# Productivity Spillovers from Foreign Direct Investment in New Zealand Manufacturing

## First Draft – Please do not quote

Kris Iyer, Ministry of Economic Development, New Zealand
Philip Stevens, Ministry of Economic Development, New Zealand
K.K. Tang, School of Economics, The University of Queensland, Australia

### Abstract

This paper seeks to answer two questions: Whether FDI led productivity spillovers exist in NZ manufacturing, and, whether such spillovers are conditional on the absorptive capacity of domestic firms. Productivity spillovers from FDI are distinguished into three types - horizontal, forward and backward. Horizontal spillovers are productivity gains (losses) accruing to domestic firms as a result of MNE presence in their own industry. Forward and backward spillovers are productivity gains (losses) accruing to domestic firms as a result of their association with MNEs as customers and suppliers respectively. For the empirical analysis, this paper uses data from the prototype Longitudinal Database (LBD) administered by Statistics NZ. Drawing from the various data sources within the LBD, an unbalanced panel of 12,837 manufacturing firms, spanning years the 2001-06 is compiled. The paper finds evidence that NZ manufacturing benefits from FDI through all three types of spillovers. While horizontal and forward spillovers are independent of absorptive capacity, backward spillovers are found to accrue to domestic firms that are relatively backward.

**JEL Classifications:**

**Keywords:** foreign direct investment; multinationals; spillovers; productivity

**Corresponding author:** Kris Iyer, Economic Strategy Branch, Ministry of Economic Development, 33 Bowen Street, PO Box 1473, Wellington 6011, New Zealand, E-mail: krishna.iyer@med.govt.nz

# Disclaimer

The opinions, findings, recommendations and conclusions expressed in this report are those of the authors. Statistics NZ and the Ministry of Economic Development take no responsibility for any omissions or errors in the information contained here.

Access to the data used in this study was provided by Statistics NZ in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular, business or organisation. The results in this paper have been confidentialised to protect individual businesses from identification.

Statistics NZ protocols were applied to the data sourced from the New Zealand Customs Service; the Foundation for Research, Science and Technology; New Zealand Trade and Enterprise; and Te Puni Kokiri. Any discussion of data limitations is not related to the data's ability to support these government agencies' core operational requirements.

## 1. Introduction

Across the world, foreign direct investment (FDI) inflows are increasingly being seen as a possible means to boost long term economic growth. In the case of NZ, given the perennial dependence on foreign savings to fund domestic investment, the importance of welcoming all types of foreign investment is deeply entrenched in the minds of policy makers.[1] With FDI in particular, political enthusiasm has been more pronounced. Presumably, this owes to the view that in addition to complementing the domestic savings and employment, FDI enhances productivity. Such a view is based on anecdotal evidence at best, and is lacking in empirical substantiation.

Undoubtedly, the proposition that FDI generates productivity gains for the wider domestic economy has substantial theoretical merit.

It has been long established that for a multinational enterprise (MNE)[2] to enter and succeed the domestic market, it should have some compensating advantages that enable it to compete with the existing local players, who would have better access to, and knowledge of, the domestic market (Graham and Krugman 1991).[3] Where the MNE is not able to fully internalize these advantages, there will be *unintended* (from the MNEs perspective) productivity spillovers to the local players within the same industry (Javorcik 2004). In the literature, these spillovers are referred to as intra-industry or horizontal spillovers. Channels through which such spillovers accrue include the movement of trained labour from the MNE to the local industry (Fosfuri et al., 2001), observational learning and imitation (Görg and Greenaway 2004). Clearly, the MNE has an incentive to plug these 'leaks'. However, the MNE may not be successful in restricting them completely. Furthermore, the very entry of the MNE and the resulting competition might act as an incentive to the local players to 'trim the fat' and boost up their productivity levels.

In some cases, the process of generating spillovers may be *intentional*. In the course of their business, MNEs typically establish formal linkages with business customers and suppliers within the domestic economy. There is then an incentive for the MNE to transfer technology and other skills to these associated firms – which would result in inter-industry or vertical productivity spillovers (Javorcik 2004). Of course, even in the case of vertical spillovers, the MNE can minimise the spillovers by limiting downstream producers to low value added activities or eliminate them by relying on

[1] Foreign investments are classified into three types – foreign direct investment (FDI), foreign portfolio investment (FPI) and other foreign investment (OFI). Statistics New Zealand defines inward FDI as the purchase, by non-residents, of 10 percent or more of the total equity of a New Zealand enterprise. Loans from overseas investors to New Zealand firms where those investors hold a significant equity stake are also counted as FDI. The idea underlying the 10 percent threshold is to capture foreign investment in domestic enterprises, where the purpose of the investment is to obtain or sustain a lasting interest in the enterprise and exercise a significant degree of influence on its management. Foreign investments in equity and debt securities that fall below the 10 percent threshold are categorised as FPI, while international bank lending and other private credits are classified as OFI.

[2] A firm that has a foreign ownership stake in excess of 10 percent (i.e., FDI) is considered as an MNE. The terms FDI and MNE are, therefore, used interchangeably in the literature.

[3] A non-exhaustive list of these compensating advantages includes technological superiority, better managerial and organizational skills and access to international markets.

foreign supplies of intermediate goods. However, in such cases, there is evidence of domestic economies responding by resorting to trade related investment measures (TRIMs) such as imposing of local content requirements.

Despite the theoretical FDI literature identifying a range of spillover channels, robust empirical support for positive spillovers is, at best, mixed. Görg and Greenaway (2004) observe that the failure to find supporting evidence in favour of FDI related spillovers could be due to spillovers may simply be unimportant in reality, notwithstanding the theoretical arguments pointing to their existence. In practice, MNEs may be effective at ensuring that firm specific compensating advantages do not spillover.

Another explanation for the lack of supporting evidence is the possibility that researchers are looking for evidence in the *wrong place with the wrong microscope* Görg and Greenaway (2004).

*Wrong place*: Most studies appear to be at the industry/sector level rather than at the firm level where genuine evidence of spillovers is more likely to be uncovered.

*Wrong microscope*: With regard to the methods adopted, it is observed that most studies are cross-sectional when what is required is a panel based analysis. Panel data studies would allow investigating the domestic firm's productivity over a longer period of time, rather than relying on one data point. Moreover, panel data modelling allows for *better control of exogenous factors*. In contrast, cross-sectional data, in particular where they aggregated at the industry of sector level, fail to control for time-invariant differences in productivity across industries/sectors which might be correlated with, but not caused by, foreign presence.

Certainly, the lack of good quality, comprehensive firm level dataset has been a serious impediment to appropriately researching productivity spillovers from FDI in NZ. The prototype Longitudinal Business Database (LBD), administered by Statistics NZ, goes a long way in removing the data impediments. Generally speaking, the LBD has been built primarily around government administered data collections and stands out for both its comprehensive coverage of firms and the variety of variables captured. The breadth of data in the LBD enables significant advances to be made in many areas of microeconomic analysis, including FDI (Fabling et al., 2008). Specifically, in the context of evaluating spillovers from FDI, prior to the LBD, there was no broad based firm level information on foreign ownership. FDI data is now available to LBD users from two alternative sources: company tax returns (IR4) and the longitudinal business frame that contains data on firm demographics.

Doubtless, the FDI and other related firm level data from the LBD would facilitate looking for spillovers in the *right place with the right tools*. Research on FDI using the LBD is likely to result in an increased ability to develop evidence based and effective FDI policy.

Given the sheer scale of data available in the LBD and the vast scope of FDI policy, the possible hypotheses that we could test relating to FDI are innumerable. In this paper, we merely scratch the surface and investigate:

- Whether spillovers exist – vertical or horizontal - from FDI in NZ manufacturing, and,
- Whether the spillovers are conditional on the absorptive capacity of domestic firms.

This paper focuses on the NZ manufacturing sector for five reasons. First, with the exception of the finance and insurance sector, which is dominated by a few foreign banks, the manufacturing sector has been the largest recipient of FDI in NZ. Significantly, in terms of consents for new FDI as reported by the Overseas Investment Commission (OIC)[4], the manufacturing sector comes ahead of even the finance and insurance sector. Second, it is recognised that the linkages between foreign and domestic firms turn out to be more significant in the manufacturing sector as opposed to other sectors such as agriculture (World Investment Report 1999). Third, the risk of liquidation of FDI due to further relocation is more severe in manufacturing rather than in services, especially financial intermediation or others sectors where servicing the market motive prevails. Fourth, it is more reasonable to assume consistent technology within the manufacturing sub-division as opposed to the whole economy. The last one is a practical consideration; restricting the analysis to manufacturing permits a more detailed analysis than would have otherwise been possible in a single paper.

For informed policy making, it is desirable to develop an understanding on how spillovers materialise in NZ. As a first step towards understanding the spillover process, it is useful to distinguish between horizontal and vertical FDI spillovers, and further decompose vertical spillovers into backward and forward ones. An immediate advantage of distinguishing spillovers by type lies in developing incentive mechanisms which do not over subsidise MNEs at the tax payer's expense. Further, identifying FDI spillovers by type is also relevant to ensuring that the domestic economy is well positioned, though possibly other policy interventions, to maximise the productivity benefits from FDI. For example, a finding that a certain type of FDI spillovers is important and its materialising depends on the existence of certain firm specific attribute signals to policy makers that policies targeting the development of that attribute is complementary to FDI policy.

In fact, several studies argue that spillovers from FDI depend on the existence of adequate absorptive capacity among domestic firms.[5] Possibly, the message here for policy makers and delivery agencies is that not all FDI will automatically generate spillover benefits for the economy and not all domestic firms will be able to share the spillovers. Domestic firms need to have suitable attributes to capture the emanating spillovers. Of course, it is not known whether absorptive capacity plays a role in NZ manufacturing gaining spillovers from FDI. But where it does, FDI policy should be developed in coordination with policies that are geared towards development of those firm specific attributes.

[4] The OIC oversees acquisitions of 25 percent or more of any NZ business worth more than NZ$50 million. Hence, it does not oversee all FDI transactions.
[5] For a survey of the literature, see, Görg and Greenaway (2004).

The remainder of the paper is organised as follows. The next section provides a brief overview of the literature on productivity spillovers focusing specifically on the distinguishing between different types of spillovers and their dependence on absorptive capacity. Section 3 introduces the empirical model. Section 4 describes the data. Section 5 presents initial results that are subject to review and, the last section offers tentative concluding remarks alongside discussion on the proposed refinements to the paper.

## 2. Literature Review

Internationally, there exists a large volume of research exploring the linkages between FDI and productivity. Nonetheless, it would be fair to say that there exists considerable ambiguity in the empirical literature. This makes it difficult to draw up straightforward policy implications (see, Davis 2003). In theory, however, it is straightforward to posit a causal link running from FDI to productivity.[6]

As discussed in the previous section, an MNE needs to possess some compensating advantages i.e., firm specific assets, in order to compete effectively with local players in the domestic turf. Where the MNE does not, or is not able to, fully internalize the value of these advantages, spillovers accrue to the domestic firms (Blomström and Kokko, 1998). These spillovers could be intended and result from the deliberate development of forward and backward linkages between local and the MNE (vertical spillovers). Alternatively, the spillovers may be unintentional, arising as a result of accidental leakage of knowledge and technology to competing and unrelated firms (horizontal spillovers).

*Horizontal Spillovers*

There are several conduits through which the horizontal spillover process takes effect, such as a) the movement of labour, b) imitation and observational learning and, c) competition.

It has been observed that the most important conduit is the movement of MNE trained labour to the domestic sector – either by changing jobs or starting new ventures (Fosfuri et al., 2001). The relocation of the MNE trained workers can potentially enhance productivity through two channels. First, the MNE trained workers may carry with them knowledge of new technology or management techniques and consequently become direct agents of technology transfer (Görg and Greenaway, 2004). Second, the MNE trained workers may raise the productivity of the co-workers in the domestic firms, simply by association. There is much evidence to suggest that MNEs deliberately pay higher wages to plug this 'leak' (e.g., Aitken et al., (1997), Feenstra and Hanson (1997)). In response, domestic firms also have been observed to increase worker compensation (e.g., Aitken et al., 1997).

[6] It is acknowledged that the causality might very well run in the opposite direction or even in both directions.

The advanced technologies and new products unleashed by an MNE in the domestic market force the local players to respond by innovating. Often, innovation takes the form of imitation (e.g. reverse engineering), whereby the domestic firms replicate the products and/or the processes of the MNE. The scope for imitation is restricted by the complexity of the product and process; the more complex they are, the more difficult it is to imitate them. Nonetheless, it should be noted that any upgrading of local technology derived from imitation is a gain for the domestic economy. However, where the MNE's products and technologies are vastly different from those of local firms, spillovers are unlikely to materialise (see, Kokko 1994). In addition to the imitation of products and processes, the local firms may also imitate the management or export practices of the foreign firm (Görg and Greenaway, 2004). The presence of MNEs in the domestic sector also provides several avenues for the local players to observe and learn (see, Rhee and Belot, 1990).

MNE induced competition is a double edged sword from the point of view of productivity spillovers. On the one hand, foreign entrants might be able to intensify domestic market competition, thereby leading eventually to higher productivity, lower prices and more efficient resource allocation within the economy (e.g., Blomström, 1986). On the other, a foreign entrant may be large enough to establish a position of market power, effectively reducing the amount of domestic market competition (Davies 2003).[7] OECD (2002) observes that the risk of the latter is exacerbated if: the host country constitutes a separate geographic market; the host-country market is small; the barriers to entry into the industry are high; the entrant has an important international market position; or host-country competition laws are weak or weakly enforced. Notably, at least the first two of these are particularly relevant in the NZ context. If the negative effects of FDI on domestic firms are large enough, the overall spillover effects of FDI on an industry's productivity performance may become negative (Wang and Gu, 2006).

In summary, whether horizontal spillovers are in fact positive or negative or non-existent is an empirical matter.

*Vertical Spillovers*

Vertical spillovers occur as a result of inter-industry linkages. Inter-industry linkages refer to the formal contact between the MNEs and their local suppliers or customers. Since the MNE stands to gain from the improved performance of their associates, there is an incentive for the direct transfer of technology and know-how from the MNE to the associate firms. Given that such transmission of knowledge is borne out of a symbiotic arrangement, it has been argued that vertical spillovers are the most likely source of productivity benefits for the domestic economy (Javorcik 2004). As alluded to in the introduction, vertical spillovers may result from either backward or forward linkages.

Backward linkages are formal contractual arrangements between local suppliers and MNEs for the supply of intermediate inputs. An obvious spillover from these linkages is the direct transfer of technology to the local supplier by the MNE with a view to

[7] Also referred to as the 'market stealing effect'.

ensuring the quality of inputs (see, Görg and Greenaway, 2004).[8] MNEs are also known to provide technical assistance to their domestic suppliers to enable them to absorb the newly transmitted knowledge. Often MNEs require suppliers to upgrade their technologies and management (Görg and Greenaway 2004). Furthermore, by expanding and guaranteeing a market for intermediate inputs, the MNE provides an opportunity to the local suppliers to garner scale economies (Lim and Fong, 1982). Lall (1980) notes that MNEs also open up export markets to their domestic suppliers by facilitating contact with their overseas affiliates.

Evidence in favour of positive productivity spillovers from backward linkages has been reported in Blalock and Gertler (2002) and Javorcik (2004) in the cases of Indonesia and Lithuania respectively. There is the possibility that an MNE may circumvent the need to transmit technology to domestic suppliers by sourcing intermediate inputs from overseas. Where this happens, backward spillovers are unlikely to materialise (Görg and Greenaway 2004). Equally, it is not unheard of for domestic economies to impose measures such as a minimum local input requirement to ensure that spillovers do, in fact, occur.[9]

Forward linkages refer to the relationship between an MNE and its domestic customers. MNEs have an interest in the sales and efficiency achieved by its customers since that would in turn translate to a greater demand for the MNEs supplies. In that, the MNE has an incentive to transmit knowledge on production methods, processes and international market access to the upstream local firm.

Recently, Wang and Gu (2006) have reported significant positive spillovers from vertical linkages in the context of Canadian manufacturing sector. Likewise, Schoors and Tol (2001) find that Hungarian firms have benefited from their purchasing arrangements with MNEs. However, Gorodnichenko et al., (2007), analysing the data from 17 emerging economies, find that evidence of spillovers from forward linkages are not as consistently uncovered as those from backward ones. Javorcik (2004), in her Lithuanian study, finds negative spillovers from forward linkages.

*Absorptive Capacity*

Absorptive capacity is defined as the ability of domestic entities to identify, assimilate and exploit foreign technology (Cohen and Levinthal, 1990). The incorporation of absorptive capacity in the modelling of spillovers has widespread acceptance in the FDI literature (see, Borensztein et al., 1998). Typically, absorptive capacity has been measured as the technology gap between the domestic firms and the MNE.[10]

Theory is ambiguous whether a larger, smaller or a moderately sized technology gap is more conducive to capturing spillovers from FDI.

[8] Moran (2001) provides a number of case studies indicating that this in fact happens.
[9] The local input requirement has been one of the most fiercely debated issues in trade negotiations.
[10] Other variables such as human capital and access to finance have also been used to proxy for a firm's absorptive capacity. But the concept of technological distance is more directly linked to absorptive capacity than other variables. Moreover, the technology gap measure may well capture the information contained in the other variables (see, Gorg and Greenaway 2004).

On the one hand, Findlay (1978) argues that the potential for positive spillovers is higher where the technology gap between the domestic firm and the MNE is large. The underlying idea is that entities with a lower stock of technology possess a greater scope for technological accumulation in that they have a larger backlog of established knowledge to assimilate.

In contrast, Glass and Saggi (1998) argue that technology gap signals something about absorptive capacity to the MNE. The larger it is, the less likely the host firm is to have the human capital, physical infrastructure and distribution networks to support the inward investment. This influences not only the decision to invest but also what kind of technology to transfer. Specifically, the bigger the gap the lower the quality of technology transferred and the lower the potential for spillovers. This proposition is consistent with Cohen and Levinthal (1989, 1990) who observe that the competence to utilize new technology is largely a function of prior related knowledge.

Empirical evidence on the two propositions discussed above is ambiguous. While Haddad and Harrison (1993) find that spillovers are reduced in case of small technology gaps, Cantwell (1989) and Tsou and Liu (1994) find that large gaps constrain spillovers. Kokko et al., (1996) find evidence of some sort of a 'threshold effect' which suggests that FDI spillovers materialise when there is technology gap but such gap is not '*too large*'. Quantification of an optimum technology gap is an empirical matter. Notwithstanding, it would be reasonable to presume that the gap should not be so large as to make technology transmission so complex that spillovers do not occur (Kokko 1994). In their review of the empirical literature on productivity spillovers from FDI, Görg and Greenaway (2004) conclude likewise. Specifically, they observe that while the size of the technology gap will be directly related to the potential gains from spillovers, it is also likely to be inversely related to the probability that domestic firms are actually able to access them.

## 3. The Empirical Model and Control Effect Variables

We conduct empirical analysis by regressing firm specific estimates of gross output against capital stock, labour input, material input, and a set of variables that are expected to drive productivity. This set includes FDI spillovers, which is the subject matter of this paper, and a number of other variables for modelling of absorptive capacity and also for control effect.[11] The estimated model is specified below:

$$Y_{ijt} = \beta_0 + \beta_1 K_{ijt} + \beta_2 L_{ijt} + \beta_3 M_{ijt} + \beta_4 HFDI_{jt} + \beta_5 BFDI_{jt} + \beta_6 FFDI_{jt} + \beta_7 HI_{jt} + \beta_8 SCALE_{ijt} + \beta_9 EX_{ijt} + \beta_{10} TGAP_{ijt} + \left[\beta_{11} HFDI_{jt} \times TGAP_{ijt}\right] + \left[\beta_{12} BFDI_{jt} \times TGAP_{ijt}\right] + \left[\beta_{13} FFDI_{jt} \times TGAP_{ijt}\right] + IndustryDummies + \varepsilon_{ijt}$$

[11] Although this paper focuses on the effects of FDI on productivity, there might be other potential determinants of productivity, which if omitted, might lead to biased estimates of FDI's role. Typically, the usual suspect variables are modelled as drivers of productivity alongside the variable of interest (in this case, FDI) for control effect.

where,

$Y_{ijt}$ : Output (in natural logarithms) of firm *i* in industry *j* at time *t*

$K_{ijt}$ : Capital (in natural logarithms)

$L_{ijt}$ : Employment (in natural logarithms)

$M_{ijt}$ : Cost of Materials (in natural logarithms)

$HFDI_{jt}$ : Horizontal spillovers from FDI in industry *j* at time *t*

$BFDI_{jt}$ : Backward spillovers from FDI

$FFDI_{jt}$ : Forward spillovers from FDI

$HI_{jt}$ : Herfindahl index for domestic firms

$SCALE_{ijt}$ : Firm sales relative to average firm sales in the same sector

$EX_{ijt}$ : Dummy variable capturing if the firm is an exporter or not.

$TGAP_{ijt}$ : The difference between the firm's labour productivity and the average labour productivity in foreign firms in the same industry (productivity measured in natural logarithms).

$$\left.\begin{array}{l} HFDI_{jt} \times TGAP_{ijt}: \\ BFDI_{jt} \times TGAP_{ijt}: \\ FFDI_{jt} \times TGAP_{ijt}: \end{array}\right\} \text{ Absorptive capacity variables}$$

Horizontal FDI spillovers are measured as the share of output produced by the foreign firms in the industry *j* to the total output in the industry *j*.[12]

Following Javorcik (2004), backward FDI Spillovers (BFDI) is measured as $\sum_{k:j\neq k} \rho_{jk} HFDI_{kt}$, where $\rho_{jk}$ is share of industry's *j* input purchased from industry *k* and forward FDI Spillovers (FFDI) is measured as $\sum_{k:g\neq k} \rho_{kg} HFDI_{kt}$ , where $\rho_{kg}$ represents the share of industry's *j* output sold to industry *g*. $\rho_{kg}$ and $\rho_{jk}$ are obtained from the supply and use tables for 2003, which contain information concerning the industry's amount of output sold to other industries and amount of inputs bought from others.

The Herfindahl index (HI) is constructed as $\sum_{i=1}^{n}\left[\frac{sales_{ijt}}{sales_{jt}}\right]^2$ . It can be readily deduced that the *HI* is bound between 0 and 1 and that higher *HI* indicates greater market concentration, i.e., less competition.

[12] An alternative method would be to use employment shares. Output and employment shares are observed to be highly correlated in this sample.

19 industry dummies are included in the model to account for the 20 industry groups within the manufacturing sector. The 20 groups are determined by the level of disaggregation in the supply and use tables from which measures of vertical FDI can be derived.

Table 1 below lists the data sources of the variables. It is followed by a brief discussion on the priors relating to the control effect variables, which were not covered in the literature review.

**Table 1: Variables in the Model and Data Source[13]**

| Variable Acronym | Variable Name | Data Source |
|---|---|---|
| Y | Output | Gross Output variable from Annual Enterprise Survey (AES) |
| K | Capital | Total Assets from AES[14] |
| L | Labour | RME from Linked Employer Employee Database (LEED) |
| HFDI | Horizontal FDI Spillovers | BOP ownership rate variable from Longitudinal Business Frame (LBF), |
| BFDI | Backward FDI Spillovers | Constructed using HFDI and Supply and Use Tables (2003) |
| FFDI | Forward FDI Spillovers | Constructed using HFDI and Supply and Use Tables (2003) |
| HI | Herfindahl index | Sales by ANZSIC groups from AES |
| SCALE | Scale of Operation | Gross Output by ANZSIC 4 digit classification from AES |
| TGAP | Technology Gap | Constructed using Firm and ANZSIC 4 digit labour productivity measures; labour productivity derived from value added (AES) and labour (LEED). |
| EX | Exports Dummy | Constructed as a binary variable: Exporter and Non-Exporter; data from Customs |
| HFDI x TGAP | Variables capturing the dependence of FDI spillovers on measures of absorptive capacity. | Spillover by Type x TGAP |
| BFDI x TGAP | | |
| FFDI x TGAP | | |

[13] There is scope to increase the data coverage by considering alternative data sources such as the business activity indicator (smoothed GST returns) and IR4 (company returns). We will attempt to tap into these sources in the subsequent draft of this paper.

[14] We have used total assets to proxy for capital in this draft of the paper. We believe that a better measure of capital stock can be constructed following Fabling and Grimes (2008). This paper will be revised using better measures of capital stock.

*Competition (HI):* International evidence, empirical and theoretical, supports the view that competition drives productivity (e.g. Nickell (1996). However, it is possible to envisage circumstances in which innovation will be adversely affected by competition such as when there is 'too much' competition.

*Scale:* There is much NZ and international evidence suggesting that large firms are more productive than small ones (e.g. Lee and Tang (2001)). Indeed, Rao and Tang (2000) demonstrate that the productivity advantage of large firms persist even after controlling for other characteristics such as FDI, export behaviour, unionization, and age. In the case of NZ, Razzak (2004) and Fox (2005) report that gains from scale are substantial. Accordingly, it is expected that the coefficient on the scale variable will be be positive.

*Exporting behaviour and foreign ownership:* There exists a sizeable literature suggesting that firms that export tend to be more productive than those that do not. For instance, in NZ, it has been documented that exporters have, on average, a 33 percent advantage in labour productivity relative to non-exporters (Fabling et al., 2008). What is less clear is whether productive firms are more likely to export pr exporting behaviour drives productivity. Indeed, Fabling et al., observe that that productive firms in NZ appear to 'self-select' to exporting. Likewise, there is international and domestic evidence to suggest that, firms with a foreign ownership stake are more productive (e.g. Fabling et al., 2008). Accordingly, it is reasonable to expect the two binary variables in the model relating to exporting and foreign ownership will return a positive coefficient.

## 4. Data[15]

The data used in this paper comes from the LBD. The LBD contains data mainly for financial years 2000 to 2007 from a number of sources including the Annual Enterprise Survey (AES), Goods and Services Tax (GST), Business Activity Indicator (smoothed GST returns), financial returns (IR10 and IR4), Customs and some other surveys such as business operations survey, energy use survey, business finance survey etc.[16] The spine of the LBD is the Longitudinal Business Frame (LBF) which contains demographical information pertaining to firms including data on foreign ownership interests. Given that the focus of this paper is on the manufacturing sector, the analysis is restricted to firms that are classified under ANZSIC C, i.e., the manufacturing subdivision. The backward and forward linkages of firms within the manufacturing sub-division, as well the linkages of the manufacturing sector with firms in other sub-divisions were modelled using the supply and use tables of Stats New Zealand (2003).

The share of foreign owned firms varies across industry groups as shown in Table 2. Notably, almost 40 percent of NZ output is generated by firms that had a greater than 10 percent foreign ownership stake. The NZ economy is organised into 40 industry

[15] All counts have been random rounded for confidentiality reasons. Accordingly, some totals such as the sum of foreign and domestic firms may not add up to the total number of firms in the sample.
[16] Some data exists for years prior to 2000 and there is some data for the year 2008 as well.

classes. While the grouping follows the ANZSIC classification per se, the exact composition of industry classes has been determined by the Supply and Use tables which form the basis of computing measures of vertical FDI. The manufacturing sub-division is distinguished into 19 classes.

Among the non-manufacturing activities, the contribution of MNEs is substantial in the oil and gas sector, communication services and finance and insurance activities. In contrast, the primary sector output appears driven mainly by domestically owned firms. The role of FDI in the provision of education, health, legal and accounting and real estate services is also minimal. Even within the manufacturing sub-division there is substantial variation in the contribution of MNEs to gross output. Activities such as the production of beverages and tobacco, paper products, rubber, plastic and other chemical products, basic metals and photographic and scientific equipment is dominated by MNEs. On the other hand, the meat and dairy goods production, furniture manufacturing and printing/media activity is characterised by low levels of MNE contribution to output.

Table 2: Share of firms with FDI in Gross Output across Industry Classes

| **Industry Classes** | **Share of FDI firms in Gross Output** |
|---|---|
| Ag & forestry | 4.95 |
| Fishing & fish products | 16.95 |
| Mining & quarrying | 42.24 |
| Oil & gas | 97.81 |
| Meat & dairy products | 12.27 |
| Other food | 65.96 |
| Beverages & tobacco | 88.46 |
| Textiles | 31.46 |
| Clothing & footwear | 30.81 |
| Wood products | 49.93 |
| Paper products | 74.13 |
| Printing, publishing & recorded media | 0.17 |
| Fertiliser, petroleum and industrial chemicals | 37.24 |
| Rubber, plastic & other chemical products | 72.11 |
| Non metallic mineral products | 49.09 |
| Basic metals | 71.10 |
| Structural, sheet & fabricated metal products | 38.69 |
| Motor vehicles & other transport equipment | 44.90 |
| Industrial machinery | 36.53 |
| Electronic equipment & appliances | 59.42 |
| Photographic & scientific equipment | 73.29 |
| Furniture | 5.76 |
| Other manufactures | 10.23 |
| Electricity & Water | 19.84 |
| Construction | 25.69 |
| Wholesale trade | 57.13 |
| Accommodation, restaurant & bar services | 46.44 |
| Transport | 59.65 |
| Communication services | 81.43 |
| Finance and Insurance | 77.90 |
| Real estate services | 8.91 |
| Equipment hire services | 60.93 |

| | |
|---|---|
| Computer services | 57.25 |
| Legal & accounting services | 0.37 |
| Other business services | 41.06 |
| Government | 0.00 |
| Education | 3.48 |
| Health & community services | 5.86 |
| Culture & recreational services | 37.34 |
| Personal & other community services | 31.98 |
| Total | 39.43 |

Among the firms in the manufacturing sector, those with negative or zero employment/gross output/intermediate consumption/value added were excluded from the analysis. The final sample consisted of 12,837 manufacturing firms spanning 146 ANZSIC 4 digit codes.

Of these, 300 firms have a foreign ownership stake in excess of 10 percent in at least one year. The rest of the firms (12,534) are domestically owned in all if the observed years. The average number of time observations for the foreign owned and domestic firms were roughly similar; 3.35 for foreign firms and 3.23 for domestic firms.

816 of the sample firms exported at least in on of the years and the rest were non exporters. 195 of the 300 MNE's indulged in exporting. This suggests that almost two-thirds of the MNE's in the manufacturing sub-division export. In contrast, only 5 percent of domestic manufacturers export their produce. This evidence is in line with Fabling et al. (2008) who report that foreign owned firms are more likely to export. However, while Fabling et al. comment that foreign firms are three times more likely to export, we find that the number is more like 13 times. Perhaps, this difference is attributable to this paper focusing on the manufacturing sub-division as opposed to the entire economy. It is known that about 90 percent of NZ exports are accounted for by the manufacturing sector.

Summary statistics pertaining to the key variables in the analysis are by presented in Table 3.

**Table 3: Summary Statistics**

| Variables | Domestic Firms | MNE's |
|---|---|---|
| No. of Firms | 12,534 | 300 |
| Gross Output (Avg) | $ 2,958,238 | $ 108,727,930 |
| Capital (Avg) | $ 2,562,096 | $ 132,341,334 |
| Employment (RME) | 10 | 332 |
| Intermediate Consumption (Avg) | $ 2,240,320 | $ 69,773,971 |

| | | |
|---|---|---|
| No. of Exporters | 624 (5%) | 195 (65%) |
| Hefindahl Index | 0.14 | 0.30 |
| Scale | 0.006 | 0.23 |
| ALP (Avg) | $ 31,437 | 156,366 |

From Table 3, it is apparent that MNEs are, on average, much larger than domestic firms. An average MNE in the manufacturing sector is 37 times larger than a domestic firm in terms of gross output and employs 52 times more capital, 35 times more labour and 31 times more materials. The average MNE is 5 times more productive than the average domestic firm. None of these results should come as a surprise given that the NZ economy in general is characterised by a large number of small firms; although most of the output is generated by the larger firms. The average measures computed for the herfindahl index (HI) and scale variables are at the 4 digit industry level. It is apparent that MNEs in NZ tend to be located in industries that are characterised by significant market power; the average HI score for MNEs is more than two times that for domestic firms. Likewise, MNEs are more likely to be found in industries that enjoy larger scale economies.

## 5. Empirical Results and Discussion

The empirical methodology applied in the paper is the *between group fixed effect model*. Each firm is a group on its own, as opposed to the 40 industry classes in Table 2 or ANZSIC 4 digit classifications being treated as groups. Recall that the industry dummies are included to accommodate the groupings in table 2.

The choice of empirical methodology is driven by the questions that are being investigated in this paper:

- Whether spillovers exist – vertical or horizontal - from FDI in NZ manufacturing, and,
- Whether the spillovers are conditional on the absorptive capacity of domestic firms.

Earlier in the paper it was pointed out that most international studies examining FDI spillovers appear to be at the industry/sector level rather than at the firm level where genuine evidence of spillovers is more likely to be uncovered. It was argued that such research is looking for evidence in the *wrong place with the wrong microscope*. Recognizing this, the present paper looks for evidence in the *right place* by using firm level data. It is, therefore, sensible to use firms as opposed to cluster of similar firms (say, ANZSIC 4 digit classifications) as groups. As is the practice, an F test was run on the model to determine the existence of firm specific effects; the F value was significant at less than 1 percent suggesting that firm specific effects do exist. This validates the choice of individual firms as groups.

In essence, the *between group fixed effect model* fits the model using group means of dependent and independent variables. In the present instance, this implies that there will be one observation for each variable (dependent and all independent), per firm.

This observation will be average of the values recorded over time for the firm. This approach should smooth out the variation in annual observations. Also, to a limited extent, this should be able to account for endogeneity issues. It is less likely that an averaged observation over time of the dependent and independent variables should suffer from an endogeneity bias, relative to a time specific contemporaneous observation of the dependent and vector of independent variables.

The diametrically opposite empirical alternative would have been to use *between time fixed effect model* where variables are averaged across firms and spillovers over time for the whole sample of firms are investigated. That is clearly not the purpose of this research and, therefore, the between time model is not considered. However, a random effects model is applied on the data only to be overwhelmingly rejected by the Hausman test (p-value close to 0).

Drawing mainly from the research questions being investigated and supported by the results of diagnostic tests - checking for the existence of firm specific effects and checking for random vs. fixed effects modelling - we are reasonably convinced that the chosen empirical methodology is appropriate.

Table 4 documents the empirical results from the between group fixed effect models. However, prior to discussing the results, the authors would like to draw the attention of the readers to the fact that these results are likely to change as the data is revised. In particular, it is recalled that total assets have been used to proxy for capital stock. Following Fabling and Grimes (2008), we intend to derive better measures of capital and use them in the subsequent versions of this paper. Also, it is our intent to make the sample more comprehensive by appending data from the BAI.

Table 4: Regression Results

| **Independent Variable** | **Model 1** | **Model 2** | **Model 3** | **Model 4** | **Model 5** |
|---|---|---|---|---|---|
| Capital | 0.0093*** | 0.0095*** | 0.0181*** | 0.0097*** | 0.0110*** |
| Labour | 0.4905*** | 0.4901*** | 0.4801*** | 0.4918*** | 0.4945*** |
| Materials | 0.5053*** | 0.5051*** | 0.5085*** | 0.5057*** | 0.5063*** |
| Scale | 0.1974*** | 0.2010*** | 0.1867*** | 0.2057*** | --- |
| HI | 0.1202*** | 0.1209*** | 0.0857*** | 0.1198*** | --- |
| TGAP | 0.4175*** | 0.4348*** | 0.4144*** | 0.4176*** | 0.4169*** |
| Foreign-Domestic Ownership | 0.1075*** | 0.1099*** | 0.1287*** | 0.1117*** | 0.1393*** |
| Exporter-Non Exporter | 0.0342*** | 0.0341*** | 0.0472*** | --- | --- |
| HFDI | 0.0918* | 0.0884* | 0.0384*** | 0.0900* | 0.0932* |
| BFDI | -0.4206 | -0.4304 | 0.2575*** | -0.4094 | -0.2701 |
| FFDI | 0.9858*** | 0.9873*** | 0.8050*** | 0.9819*** | 0.8389** |

| | | | | | |
|---|---|---|---|---|---|
| HFDI x TGAP | -0.0109 | --- | -0.0255** | -0.0106 | -0.0100 |
| BFDI x TGAP | 0.1989*** | --- | 0.2078*** | 0.1971*** | 0.2011*** |
| FFDI x TGAP | 0.0759 | --- | 0.0911* | 0.0783 | 0.0795 |
| D6 | -0.2981*** | -0.2960*** | --- | -0.2980*** | -0.2992*** |
| D7 | 0.1104** | 0.1188** | --- | 0.1157*** | 0.1119** |
| D8 | -0.2212*** | -0.2207*** | --- | -0.2212*** | -0.2459*** |
| D9 | -0.2301*** | -0.2300*** | --- | -0.2308*** | -0.2759*** |
| D10 | -0.1784*** | -0.1764*** | --- | -0.1785*** | -0.2194*** |
| D11 | -0.1053*** | -0.1030*** | --- | -0.1047*** | -0.1412*** |
| D12 | 0.0462 | 0.0429 | --- | 0.0447 | 0.0535 |
| D13 | 0.1750*** | 0.1740*** | --- | 0.1726*** | 0.1666*** |
| D14 | -0.1483*** | -0.1477*** | --- | -0.1459*** | -0.1582*** |
| D15 | -0.2704*** | -0.2689*** | --- | -0.2701*** | -0.2777*** |
| D16 | -0.1329*** | -0.1323*** | --- | -0.1334*** | -0.1317*** |
| D17 | -0.0965*** | -0.0967*** | --- | -0.0968*** | -0.1279*** |
| D18 | -0.1340*** | -0.1340*** | --- | -0.1351*** | -0.1727*** |
| D19 | -0.0317 | -0.0316 | --- | -0.0327 | -0.0825* |
| D20 | -0.1975*** | -0.1966*** | --- | -0.1946*** | -0.2021*** |
| D21 | 0.0758 | 0.0778 | --- | 0.0737 | 0.0363 |
| D22 | -0.1580*** | -0.1578*** | --- | -0.1587*** | -0.2025*** |
| D23 | -0.1119*** | -0.1118*** | --- | -0.1122*** | -0.1541*** |
| Intercept | 5.6981*** | 5.7009*** | 5.4199*** | 5.6905*** | 5.7166*** |
| R-Square | 0.9849 | 0.9848 | 0.9832 | 0.9849 | 0.9847 |

***, **, * indicate significance at 1, 5 and 10 percent respectively.

Five alternative specifications (models 1 to 5) are presented. Model 1 is the main one while the others able examining the robustness of the results and also provide some additional insights. In all of the models, the coefficients of the factor inputs (Capital, Labour and Materials) come out as being positive and significant. While the coefficients of labour and materials are reasonable in terms of what is conventionally expected, the coefficient of capital is consistently low. It is quite unlikely that capital carries a coefficient of 0.01 in a production function. Having said that, it is likely that this result is a consequence of using total assets as a proxy for capital stock. As mentioned earlier, subsequent versions of this paper will use better measures of capital stock- specifically a summation of rental and leasing costs, depreciation and cost of capital charge for owned assets.

The models were also estimated with value added as the dependent variable and capital and labour as the factor inputs (excluding intermediate consumption). That did not improve estimates and capital continued to have an unreasonably low coefficient.

The coefficients on the foreign-domestic ownership and exporter-non exporter binary variables are positive and significant. It is recalled that firms that had a foreign ownership stake carried a value of 1 as did those that exported. Both of these findings are not surprising and are extensively documented in the international and NZ literature alike. In the NZ context, Fabling et al. (2008) have observed that exporters are more productive than non-exporters and foreign owned firms are more productive than domestically owned ones. Model 4 excludes the exporter-non exporter variable and re-estimates the model. The results remain robust to this change in specification.

It appears that not controlling for whether a firm exports or not does not confound results pertaining to spillovers from FDI.

The coefficients on the other variables are more readily interpretable and, in general, more confirming with evidence uncovered in past studies. Scale is highly significant and positive implying that scale contributes to growth in output. As evident from table 4, this result is robust. Indeed, even the magnitude of the scale coefficient is stable across alternative specifications.

Likewise, results pertaining to the TGAP variable are also consistent across alternative specifications. The finding with regard to TGAP is that a large value of TGAP – which reflects backwardness – is more conduce for growth. This result is in line with Findlay (1978). Findlay argues that entities with a lower stock of technology possess a greater scope for technological accumulation in that they have a larger backlog of established knowledge to assimilate. The countering view, as discussed in the literature review, is that a smaller TGAP is more conducive. This view draws from the understanding that a larger TGAP is reflective of the domestic economy not having the ability to absorb foreign technology. Clearly, this view is less tenable in the context of developed economies such as NZ.

The coefficient of HI is positive and significant, again across all specifications. This implies that less competition drives growth in NZ manufacturing. However, this result is not counter-intuitive in the context of this study. It is known that the NZ economy is characterised by a large number of small firms and a few large firms, with the latter accounting for most of the output. Also, there is evidence to suggest that the larger firms are more productive than the smaller firms (Bartleet et al., 2009). Further, the large firms tend to operate in industries that have fewer players.

Results on the FDI variables are encouraging in that all types of FDI spillovers are found to exist in NZ manufacturing and they are growth inducing.

There is evidence of domestic firms gaining from MNEs within the same industry, i.e., HFDI. Whether this is a consequence of labour turnover, imitation or increased efficiency die to competition is a subject matter for further enquiry. HFDI spillovers are not conditional on absorptive capacity as measured by TGAP. Irrespective of how productive they are firms stand to gain by foreign presence in their industries.

Likewise, with forward FDI. It is known that MNEs may have self-interest in transmitting knowledge on production methods, processes and international market access to the upstream local firm. Upstream firms gain from MNEs irrespective of the productivity as evidenced by the non-significance of the FFDI x TGAP variable.

The evidence on backward linkages is dissimilar. On its own, the coefficient on the BFDI variable is not significant (excepting in model 3 which is discussed below). However, the interaction of BFDI with TGAP is consistently significant and positive. This means that the downstream suppliers of MNEs who are highly productive do not gain from their association with the MNEs. In contrast, if the MNE chooses to be supplied by a low productive firm, that firm is able to enjoy a higher rate of growth owing to an association with the MNE.

While estimating the production augmented for FDI spillovers and other control variables, there is a need to account for industry specific effects. This is due to the so called *'self-selection'* bias. It has been commented that MNEs tend to invest in the more productive sectors of the economy. As a result, where industry effects are not controlled for, the estimated results tend to be biased and inconsistent; correlation between growth and foreign presence, a result of *self-selection* is misinterpreted as evidence of spillovers. Indeed, model 3 is a case in point. In this specification, industry dummies are excluded. The changed specification results in the HFDI variable acquiring statistical significance independently when in fact, across all other specifications HFDI spillovers are contingent on TGAP.

In using firm level data, this paper looks for evidence on FDI spillovers in the *right place*. By considering the time dimension and accommodating for the possibility that MNEs locate in high productive industries, it is ensured that the *right microscope* is used in the analysis.

## 6. Concluding Remarks and Proposed Further Revisions

This paper aims to answer two questions. First, whether FDI spillovers exist in NZ manufacturing and, second, whether FDI spillovers contingent on absorptive capacity.

Three types of FDI spillovers are distinguished: horizontal, backward and forward. Horizontal spillovers are intra-industry in nature where domestic firms learn from the MNE that is located in their own industry through labour turnover, imitation or simply because of competition. Vertical spillovers, on the other hand are inter-industry in nature where suppliers to (backward spillovers) and customers of (forward spillovers) the MNE located in an industry other than their own learn through their association with MNEs.

An unbalanced sample of 12,837 manufacturing firms, observed over the period 2001-06, spanning 146 ANZSIC 4 digit classifications is applied in the analysis. It is observed that firms with a foreign ownership stake in excess of 10 percent, i.e., MNES or firms with FDI tend to be significantly larger than the average domestic firms in both terms of producing output and using factor inputs such as labour, capital and intermediate inputs. The average MNE is also found to be 5 times more productive than the average domestic firm. These results are not unexpected given that the NZ economy is characterised by a large number of small firms. We believe that the size and productivity of the MNEs relative to domestic firms can be better gauged if a subset of domestic firms – those that match the MNE is size – is used in the analysis. This is an area in which the subsequent versions of this paper will focus on.

The results per se are encouraging from the point of view of the NZ economy gaining from FDI. It s observed that there is robust evidence of domestic firms gaining by the presence of MNEs in their own industry, i.e., HFDI. Also it is found that domestic firms gain by having an MNE as a supplier of inputs, i.e., FFDI. Significantly, neither type of spillovers discussed above is dependent on the absorptive capacity of the domestic firms. In case of domestic firms gaining by supplying to MNEs, i.e., BFDI,

the evidence is a little different. Only the relatively low productive domestic firms gain by associating with MNEs.

Most of the control variables in the model carry expected signs. Increased scale, exporting behaviour and foreign ownership are associated with higher growth rates. The coefficient on the TGAP variable is positive. This implies that relatively backward firms grow faster. This suggests that some sort of a catching-up occurring in NZ manufacturing. The Herfindahl index returns a positive sign suggesting that less competition is associated with increased growth. This result is attributed to MNEs being large in size and locating in industries which are characterised by concentration of market power. The coefficients on the factor inputs, specifically, capital is a cause for concern. The estimate appears far too low to draw comfort. We believe that this might be a consequence of using total assets to proxy for capital stock. In the subsequent revisions to this paper we intend to apply a better measure of capital stock that includes leasing and rental costs, depreciation and cost of capital.

Other potential improvements to the paper being envisaged are:

- Increasing the sample size by appending data from the BAI.
- Investigating the robustness of results using alternative panel data methodologies.
- Checking for non-linearity using squared terms and examining other interaction terms in the model.
- Estimating a labour productivity regression to see if there are significant variations in findings.

Notwithstanding the proposed refinements, this paper is the first NZ based study investigating FDI spillovers using a panel of firm level data. Drawing from the international literature, this paper argues that in order to uncover evidence of genuine spillovers it is important to look at that FDI phenomenon at the firm level, accommodating the time dimension and accounting for the possibility that MNEs might locate in high productive industries. The paper's choice of data, econometric methodology and empirical model are all consistent with the said argument.

We believe that a revised version of this paper will be a useful background material towards developing FDI policy in NZ.

## References


Aitken, B.J., Harrison, A.E. and Lipsey, R.E. (1997). "Wages and foreign ownership: A comparative study of Mexico, Venezuela, and the United States," Journal of International Economics, Elsevier, vol. 40(3-4), pages 345-371, May

Aitken, B. J., Hanson.G.H. and Harrison, A.E. (1997) “Spillovers, Foreign Investment and Export Behavior”, *Journal of International Economics* 43: 103-132.

Bartleet, M., Iyer. K., Lawrence, G., Numan-Parsons, E. and Stroombergen, A. (2009) “Impact of Emissions Pricing on New Zealand Manufacturing: A Short-Run Analysis” Ministry of Economic Development.

Blalock, G. and Gertler. P. (2002), “Firm Capabilities and Technology Adoption: Evidence from Foreign Direct Investment in Indonesia”, Working Paper, Department of Applied Economics and Management, Cornell University.

Blomstrom, M. (1986). "Foreign Investment and Productive efficiency: the case of Mexico." *Journal of Industrial Economics* 35: 97-112

Blomstrom, M. and Kokko, A (1998). “How Foreign Investment Affects Host Countries”, *The World Bank Policy Research Working Paper.*

Borensztein, E., De Gregorio, J. and Lee, J.W. (1998). "How Does Foreign Direct Investment Affect Economic Growth?" *Journal of International Economics*, 45:1, pp. 115-35.

Cantwell, J. (1989) *Technological Innovation and Multinational Corporations*, Oxford: Basil Blackwell.

Cohen, W.M. and Levinthal, D.A. (1989). "Innovation and Learning: The Two Faces of R&D." *Economic Journal*, 99:397, pp. 569-96.

Cohen, W. M. and Levinthal, D.A. (1990). "Absorptive capacity: A new perspective on learning and innovation." *Administrative Science Quarterly*, 35, pp. 128-52.

Davis, N (2003) "Inward Direct Investment, Productivity Spillovers and Public Policy." Ministry of Economic Development.

Fabling, R., and Grimes, A., (2008), "Organisational practices and firm performance: Analysis from a panel of New Zealand firms", paper presented to Comparative Analysis of Enterprise Data conference, Budapest.

Fabling, R., Grimes, A., Sanderson, L., and Stevens, P., (2008), "Some rise by sin, and some by virtue fall: Firm dynamics, market structure and performance", *MED Occasional Paper*. 08/01

Feenstra, R.C. and Hanson, G.H. (1997) “Foreign Direct Investment and Relative Wages: Evidence from Mexico’s Maquiladoras,” *Journal of International Economics*, 42(3/4), May 1997, 371-393.

Findlay, R. (1978). "Relative backwardness, direct foreign investment and the transfer of technology: a simple dynamic mode." *Quarterly Journal of Economics*, 92, pp. 1-16.

Fosfuri, A., Motta, M. and Ronde, T (2001), “Foreign Direct Investment and Spillovers through Workers’ Mobility”, *Journal of International Economics* 53 (1): 205-22.

Fox, K. (2005) “Returns to Scale, Technical Progress and Total Factor Productivity Growth in New Zealand Industries”, *New Zealand Treasury Working Paper* 05/04.

Glass, A.J. and Saggi, K. (1998) “International Technology Transfer and the Technology Gap,” *Journal of Development Economics* 55: 369-398.

Gorodnichenko, Y. Svejnar, J. and Terrell. K. (2007). “When Does FDI have Positive Spillovers? Evidence from 17 Emerging Market Economies” *IZA Discussion Paper No. 3079*. Institute for the Study of Labour (IZA), Bonn

Görg, H and Greenaway, D. (2004). "Much ado about nothing? Do domestic firms really benefit from foreign direct investment?" *World Bank Research Observer*, 19:2, pp. 171-97.

Graham, E.M., and Krugman, P.R. (1991). “*Foreign Direct Investment in the United States”* Washington, DC: Institute for International Economics.

Haddad, M. and Harrision, A.E. (1993). "Are There Positive Spillovers from Direct Foreign Investment? Evidence from Panel Data for Morocco." *Journal of Development Economics* 42(1): 51-74.

Javorcik, B. (2004). "Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages." *American Economic Review* 94(3): 605-627.

Kokko, A. (1994). "Technology, market characteristics and spillovers." *Journal of Development Economics* 43: 279-293.

Kokko, A., Tasini, A. and Zejan, M. (1996). "Local Technological Capability and Productivity Spillovers from FDI in the Uruguayan Manufacturing Sector." *Journal of Development Studies* 32(4): 602-611.

Lall, S (1980). “Vertical Inter-Firm Linkages in LDCs: An Empirical Study,” *Oxford Bulletin of Economics and Statistics* 42: 203-206.

Lee, F. C., and Tang, J. (2001) “Multifactor Productivity Disparity between Canadian and US Manufacturing Firms.” *Journal of Productivity Analysis* 15: 115-28.

Lim, L. and Fong. P.E. (1982) “Vertical Linkages and Multinational Enterprises in Developing Countries” *World Development* 10 (7), 585-95.

Moran, T (2001), “*Parental Supervision: The New Paradigm for Foreign Direct Investment and Development”*, Washington DC: Institute for International Economics.

Nickell, S.J, 1996**. "**Competition and Corporate Performance," *Journal of Political Economy* 104(4), pages 724-46,

OECD (2002) "*Foreign Direct Investment for Development: Maximising Benefits, Minimising Costs"*, OECD, Paris.

Rao, S. and Tang, J. (2000), "Are Canadian-controlled Manufacturing Firms Less Productive than their Foreign -Controlled Counterparts?", *Industry Canada, Working Paper* #3.

Razzak, W. A. (2004) "Towards Building A New Consensus About New Zealand's Productivity", *Labour Market Policy Group Occasional Papers* 01-2003.

Rhee, Y. W. and Belot, T. (1990) "Export Catalysts in Low-Income Countries: A Review of Eleven Success Stories", *World Bank Discussion Paper* 72..

Schoors, K. and Tol, BV.d (2001). "The Productivity Effect of Foreign Ownership on Domestic Firms in Hungary", University of Gent.

Tsou, M-W. and J-T. Liu (1994) "The Spillover Effects for Foreign Direct Investment: Empirical evidence from Taiwan Manufacturing Industries", *Taiwan Economic Review* 25 (2), 155-81.

Wang. Y. and Gu, W. (2006) "FDI, Human Capital and Productivity: The Role of Vertical Linkages", *forthcoming in the Statistics Canada Working Paper series*.

WORLD INVESTMENT REPORT (1999) "Foreign direct investment and the challenge of development"