187574.3) N=501950	8124.4 (54281.4) N=484050	6682.9 (65059.4) N=1637900
Deflated value added	27435.0 (91872.8) N=513903	8372.8 (57305.8) N=898424	15525.3 (75510.6) N=2166217	–	1774.1 (9154.5) N=479857	1728.1 (29551.2) N=1601845
Employment	300.8 (805.9) N=522500	89.1 (404.6) N=916800	138.7 (374.1) N=2225600	122.5 (441.7) N=491785	32.8 (163.6) N=484050	27.7 (213.1) N=1616576
Deflated turnover per employee	1369.0 (10049.0) N=522500	1418.7 (8924.6) N=916800	3382.8 (39515.9) N=2225600	737.1 (8961.4) N=491785	409.6 (4046.3) N=484050	410.9 (7175.7) N=1616576
Deflated value added per employee	349.5 (3383.4) N=513903	220.9 (7210.6) N=898424	323.5 (2890.1) N=2166217	–	76.9 (270.2) N=479857	87.1 (587.8) N=1583191
Age	17.6 (26.5) N=401605	17.4 (13.8) N=766910	22.7 (23.7) N=1885315	13.1 (13.6) N=388460	14.5 (13.5) N=396661	16.4 (16.5) N=1263425
Debt/fixed assets	3.1 (17.8) N=521589	27.5 (1008.8) N=914372	57.3 (771.9) N=2215440	10.7 (327.1) N=499157	4.7 (36.5) N=483061	7.2 (54.7) N=1630641
Deflated total assets per employee	407.8 (3865.1) N=520494	146.0 (1466.5) N=907584	332.6 (6274.4) N=2190947	451.0 (6270.7) N=483039	143.5 (1724.7) N=480166	189.8 (1426.2) N=1600755

Notes: The figures shown above are the mean, standard deviation (in parenthesis) and total number of observations (N). Turnover and value added are deflated by a GDP deflator with 2006 as the base year. Foreign acquisition is defined as any ownership stake crossing a threshold of 10 per cent of total shareholding.

<b>Table C3 Summary statistics of all firms – services</b>						
<b>Country</b>	<b>Austria</b>	<b>Belgium</b>	<b>Netherlands</b>	<b>Denmark</b>	<b>Finland</b>	<b>Sweden</b>
Deflated turnover	101578.4 (271539.3) N=526700	38416.1 (252597.5) N=935750	101614.6 (518280.3) N=2250000	36721.8 (186744.6) N=513700	8266.2 (54540.4) N=504750	6717.1 (64870.3) N=1660200
Deflated value added	27432.2 (91847.4) N=518034	8387.7 (57015.6) N=916882	15526.7 (75509.8) N=2189915	–	1805.6 (9141.4) N=500365	1741.7 (29397.6) N=1623186
Employment	300.7 (806.8) N=526700	89.5 (403.6) N=935750	138.7 (374.3) N=2250000	122.6 (441.6) N=503342	33.5 (164.5) N=504750	28.0 (213.3) N=1638649
Deflated turnover per employee	1368.8 (10042.5) N=526700	1411.8 (8942.4) N=935750	3379.8 (39438.4) N=2250000	749.1 (9138.1) N=503342	405.3 (3970.8) N=504750	412.9 (7236.8) N=1638649
Deflated value added per employee	349.6 (3384.3) N=518034	221.1 (7168.1) N=916882	323.2 (2885.4) N=2189915	–	76.5 (266.8) N=500365	87.5 (593.3) N=1604321
Age	17.6 (26.5) N=405120	17.4 (13.9) N=783355	22.7 (23.7) N=1906125	13.2 (13.7) N=398345	14.5 (13.5) N=414371	16.4 (16.5) N=1282580
Debt/fixed assets	3.1 (17.8) N=525783	27.3 (1000.6) N=933275	57.3 (772.0) N=2239745	10.8 (336.0) N=510864	4.7 (36.5) N=503735	7.2 (54.5) N=1652845
Deflated total assets per employee	408.8 (3872.3) N=524681	145.3 (1458.0) N=926349	332.0 (6262.8) N=2214980	451.1 (6290.2) N=494405	140.7 (1705.8) N=500685	190.2 (1443.3) N=1622594

Notes: The figures shown above are the mean, standard deviation (in parenthesis) and total number of observations (N). Turnover and value added are deflated by a GDP deflator with 2006 as the base year. Foreign acquisition is defined as any ownership stake crossing a threshold of 10 per cent of total shareholding.

<b>Table C4 Summary statistics of foreign-acquired firms – manufacturing</b>						
<b>Country</b>	<b>Austria</b>	<b>Belgium</b>	<b>Netherlands</b>	<b>Denmark</b>	<b>Finland</b>	<b>Sweden</b>
Deflated turnover	94415.5 (194243.8) N=1050	42655.7 (141898.0) N=2600	161047.6 (414018.4) N=2280	43880.0 (160801.7) N=3200	13440.3 (45696.1) N=2200	32105.6 (151955.5) N=4650
Deflated value added	23877.8 (49469.8) N=1032	10310.3 (23959.4) N=2521	15480.8 (68315.6) N=2207	–	4191.1 (13275.0) N=2146	10277.4 (196707.1) N=4540
Employment	334.9 (696.5) N=1050	129.5 (381.1) N=2600	145.6 (392.9) N=2280	150.2 (448.8) N=3152	61.3 (209.1) N=2200	100.4 (327.9) N=4636
Deflated turnover per employee	1505.8 (11192.2) N=1050	709.7 (3463.3) N=2600	8318.3 (55807.0) N=2280	842.8 (12290.9) N=3152	310.5 (633.0) N=2200	283.5 (709.8) N=4636
Deflated value added per employee	307.9 (3039.1) N=1032	248.4 (5821.4) N=2521	567.1 (1781.3) N=2207	–	88.1 (161.3) N=2146	73.5 (180.8) N=4526
Age	19.5 (18.6) N=845	23.0 (19.7) N=2230	29.0 (225.7) N=2008	19.9 (16.4) N=2765	15.0 (11.2) N=1876	26.8 (23.8) N=4080
Debt/fixed assets	2.7 (17.0) N=1050	5.6 (26.4) N=2600	93.8 (457.4) N=2274	8.3 (149.5) N=3188	3.7 (33.4) N=2199	5.8 (44.7) N=4637
Deflated total assets per employee	280.4 (1730.3) N=1050	106.4 (647.2) N=2597	562.6 (4918.8) N=2247	338.7 (5733.9) N=3118	49.2 (205.2) N=2194	77.0 (433.9) N=4602

Notes: The figures shown above are the mean, standard deviation (in parenthesis) and total number of observations (N). Turnover and value added are deflated by a GDP deflator with 2006 as the base year. Foreign acquisition is defined as any ownership stake crossing a threshold of 10 per cent of total shareholding.

<b>Table C5 Summary statistics of non-acquired firms – manufacturing</b>						
<b>Country</b>	<b>Austria</b>	<b>Belgium</b>	<b>Netherlands</b>	<b>Denmark</b>	<b>Finland</b>	<b>Sweden</b>
Deflated turnover	101006.4 (268409.5) N=125900	36873.1 (239613.2) N=222900	100863.8 (510888.2) N=313700	37193.9 (210695.7) N=91700	7747.2 (42075.6) N=127250	6123.8 (54798.8) N=298800
Deflated value added	27999.5 (97775.5) N=123816	8151.4 (55241.8) N=218898	15507.6 (76022.1) N=305204	–	1981.2 (7682.4) N=126253	1671.7 (35494.2) N=294970
Employment	303.5 (853.8) N=125900	90.9 (385.1) N=222900	138.6 (373.6) N=313700	125.4 (427.6) N=90023	36.4 (112.8) N=127250	29.3 (137.6) N=297139
Deflated turnover per employee	1372.0 (10185.5) N=125900	1114.9 (7441.6) N=222900	3337.1 (39506.2) N=313700	745.9 (10131.9) N=90023	259.0 (2792.3) N=127250	262.0 (5830.0) N=297139
Deflated value added per employee	361.5 (3625.8) N=123816	184.8 (7143.9) N=218898	322.4 (2910.9) N=305204	–	62.6 (192.8) N=126253	62.7 (490.0) N=293523
Age	24.7 (32.7) N=103720	22.8 (16.8) N=191535	32.1 (30.1) N=269295	15.2 (12.9) N=75525	17.3 (14.4) N=106689	21.1 (17.6) N=250670
Debt/fixed assets	3.1 (17.8) N=125683	22.3 (924.9) N=222393	58.5 (778.6) N=312224	10.3 (316.3) N=91187	2.8 (20.9) N=127094	4.3 (27.0) N=298089
Deflated total assets per employee	398.2 (3760.4) N=125416	121.0 (1347.3) N=221137	323.8 (6234.8) N=308831	389.3 (5473.4) N=88565	72.7 (1032.9) N=126588	72.4 (745.2) N=295708

Notes: The figures shown above are the mean, standard deviation (in parenthesis) and total number of observations (N). Turnover and value added are deflated by a GDP deflator with 2006 as the base year. Foreign acquisition is defined as any ownership stake crossing a threshold of 10 per cent of total shareholding.

<b>Table C6 Summary statistics of all firms – manufacturing</b>						
<b>Country</b>	<b>Austria</b>	<b>Belgium</b>	<b>Netherlands</b>	<b>Denmark</b>	<b>Finland</b>	<b>Sweden</b>
Deflated turnover	100886.7 (267398.2) N=127700	36840.8 (237691.1) N=228350	100851.3 (511480.7) N=320100	37451.4 (210703.8) N=97750	7918.7 (43223.2) N=136300	6525.4 (57148.0) N=309000
Deflated value added	27952.8 (97465.5) N=125585	8155.7 (54673.0) N=224241	15495.5 (75980.5) N=311425	–	2044.8 (7832.6) N=135206	1804.5 (42392.2) N=304890
Employment	303.6 (851.3) N=127700	91.4 (383.3) N=228350	138.6 (373.0) N=320100	126.4 (425.8) N=95977	37.4 (118.4) N=136300	30.6 (142.0) N=307281
Deflated turnover per employee	1371.2 (10169.0) N=127700	1104.2 (7382.8) N=228350	3330.5 (39497.7) N=320100	750.7 (10150.4) N=95977	264.8 (3887.3) N=136300	262.2 (5734.6) N=307281
Deflated value added per employee	360.3 (3612.6) N=125585	184.4 (7085.4) N=224241	320.8 (2887.6) N=311425	–	63.0 (195.7) N=135206	62.9 (482.8) N=303396
Age	24.6 (32.5) N=105230	22.8 (16.8) N=196305	32.2 (30.1) N=274970	15.5 (13.3) N=80765	17.2 (14.2) N=114594	21.2 (17.7) N=259665
Debt/fixed assets	3.1 (17.7) N=127480	21.9 (913.8) N=227842	58.2 (774.5) N=318598	10.6 (339.8) N=97214	2.8 (20.8) N=136139	4.3 (28.2) N=308257
Deflated total assets per employee	396.4 (3740.0) N=127211	120.2 (1333.5) N=226576	322.6 (6197.3) N=315139	387.1 (5497.2) N=94445	71.5 (1004.8) N=135604	72.5 (739.5) N=305752

Notes: The figures shown above are the mean, standard deviation (in parenthesis) and total number of observations (N). Turnover and value added are deflated by a GDP deflator with 2006 as the base year. Foreign acquisition is defined as any ownership stake crossing a threshold of 10 per cent of total shareholding.

## References

- Aitken, B. and A. Harrison (1999): "Do domestic firms benefit from direct foreign investment? Evidence from Venezuela", *The American Economic Review*, Vol. 89, 605–18.
- Aitken, B., A. Harrison and R. E. Lipsey (1996): "Wages and foreign ownership A comparative study of Mexico, Venezuela, and the United States", *Journal of International Economics*, Vol. 40(3–4), 345–71.
- Almeida, R. (2007): "The labor market effects of foreign owned firms", *Journal of International Economics*, Vol. 72, 75–96.
- Andridge R. R. and R. J. A. Little (2010): "A review of hot deck imputation for survey non-response", *International Statistical Review*, Vol. 78(1), 40–64.
- Arellano, M. and S. R. Bond (1991): "Some tests of specification of panel data: Monte Carlo evidence and an application to employment equations", *Review of Economic Studies*, Vol. 58(2), 277–297.
- Arndt, C. and A. Mattes (2010): "Cross-Border Mergers and Acquisitions of Multinational Firms. New Firm-Level Evidence", *IAW Discussion Papers* No. 62.
- Arnold, J. M. and B. S. Javorcik (2009): "Gifted kids or pushy parents? Foreign direct investment and plant productivity in Indonesia", *Journal of International Economics*, Vol. 79, 42–53.
- Aw, B. Y., X. Chen and M. J. Roberts (2001): "Firm-Level Evidence on Productivity Differentials and Turnover in Taiwanese Manufacturing", *Journal of Development Economics*, Vol. 66(1), 51–86.
- Balsvik, R. and S. A. Haller (2010): "Picking 'Lemons' or Picking 'Cherries'? Domestic and Foreign Acquisitions in Norwegian Manufacturing", *Scandinavian Journal of Economics*, Vol. 112(2), 361–87.
- Bandick, R. (2011): "Foreign Acquisition, Wages and Productivity", *The World Economy*, Vol. 34(6), 931–51.
- Bandick, R. and H. Görg (2010): "Foreign acquisition, plant survival, and employment growth", *Canadian Journal of Economics*, Vol. 43(2), 547–73.
- Bandick, R. and P. Hansson (2009): "Inward FDI and demand for skills in manufacturing firms in Sweden", *Review of World Economics*, Vol. 145(1), 111–31.
- Bandick, R. and P. Karpaty (2011): "Employment Effects of Foreign Acquisition", *International Review of Economics and Finance*, Vol. 20(2), 211–24.
- Bartel, A. P. and F.R. Lichtenberg (1987). "The Comparative Advantage of Educated Workers in Implementing New Technology", *Review of Economics and Statistics*, 69(1), 1–11.
- Bellak, C. (2004): "How Domestic and Foreign Firms Differ and Why Does it Matter?", *Journal of Economic Surveys*, Vol. 18(4), 483–514.
- Bellak, C., M. Pfaffermayr and M. Wild (2006): "Firm Performance after Ownership Change: A Matching Estimator Approach", *Applied Economics Quarterly*, Vol. 52(1), pp. 29–54.
- Benfratello, L. and A. Sembenelli (2006): "Foreign ownership and productivity: Is the direction of causality so obvious?", *International Journal of Industrial Organization*, Vol. 24, 733–51.
- Bernard, A. B. and J. B. Jensen (1995): "Exporters, Jobs, and Wages in U.S. Manufacturing: 1976–1987", *Brookings Papers on Economic Activity*, Microeconomics 1, 67–119.

Bertrand, O. H. and Zitouna (2008): "Domestic versus cross-border acquisitions: which impact on the target firms' performance?", *Applied Economics*, Vol. 40, 2221–38.

Blomström, M. and F. Sjöholm (1999): "Technology transfers and spillovers: does local participation with multinationals matter?" *European Economic Review*, Vol. 43, 915–23.

Bloom, N., R. Sadun and J. Van Reenen (2012): "Americans Do IT Better: US Multinationals and the Productivity Miracle", *American Economic Review*, Vol. 102(1), 167–201.

Branstetter, L. G. (2001): "Are Knowledge Spillovers International or Intranational in Scope? Micro-econometric Evidence from the U.S. and Japan", *Journal of International Economics*, Vol. 53(1), 53–79.

Caves, R. E. (1971): "International corporations: the industrial economics of foreign investment", *Economica*, Vol. 38(149), 1–27.

Caves, R. E. (1974): "Multinational Firms, Competition, and Productivity in Host-Country Markets", *Economica*, Vol. 41(162), 176–93.

Caves, R. E. (1996): *Multinational Enterprise and Economic Analysis*, Cambridge University Press, Cambridge.

Caves, D. W., L. R. Christensen and W. E. Diewert (1982): "Multilateral Comparisons of Output, Input, and Productivity Using Superlative Index Numbers", *The Economic Journal*, Vol. 92, 73–86.

Chari, A., W. Chen and K. M. E. Dominguez (2009): "Foreign Ownership and Firm Performance: Emerging-Market Acquisitions in the United States", *NBER Working Paper No. 14786*.

Chen, W. (2011): "The effect of investor origin on firm performance: Domestic and foreign direct investment in the United States", *Journal of International Economics*, 83(2), 219–28.

Chhibber, P. K. and S. K. Majumdar (1999): "Foreign Ownership and Profitability: Property Rights, Control, and the Performance of Firms in Indian Industry", *Journal of Law and Economics*, Part 1, Vol. 42(1), 209–38.

Conyon, M. J., S. Girma, S. Thompson and P. W. Wright (2002a): "The Productivity and Wage Effects of Foreign Acquisition in the United Kingdom", *The Journal of Industrial Economics*, Vol. L(1), 85–102.

Conyon, M. J., S. Girma, S. Thompson and P. W. Wright (2002b): "The impact of mergers and acquisitions on company employment in the United Kingdom", *European Economic Review*, Vol. 46(1), 31–49.

Criscuolo, C. and R. Martin (2009): "Multinationals and U.S. Productivity Leadership: Evidence from Great Britain", *Review of Economics & Statistics*, Vol. 91(2), 263–81.

Csengödi, S., R. Jungnickel and D. M. Urban (2008): "Foreign Takeovers and Wages in Hungary", *Review of World Economics*, Vol. 144(1), 55–82.

Dimelis, S. and H. Louri (2002): "Foreign ownership and production efficiency: a quantile regression analysis", *Oxford Economic Papers*, Vol. 54, 449–469.

Dunning, J. (1977): "Trade, Location of Economic Activities and MNE: A Search for an Eclectic Approach", in Ohlin, B., P.O. Hesselborn, and P.M. Wickman (eds.) *The International Allocation of Economic Activity*, London: MacMillan, 395–418.

Dunning, J. (1998): "Location and the Multinational Enterprise: A Neglected Factor?", *Journal of International Business Studies*, Vol. 29(1), 45–66.



- Findlay, R. (1978): "Relative Backwardness, Direct Foreign Investment, and the Transfer of Technology: A Simple Dynamic Model", *Quarterly Journal of Economics*, Vol. 92(1), 1–16.
- Fortanier, F. and S. J. V. Moons (2011): "Foreign Investors in the Netherlands: Heterogeneous Employment and Productivity Effects", *De Economist*, Vol. 159, 511–31.
- Fukao, K., K. Ito and H.U. Kwon (2005): "Do out-in M&As bring higher TFP to Japan? An empirical analysis based on micro-data on Japanese manufacturing firms", *Journal of the Japanese and International Economies*, Vol. 19(2), 272–301.
- Fukao, K., K. Ito, H. U. Kwon and M. Takizawa (2008): "Cross-Border Acquisitions and Target Firms' Performance: Evidence from Japanese Firm-Level Data", published in T. Ito and A. K. Rose: *International Financial Issues in the Pacific Rim: Global Imbalances, Financial Liberalization, and Exchange Rate Policy*, (NBER-EASE Volume 17), 347–89.
- Fukao, K. and Y. Murakami (2005): "Do Foreign Firms Bring Greater Total Factor Productivity to Japan?", *Journal of the Asia Pacific Economy*, Vol. 10(2), 237–54.
- Gioia, C. and S. Thomsen (2004): "International Acquisitions in Denmark 1990-1997: Selection and Performance", *Applied Economics Quarterly*, Vol. 50(1), 61–87.
- Girma, S. (2005a): "Safeguarding Jobs? Acquisition FDI and Employment Dynamics in U.K. Manufacturing", *Review of World Economics*, Vol. 141(1), 165–78.
- Girma, S. (2005b): "Technology Transfer from Acquisition FDI and the Absorptive Capacity of Domestic Firms: An Empirical Investigation", *Open Economies Review* Vol. 16, 175–87.
- Girma, S. and H. Görg (2004): "Blessing or Curse? Domestic Plants' Survival and Employment Prospects After Foreign Acquisition", *Applied Economics Quarterly*, Vol. 50(1), pp. 89–110.
- Girma, S. and H. Görg (2007): "Multinationals' Productivity Advantage: Scale or Technology?" *Economic Inquiry*, Vol. 45(2), 350–62.
- Girma, S., H. Görg and M. Pisu (2008): "Exporting, linkages and productivity spillovers from foreign direct investment", *Canadian Journal of Economics*, Vol. 41(1), 320–40.
- Girma, S., D. Greenaway and K. Wakelin (2001): "Who Benefits from Foreign Direct Investment in the UK?", *Scottish Journal of Political Economy*, Vol. 48(2), 119–33.
- Girma, S., R. Kneller and M. Pisu (2007): "Do exporters have anything to learn from foreign multinationals?", *European Economic Review*, Vol. 51, 981–98.
- Gong, Y., H. Görg and S. Maioli (2007): "Employment Effects of Privatisation and Foreign Acquisition of Chinese State-owned Enterprises", *International Journal of the Economics of Business*, Vol. 14(2), 197–214.
- Greenaway, D., A. Guariglia and Z. Yu (2009): "The More the Better? Foreign Ownership and Corporate Performance in China", *University of Nottingham Research Paper 2009/05*.
- Gugler, K., D. C. Mueller, B. B. Yurtoglu and C. Zulehner (2003): "The effects of mergers: an international comparison", *International Journal of Industrial Organization*, Vol. 21, 625–53.
- Gugler, K. and B. B. Yurtoglu (2004): "The effects of mergers on company employment in the USA and Europe" *International Journal of Industrial Organization*, Vol. 22, 481–502.

- Hanley, A. and V. Zervos (2007): "The Performance of UK Takeovers: Does the Nationality of Acquirers Matter?", *International Journal of the Economics of Business*, Vol. 14(2), 283–97.
- Harris, R. (2009): *The Effect of Foreign Mergers and Acquisitions on UK Productivity and Employment*, Report Submitted to UKTI October 2009.
- Harris, R. and C. Robinson (2002): "The Effect of Foreign Acquisitions on Total Factor Productivity: Plant-Level Evidence from U.K. Manufacturing, 1987–1992", *Review of Economics and Statistics*, Vol. 84(3), 562–68.
- Heckman, J., Ichimura, H., and P. Todd (1997): "Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme", *Review of Economic Studies*, Vol. 64(4), 605–54.
- Helpman, E. (2006): "Trade, FDI, and the Organization of Firms", *Journal of Economic Literature*, Vol. XLIV, 589–630.
- Helpman, E., M. J. Melitz and S. R. Yeaple (2004): "Export Versus FDI with Heterogeneous Firms", *The American Economic Review*, Vol. 94(1), 300–16.
- Huttunen, K. (2007): "The Effect of Foreign Acquisition on Employment and Wages: Evidence from Finnish Establishments", *Review of Economics & Statistics*, Vol. 89(3), 497–509.
- Ilmakunnas, P. and M. Maliranta (2004): "Foreign medicine: a treatment effect analysis of the productivity effects of foreign ownership", *Applied Economics Quarterly*, 50(1), 41–59.
- International Monetary Fund (1993): *Balance of Payments Manual*, 5th ed. (Washington).
- Javorcik, B. S. (2004): "Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers Through Backward Linkages", *The American Economic Review*, Vol. 94(3), 605–27.
- Jensen, M.C. (1986): "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers", *American Economic Review*, Vol. 76(2), 323–29.
- Karpaty, P. (2007): "Productivity Effects of Foreign Acquisitions in Swedish Manufacturing: The FDI Productivity Issue Revisited", *International Journal of the Economics of Business*, Vol. 14(2), 241–60.
- Keller, W. (2004): "International Technology Diffusion", *Journal of Economic Literature*, Vol. 42(3), 752–82.
- Lapan, H. and P. K. Bardhan (1973): "Localized Technical Progress and Transfer of Technology and Economic Development", *Journal of Economic Theory*, Vol. 6(6), 585–95.
- Lehto, E. and P. Böckerman (2008): "Analysing the employment effects of mergers and acquisitions", *Journal of Economic Behavior & Organization*, Vol. 68(1), 112–24.
- Levinsohn, J. and A. Petrin (2003): "Estimating production functions using inputs to control for unobservables", *Review of Economic Studies* Vol. 70(2), 317–42.
- Lipsey, R. E., F. Sjöholm and J. Sun (2010): "Foreign Ownership and Employment Growth in Indonesian Manufacturing", *NBER Working Paper* No. 15936.
- Maliranta, M. and S. Nurmi (2004): "Do Foreign Players Change the Nature of the Game Among Local Entrepreneurs?", *ETLA Discussion Papers* No. 942.
- Maliranta, M. and S. Nurmi (2007): "Does Foreign Presence Stimulate Creative Destruction in Local Markets?", *ETLA Discussion Papers* No. 1114.

- Mattes, A. (2010a): "International M&A: Evidence on Effects of Foreign Takeovers", *IAW Discussion Papers* No. 60.
- Mattes, A. (2010b): "The Impact of Horizontal and Vertical FDI on Labor Demand for Different Skill Groups", *IAW Discussion Papers* Nr. 59.
- Mander, A. (2003): "WHOTDECK: Stata Module to Perform Multiple Imputation Using the Approximate Bayesian Bootstrap with Weights". Statistical Software Components S433201, Boston College Department of Economics, revised 21 Feb 2011. Downloadable at <http://fmwww.bc.edu/repec/bocode/w/whotdeck.ado>
- Mander, A. P. and Clayton, D. (2003) "Weighted Hotdeck Imputation". Downloadable at <http://fmwww.bc.edu/repec/bocode/w/whotdeck.pdf>
- Nelson, R. R. and E. S. Phelps (1966): "Investment in humans, technological diffusion, and economic growth", *American Economic Review*, Vol. 56, 69–75.
- Nocke, V. and S. Yeaple (2007): "Cross-border mergers and acquisitions vs. greenfield foreign direct investment: The role of firm heterogeneity", *Journal of International Economics*, Vol. 72, 336–65.
- Olley, G. and A. Pakes (1996): "The Dynamics of Productivity in the Telecommunications Equipment Industry", *Econometrica*, 64, 1263–79.
- Piscitello, L. and L. Rabbiosi (2005): "The Impact of Inward FDI on Local Companies' Labour Productivity: Evidence from the Italian Case", *International Journal of the Economics of Business*, Vol. 12(1), 35–51.
- Roll, R. (1986): "The Hubris Hypothesis of Corporate Takeovers", *Journal of Business*, Part 1, Vol. 59(2), 197–216.
- Rubin, D. B. (1987): *Multiple Imputation for Nonresponse in Surveys*. New York: John Wiley and Sons.
- Salis, S. (2008): "Foreign Acquisition and Firm Productivity: Evidence from Slovenia", *The World Economy*, Vol. 31(8), 1030–48.
- Schiffbauer, M., I. Siedschlag and F. Ruane (2009): "Do Foreign Mergers and Acquisitions Boost Firm Productivity?", *ESRI Working Paper* No. 305.
- Törnqvist, L. (1936), "The Bank of Finland's Consumption Price Index", *Bank of Finland Monthly Bulletin*, No. 10, 1–8.
- Vahter, P. (2011): "Does FDI Spur Productivity, Knowledge Sourcing and Innovation by Incumbent Firms? Evidence from Manufacturing Industry in Estonia", *The World Economy*, Vol. 34(8), 1308–26.
- Vickers, J. (1995): "Concepts of Competition", *Oxford Economic Papers*, Vol. 47(1), 1–23.



Aikaisemmin ilmestynyt ETLA Raportit-sarjassa (ennen ETLA Keskusteluaiheita)  
*Previously published in the ETLA Reports series (formerly ETLA Discussion Papers)*

- No 1284 *Jože Damijan – Stefanie A. Haller – Ville Kaitila – Mika Maliranta – Emmanuel Milet – Matija Rojec, The Performance of Trading Firms in the Services Sectors – Comparable Evidence from Four EU Countries. 6.9.2012. 40 p.*
- No 1285 *Tuomo Nikulainen – Julia Salmi, Uudistaminen ja yhteistyöverkostot Suomen teollisuudessa. Havainnot yrityskyselystä. 14.9.2012. 23 s.*
- No 1286 *Tuomo Nikulainen – Antti-Jussi Tahvanainen – Martti Kulvik, Expectations, Reality and Performance in the Finnish Biotechnology Business. 19.9.2012. 25 p.*
- No 1287 *Matias Kalm – Timo Seppälä, Palaako tuotanto Aasiasta Suomeen? Case Polkupyörä. 19.9.2012. 24 s.*
- No 1288 *Timo Seppälä – Martin Kenney, Competitive Dynamics, IP Litigation and Acquisitions. The Struggle for Positional Advantage in the Emerging Mobile Internet. 4.10.2012. 30 p.*
- 
- No 1 *Nuutti Nikula – Markku Kotilainen, Determinants for Foreign Direct Investment in the Baltic Sea Region. 6.11.2012. 30 p.*
- No 2 *Olavi Rantala, EU:n ilmastopolitiikan talousvaikutukset vuoteen 2020. 26.11.2012. 44 s.*
- No 3 *Jukka Lassila – Tarmo Valkonen, Julkisen talouden rahoituksellinen kestävyys. 21.1.2013. 26 s.*
- No 4 *Jukka Lassila – Niku Määttänen – Tarmo Valkonen, Kuntaeläkkeiden rahoitus ja kunnalliset palvelut. 30.1.2013. 30 s.*
- No 5 *Niku Määttänen – Tarmo Valkonen, Asunnot eläkkeiksi? 18.2.2013. 26 s.*

Sarjan julkaisut ovat raportteja tutkimustuloksista ja väliraportteja tekeillä olevista tutkimuksista.

Julkaisut ovat ladattavissa pdf-muodossa osoitteessa: [www.etla.fi](http://www.etla.fi) » julkaisut » raportit

*Papers in this series are reports on research results and on studies in progress.*

*Publications in pdf can be downloaded at [www.etla.fi](http://www.etla.fi) » publications » reports*

**ETLA**

Elinkeinoelämän tutkimuslaitos  
The Research Institute of the Finnish Economy  
Lönnrotinkatu 4 B  
00120 Helsinki

Puh. 09-609 900  
Fax 09-601 753  
[www.etla.fi](http://www.etla.fi)  
[etunimi.sukunimi@etla.fi](mailto:etunimi.sukunimi@etla.fi)

ISSN-L 2323-2447, ISSN 2323-2447, ISSN 2323-2455 (Pdf)