FDI AFFILIATES, FRAGMENTATION AND INTRA-FIRM TRADE*

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Abstract

This paper contributes to the increasing number of empirical studies of complex FDI and the role of affiliate trade. A logit model is used to distinguish firm-level characteristics of MNE affiliates who undertake foreign affiliate sales (FAS traders) from those affiliates who do not engage in FAS (non-FAS traders). We recognise FAS as intra-firm trade and evidence of vertical MNE interdependence. Affiliates who engage in intra-firm trade through FAS are found to be larger, more productive, and more likely to be based in high-tech sectors than affiliates not engaged in FAS. Evidence of interdependence between the MNE affiliate and parent is further explored with a measure of headquarter intensity that indicates there is no difference between affiliates engaged in FAS or not in terms of paying management fees to the MNE parent.

KEY WORDS: Complex FDI, fragmentation, affiliates, vertical/horizontal intra-firm trade

JEL Classification: F14, F23, L25

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1. Introduction

High and growing levels of foreign direct investment (FDI) and intra-firm trade by multinational enterprises (MNEs) are among the stylized facts of international investment and trade patterns in the present era of global economic integration. A feature of this integration is trade associated with the fragmentation of production across national borders (Jones and Kierzkowski, 1990; Arndt and Kierzkowski, 2001). Falling trade costs and technological progress enable MNEs to fragment production internationally within the MNE and the decline in foreign investment costs and the growth of markets have fostered the activity of FDI (Markussen and Maskus, 2002).

Associated with these changing patterns of production is an increase in trade between the MNE parent and its subsidiaries (affiliates). A number of empirical studies of US (Borga and Zeile, 2004), Japanese (Kume and Totsuka, 1991) and Swedish (Andersson and Fredriksson, 1996) firms note that foreign affiliates account for an increasing share of total exports from MNEs, and a large proportion of this represents intra-firm trade as part of the operations of an integrated international MNE. Intra-firm transactions are estimated to account for about one-third of US exports and about 40 per cent of US imports, highlighting the increasing importance of the growth of MNEs and FDI for aggregate trade patterns (Zeile, 2003). Such features of FDI and associated trade have initiated theoretical interest in more complex integration strategies of MNEs.

Whilst early theory of trade and multinational firms focused on two major modes of organising production internationally, the degree of horizontal or vertical integration/organisation of the MNE (Caves, 1982; Markusen, 1984; Helpman and Krugman, 1985) recent general equilibrium theory of trade and MNEs has extended these approaches to incorporate hybrid forms of horizontal and vertical MNE activities. These arise because MNEs operate in an interdependent manner across multiple rather than just two countries as in the earlier models (Baltagi, Egger and Pfaffermayr, 2007). Thus we find that complex FDI operates in host countries in order to (i) serve the MNE domestic/home country more cheaply, (ii) produce and sell in local host country markets to save on trade costs, or (iii) produce for third country markets as “export platform” FDI (Ekholm, Forslid and Markusen, 2007; Badinger and Egger, 2008).
Whilst a growing literature attempts to understand the nature of “complex FDI” there is little empirical evidence on what distinguishes MNE affiliates who trade output at arm’s length from those that internalize their trade within the MNE itself by undertaking foreign affiliate sales (FAS) to other affiliates of the MNE and/or the MNE parent. In this empirical study we relate such internalisation decisions to firm-level characteristics, a feature as Antras and Helpman (2004), among others, have suggested may be important in the intra-firm trade decision. The paper contributes to the understanding of the characteristics, behaviour and performance of MNE affiliates in a FDI export-platform host-economy by searching for differences in firm-level characteristics of affiliates that engage in FAS compared with affiliates that do not. We examine micro-level (affiliate) data relating to the characteristics and trade relationships between MNE affiliates within a country that has become a significant host to export-orientated FDI, namely Ireland. We seek to establish whether or not there are certain characteristics of Irish-based affiliates that distinguish those with a higher degree of interdependence with their MNE from those Irish affiliates that exhibit less interdependence with their MNE.

Our empirical results indicate significant differences in the characteristics of FAS trading affiliates and non-FAS traders. Affiliates engaged in intra-firm trade are larger, more productive, and more likely to be located in high-tech sectors than affiliates who do not engage in intra-firm trade. Evidence of interdependence between the MNE affiliate and parent is further explored with a measure of headquarter intensity that indicates there is no difference between affiliates engaged in FAS or not in terms of paying management fees to the MNE parent.

The remainder of this paper develops as follows. Section 2 reviews the motivating theoretical literature and previous empirical studies of intra-firm trade. Section 3 introduces the data and presents some summary statistics in relation to the two different types of MNE affiliates in Irish manufacturing. Section 4 estimates the econometric model and Section 5 concludes the paper.
2. Theoretical and empirical review

The issues of fragmentation of production and intra-firm trade are linked to early theories of trade and MNEs that focused on the organisation of firms across national borders. Factors determining an affiliate’s propensity to export should relate to the organisation of foreign production, which may be either horizontally or vertically integrated, with implications for the pattern of trade (Caves, 1971).

Horizontal FDI is generally defined as locating MNE affiliates and production in a host country in order to serve the local (host) market to save on transaction and trade costs (Markusen, 1984). Horizontal MNEs thus incur in higher fixed investment costs than otherwise (Markusen and Venables, 2000) and each foreign affiliate produces primarily for the local market with little trade between affiliates in separate countries. Vertical FDI involves locating production in various countries in order to take advantage of international factor price differentials and save on production costs (Helpman, 1984; Helpman and Krugman, 1985). The MNE headquarters is located in a skilled labour-abundant country and unskilled labour intensive production is undertaken via an affiliate in an unskilled labour-abundant host country. The MNE serves the parent market via foreign affiliate exports. Forward integration thus indicates international specialisation since production facilities in affiliates supplement rather than replicate those in the parent company.

The two major modes of MNE integration were further developed through the introduction of the concept of “fragmentation” to explain the dynamics of the international organisation of production within a firm (Jones and Kierzkowski, 1990). The rise in marginal costs eventually limits the growth of a firm (with a single plant), so to encourage faster expansion of the firm the manufacturing process would be split into vertically integrated blocks, linked through service activities such as logistics, communications, etc. The reduction in transport costs and institutional barriers permits each production stage to be located domestically or overseas. This new perspective permitted a better understanding of the international organisation of production between and within MNEs and the corresponding trade patterns of MNEs.
Explanations of intra-firm trade were further extended with the incorporation of contracts into theories by creating a property rights model of the boundaries of the firm and embedding it into a general model of trade in which countries differ in their endowments of labour and capital (Antras, 2003, 2005; Antras and Helpman, 2004). As Spencer (2005, p.14) paraphrases, “...final-goods in the capital-intensive sector are produced under vertical integration, whereas those in the labour-intensive sector are outsourced. The model predicts that for any pair of countries, the share of a country’s intra-firm imports is an increasing function of the capital-labour ratio of the exporting country.”

Recent general equilibrium theory of trade and MNEs has extended further the two major modes of MNE integration to incorporate hybrid forms of horizontal and vertical MNE activities. These arise because MNEs operate in an interdependent manner across multiple rather than just two countries as in earlier models (Baltagi et al., 2007). Hybrid or “complex” MNEs, which are neither purely horizontal nor purely vertical, operate in host countries in order to (i) serve the MNE domestic/home country more cheaply, (ii) produce and sell in local host country markets to save on trade costs, or (iii) produce for third country markets as “export platform” FDI (Ekholm et al., 2007).

Thus complex MNEs may operate affiliate plants not only to serve the host market, but to also undertake trade with third-country markets. Trade interdependence between affiliates located in an export-platform host country and other members of the MNE reflect an increasingly important aspect of MNE integration, yet little is understood about the features of these export-platform-based affiliates and the nature of their MNE interdependence. Previous empirical studies have used data on host and home countries, the MNE parent, and industry-level information to inform theories of intra-firm trade (references), but the increasing availability of firm (affiliate) level data permits empirical investigations at the micro-level.

In this empirical study we distinguish MNE affiliates who trade output at arm’s length (non-FAS traders) from those that internalize their trade within the MNE itself by undertaking foreign affiliate sales (FAS traders) to other affiliates of the MNE and/or
the MNE parent. We relate such internalisation decisions to firm-level characteristics, a feature which may be important in the intra-firm trade decision (Antras and Helpman 2004). Moreover, we do so using a micro-level data set that features MNE affiliates in a FDI export-platform host-economy, namely Ireland, a country that has become a significant host to export-orientated FDI. We seek to establish whether or not there are certain characteristics of Irish-based affiliates that distinguish those with a higher degree of interdependence with their MNE from those Irish affiliates that exhibit less interdependence with their MNE, reflected by intra-firm trade.

3. Overview of the Data
We use a data set comprising firm-level observations of manufacturing enterprises in Ireland collected as part of the Census of Industrial Production (CIP) conducted annually by the Central Statistics Office (CSO).\(^1\) The data we extract from the Census are those identified as Irish-based affiliates of foreign-owned MNEs.\(^2\) The Census data are maintained with individual enterprise codes, permitting identification of each Irish affiliate across years, and are categorised by four-digit sector.\(^3\) Our data set covers the years 1996 to 2003 inclusive and consists of 4,490 observations on 898 different affiliates that operate during the period considered.\(^4\) Responses in the Census permit identification of Irish-affiliates that invoice a proportion of their turnover to other affiliates (including the MNE parent).\(^5\) We define these Irish-based enterprises as “foreign affiliate sales” (FAS) traders.\(^6\)

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1. We use the *Census of Industrial Enterprises*, required under Council Regulation (EC, Euratom) No. 58/97, which covers those enterprises that are wholly or primarily engaged in industrial production and have 3 or more persons engaged. An *enterprise* is defined as the smallest combination of legal units that is an organisational unit producing goods and services, which benefits from a certain degree of autonomy in decision making, especially for the allocation of its current resources (CSO, 2003a, p.5).
2. Foreign ownership is determined by the nationality of the owners of 50 per cent or more of share capital.
3. We use the 4-digit NACE rev. 1 nomenclature (CSOa).
4. The data form an unbalanced panel in the sense that some affiliates entered, some exited, and some remained in existence for the duration period.
5. The Census uses the term “affiliate” when posing the question on forwarding turnover. Thus the Irish enterprise could be dealing with the MNE parent or other affiliates of the MNE; we are not able to distinguish between the two.
6. Intra-firm trade may be in final or intermediate goods. The limitation of our data set is that we do not observe product information; we do not have data on the nature of the products being traded between the Irish affiliate and other affiliates/parent. As Alfaro and Charlton (2008) note, ideal data would permit the identification of horizontal FDI as affiliates that are owned by a foreign parent, produce the same products as the parent, but sell them in the local (Irish) market. Vertical FDI could be identified as affiliates that are owned by a foreign parent, produce products that are intermediate inputs into the parent’s production, and export those inputs to the parent country.
Affiliates that do not engage in FAS could be servicing the local Irish market and/or exporting their turnover. Either way, such affiliates reflect a horizontal interdependence with their MNE in that they are not supplying any member of the MNE with output produced in Ireland. Conversely, an Irish-based affiliate that does engage in FAS with its affiliates reflects vertical interdependencies with its MNE.

Table 1 presents an overview of characteristics of Irish-based affiliates. There were on average 635 Irish manufacturing affiliates in operation per year between 1996 and 2003, and over that period the number declined by 8 per cent. In terms of scale, the average employment size of affiliates over the period was 183 full-time staff – and this average rose by almost 10 percent in the eight years. The affiliates can be identified by two broad groupings of MNE parent nationality: (1) European (EU) and (2) Non-European owned. The balance between the groups remained constant over the period, with non-EU affiliates accounting for almost 63 percent of total affiliates. The data also allow us to categorise affiliates by their sectoral technology group. We distinguish between the high tech and low tech sectors since Irish policy has been focussed on fostering FDI into the former. The ‘high-tech’ sectors cover chemicals (including pharmaceuticals) and office machinery & equipment, while the ‘low-tech’ or traditional sectors include the food, paper products, and metals sectors. Table 1 indicates that just over half of all affiliates are located in the high-tech sectors.

Finally, the data allow us to distinguish between affiliates according to whether or not they engage in intra-firm trade within the MNE group. Despite the impression that Irish manufacturing operates as an FDI export platform that facilitates the fragmented production processes of MNEs that locate within Ireland (reference), a significant proportion of FDI does not participate in intra-firm trade. We define non-affiliate traders as Irish-based manufacturing affiliates that forward no turnover to affiliates. Our pooled data across years 1996-2003 indicates that an average of 60 per cent of all affiliates conducted some intra-firm trade over the period, with the remaining 40 per cent of all affiliates undertaking no intra-firm trade. However, reflecting the

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7 All values for the pre-Euro period (1996-2001) are converted to Euros at the European Central Bank conversion rate of €1.26974.
8 While the average rose over the period, annual data indicate that average firm size rose until the year 2000 before continuously declining in the years after that.
9 We use the OECD classification of sectors by technology.
increasing complexity of FDI activities, the proportion of non-affiliate traders declined significantly over the period; by 2003 just one-quarter of all affiliates in Irish manufacturing undertook no trade with affiliates, as the proportion of affiliates defined as traders increased by almost 14 per cent over the period.

< TABLE 1 ABOUT HERE >

Clearly intra-firm trade, as represented by FAS, is a strong indicator of the degree of interdependence between affiliates and their MNE parents, but we explore the link further by examining another indicator of that potential interdependency. The measure is Management Fees, which are a direct parent-subsidiary link. Some 57 percent of affiliates paid management fees to the parent and this share rose over the period.

Table 2 presents us with the same data broken down by Affiliate Traders and Non-Affiliate Traders. The average size of intra-firm trading affiliates was over sixty percent higher than that of non-trading affiliates measured in employment terms. However, this gap narrowed over the period as the average size of non-traders grew by more than twice the rate of traders in the eight years to 2003. In terms of nationality of parental ownership, there is little distinction between affiliate traders and non-traders, with between 45 and 47 per cent of both being EU-owned. There is, however, a marked contrast in the shares of high-tech between the two groups with the share of high tech enterprises accounting for over 58 percent among affiliate traders but only 32 percent amongst affiliate non-traders. This is consistent with what one would expect as high-tech sectors are known to be globally-fragmented, and hence the likelihood of vertical relationships amongst MNE affiliates. The measure of parent/affiliate interdependency indicates the proportions paying management fees are broadly similar.\textsuperscript{10} The average proportion of affiliates paying managements fees between 1996 and 2003 was 57 per cent. However, the proportion of affiliate non-traders paying fees over the period grew by more than 38 per cent, whereas the proportion of affiliate traders paying managements fees grew by only 5 per cent.

\textsuperscript{10} The share of non-traders paying management fees rose by close to 40 percent over the period, which may reflect a closer interdependence through this medium for affiliates that are not engaged in intra-firm trade.
This initial examination of the Irish manufacturing data indicates that both types of integration, horizontal and vertical, are present among MNE affiliates, which motivates the empirical analysis that follows. We wish to determine whether or not there are firm-level characteristics of affiliates in the host country (Ireland) that distinguish vertically interdependent affiliates from those non-traders who reflect horizontal interdependencies with their MNE. If horizontally and vertically interdependent FDI affiliates do exhibit different firm characteristics, this may deepen our understanding of FDI location decisions.

4. Econometric Model

Our econometric model estimates the relationship between Irish affiliates that undertake intra-firm trade and their firm-level characteristics. In deciding which characteristics to examine and their expected relationship with an affiliate’s propensity to engage in intra-firm trade we draw on international trade, FDI, and industrial organisation literature. The nature of our data naturally leads us to concentrate on firm-level characteristics.\(^{11}\)

We use a dummy dependent variable \((Trader_{it})\) to determine if there is a difference in micro-level characteristics of FAS traders and non-FAS traders. An affiliate \((i)\) is a FAS trader if it forwards at least one per cent of turnover to its MNE affiliates in each year \((t)\). Thus the dependent variable represents a vertically interdependent Irish affiliate. The \(Trader\) premia are estimated using a panel-data logit regression of the form

\[
Trader_{it} = \alpha + \beta_1 Size_{it} + \beta_2 Age_{it} + \beta_3 Productivity_{it} + \beta_4 Skill_{it} + \beta_5 Capital_{it} + \beta_6 HighTech_{it} + \beta_7 EUowned_{it} + \beta_8 Royalties_{it} + \beta_9 MgmtFees_{it} + \beta_10 Year + \varepsilon_{it}
\]

The premium is captured by using the dummy variable \(Trader_{it}\) (1 for intra-firm trading affiliate, 0 otherwise), so that the trading premium coefficient \((\beta_1)\) captures the average percentage difference between FAS traders and non-FAS traders in the

\(^{11}\) The affiliate characteristics included in the model are not exhaustive, being limited by variables available in the CIP.
industry for each of the performance characteristics. Our independent variables capture characteristics of affiliates at the firm level and include standard control characteristics as well as a measure of the intensity of the relationship with the MNE parent.

Andersson and Fredrikson (2000) suggest that the size of an affiliate is indicative of scale at the plant level, being associated with the international specialisation of production and intra-firm trade. Moreover, Egelhoff, Gorman and McCormick (2000) argue that increasing affiliate size can be linked to more geographically disperse sales patterns. Smaller affiliates are more likely to be engage in simple sales strategies such as supplying the home country market. In contrast, larger affiliates may be more likely to require wider regional and global markets to absorb their larger outputs, a situation likely in the context of Irish manufacturing and the growing EU marketplace in the time period considered. Thus we use the number of employees as a proxy for affiliate size \( (size_a) \), which we expect to be positively related to the propensity for intra-firm trade.

Most previous research on the relationship between affiliate age and intra-firm trade suggests that as an affiliate becomes more embedded in the host economy over time it is more likely to respond to local sales opportunities. Thus we include a variable reflecting age of the affiliate \((Age)\) in the expectation that older affiliates participate less in intra-firm trade. Our data permit identification of two categories of firms by age, 1-8 years and older than 8 years, with older firms defined as \( Age \) equal to one, zero otherwise.\(^{12}\)

We include several measures of the affiliate related to quality of the enterprise. Firstly, turnover per employee is included as a measure of the affiliate’s productivity \((Productivity_a)\) in the expectation that FAS traders have higher relative productivity for several reasons: firstly, they would be expected to gain from any potential

\(^{12}\) The CIP data do not allow us to identify the exact age of each affiliate. However, we can ascertain firms above and below 8 years of age, a useful proxy to distinguish very young firms from others. We include a dummy variable equal to 1 if the affiliate is ‘young’ in age, defined as an affiliate established within the past 10 years (i.e. 1994-2003 inclusive). Thus affiliates established prior to 1994 are defined as ‘old’ affiliates.
knowledge spillovers from the parent or sister affiliate because of the greater interdependence. Second, we would expect that an affiliate involved in a vertical process would need to be very productive or else it would reduce the profitability of the other links in the chain. By contrast, a horizontal affiliate would not face the same productivity pressure.

Our second variable reflecting affiliate quality is a measure of the proportion of skilled labour employed \( (\text{Skill}_{a}) \). Following the nomenclature of the CIP, skilled labour intensity is defined as the sum of managerial, technical, and clerical employees as a proportion of total affiliate employment. Industry and country level studies of suggest that affiliates with relatively more skilled labour may be more likely to engage in FAS (references). However, in an export-platform affiliate host such as Irish manufacturing the expected relationship between skilled labour and FAS is uncertain as a large number of FAS traders exist in traditionally low-skilled sectors, such as food, where labour is defined as low-skilled.

The competitive nature of the industry in which an affiliate operates is likely to influence its trade patterns. The MNE literature commonly distinguishes between local or ‘multidomestic’ and ‘global’ industries, the latter including chemicals, electronics and pharmaceuticals (Porter, 1986). In the case of multidomestic industries, competition in each country is essentially independent of competition in other countries. Industries tend to be multidomestic when downstream activities (e.g. marketing and distribution) are crucial to the competitive advantage of the affiliates. Industries tend to be global when the main determinants of competitive advantage are based on systems characteristics (such as propriety knowledge, factor cost differentials) and it is feasible to realize significant economies of scale and scope in activities such as R&D and manufacturing, rather than location-specific advantages. In the Irish context, these features are obvious in the high-tech sectors, but they may also be present in sectors such as food and beverages, which are traditionally defined as low-tech, but experienced strong FDI growth over the period considered. Thus whilst we expect affiliates in high-tech sectors to participate strongly in intra-firm trade, it may not be surprising to find strong intra-firm trade patterns amongst more traditional low-tech sector affiliates. A variable \( (\text{high-tech}) \) reflecting high-tech
sectors (chemicals, machinery & equipment, and electrical and optical equipment) is included in the regression model.

If the MNE is capital intensive it is expected that it would transfer more intermediate goods to its affiliates. There are two possible reasons for this. As Buckley and Casson (1976) argue, the intensive use of capital is often associated with production processes that require considerable coordination among different stages of production, giving an incentive to vertically integrate. Secondly, large sunk costs upstream increase the incentive to vertically integrate in order to capture the return on the firm’s assets downstream (check this in context of Irish MNEs to affiliates). Antras (2003) finds support for the importance of capital intensity and capital abundance in intra-firm trade, but reports at industry and country level, not firm level, indicating a positive correlation between industry capital intensity and their share on intra-firm imports.

Given this, the expected relationship between capital intensity and intra-firm trade is indeterminate. A variable measuring the addition to capital stock per employee within each affiliate is included.\(^\text{13}\)

There is a lack of prior research or theory about the effects of parent country nationality on trade flows between subsidiaries. While host country incentives offered for FDI often vary by industry and size of investment, they generally ignore parent country nationality. In the case of Irish manufacturing, it is widely believed that many non-European companies use FDI in Ireland as a relatively low cost manufacturing base from which to export into the rest of Europe. But if this is the case, what explanation is there for why European companies invest in Ireland and the direction of their affiliate flows? Explanations may exist more at the individual affiliate level than at the parent country level. EU MNEs should have a relatively high export propensity due to regional liberalisation facilitating trade across national borders – this impact should arise both because of improved prospects for vertical integration characterised by a concentration of production in a limited number of locations, and because of a greater tendency to export from horizontally integrated affiliates. Thus we could expect a positive influence of EU-owned MNEs on the dependent variable. As Table 2 indicates, the proportion of EU-owned affiliates is similar for both affiliate

\(^{13}\) The absence of a capital stock variable in the *CIP* necessitates the use of ‘Purchases of fuel and power’ per employee as a proxy for capital stock.
traders (45.5 per cent) and non-traders (47.5 per cent), although the proportion of EU-owned affiliates did decline between 1996 and 2003. A dummy variable is included to identify affiliate ownership of MNEs in the EU (EU-owned).

All of the firm level variables detailed above help us to distinguish any differences in characteristics of affiliate traders versus non-traders. In order to further measure the strength of interdependence between Irish-based affiliates and their MNE we consider as an addition to the basic model a measure of headquarter intensity, being ‘Management and marketing fees (include contributions to corporate overhead)’, representing a direct payment by the affiliate to its parent MNE. The nature of the relationship between the payment of management fees and the propensity to be an affiliate trader is uncertain. If there is a high degree of intra-firm trade between the Irish affiliate and the MNE parent the management fee may be high, reflecting payment for services associated with trade. However, if the affiliate is very much ‘stand-alone’, it is also possible that management fees paid back to MNE are high as the affiliate is undertaking much of its business in isolation and forwarding fees for non-tangible services such as management advice. A dummy variable equal to one is included if the affiliate does pay management fees (mgmt_fees), zero otherwise.

Finally, dummy variables are incorporated for the years 1996 through 2003 in order to account for any annual differences between FAS traders and non-FAS traders. Table 3 reports the empirical results.

The specification in column (1) of Table 3 reports the results for the basic model, with Column (2) including the measure of headquarter intensity, the management fees variable. Across both specifications the most significant determinants of affiliate traders are size and sector; affiliate traders are approximately 63 per cent more likely to be both large affiliates and located in the high-tech sectors. Moreover, affiliate traders are around 23 per cent more productive than non-affiliate traders. These affiliate-level results reflect those found at the industry level in previous empirical studies (Andersson and Fredriksson, 1996; Antras and Helpman, 2004)
All other affiliate characteristics show no significant difference between FAS traders and non-FAS traders. Even though the results are statistically insignificant, the results on our age variable suggest that younger firms are less likely to trade with other affiliates. Also, FAS traders and non-FAS traders exhibit no difference in terms of either skill or capital intensity. Finally, no significant differences appear in terms of affiliate EU versus non-EU ownership and the propensity to engage in intra-firm trade.

Our measure of the intensity of the affiliate relationship with the MNE parent is given by the management fees variable specified in Column (2). We find no difference between FAS traders and non-FAS traders in terms of the payment of management fees to the MNE parent. The insignificance of this variable may reflect the absence of any systematic relationship between the Irish-based affiliate and its MNE parent whether or not the affiliate engages in FAS.

< TABLE 3 ABOUT HERE >

In summary, our results for affiliates in an export-platform host country that plays host to complex FDI indicate that relatively larger, more productive and high-tech affiliates are more likely to engage in intra-firm trade.

5. Conclusion
This paper uses a micro-level data set to undertake an initial empirical examination of the characteristics of MNE affiliates that engage in intra-firm trade in order to determine if there are significant differences between affiliates that engage in trade with their MNE affiliates and those that do not. We use a number of affiliate-level variables to capture the interdependence within the MNE, allowing us to distinguish affiliates that represent horizontal interdependence and those with characteristics aligned with vertical interdependence.

Using a panel data set covering the years 1996-2003, we find that vertical interdependence amongst affiliates is more important than horizontal interdependence. Our results pertain to a small, open export-platform FDI host
country and inform the expanding theoretical and empirical evidence that motives for FDI are more complicated than suggested by two-country general equilibrium trade theory. Moreover, the finer level of MNE disaggregation provided by micro-level data emphasises the heterogeneity of affiliates, furthering our understanding of MNE features and location decisions.
References


Table 1: Features of All Affiliates, 1996-2003 Average and Trend

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<tbody>
<tr>
<td>Affiliates</td>
<td>635</td>
<td>662</td>
<td>642</td>
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<tr>
<td>Size (employment)</td>
<td>183</td>
<td>161</td>
<td>177</td>
<td>+ 9.9%</td>
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<td>EU-owned</td>
<td>46.3%</td>
<td>46.7%</td>
<td>46.9%</td>
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<td>High-tech</td>
<td>52.9%</td>
<td>53.2%</td>
<td>51.1%</td>
<td>- 3.9%</td>
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<td>Royalty paying</td>
<td>37.9%</td>
<td>35.2%</td>
<td>38.2%</td>
<td>+ 8.5%</td>
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<tr>
<td>Management fee paying</td>
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<td>51.4%</td>
<td>60.1%</td>
<td>+ 16.9%</td>
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<td>Traders</td>
<td>59.9%</td>
<td>66.0%</td>
<td>75.0%</td>
<td>+ 13.6%</td>
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<td>Non-traders</td>
<td>40.1%</td>
<td>34.0%</td>
<td>25.0%</td>
<td>- 26.5%</td>
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*Source: Own estimates derived from the Census of Industrial Production (CSOa).*

Table 2: Comparison of Affiliate- and Non-affiliate Traders

<table>
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<th>Affiliate Traders</th>
<th>Non-Affiliate Traders</th>
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<tbody>
<tr>
<td>Size (employment)</td>
<td>217</td>
<td>+ 5.6%</td>
</tr>
<tr>
<td>EU-owned</td>
<td>45.5%</td>
<td>+ 3.2%</td>
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<tr>
<td>High-tech</td>
<td>58.4%</td>
<td>- 3.9%</td>
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<td>Royalties</td>
<td>40.1%</td>
<td>+ 13.7%</td>
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<tr>
<td>Management fees</td>
<td>57.1%</td>
<td>+ 4.9%</td>
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</tbody>
</table>

*Source: Own estimates derived from the Census of Industrial Production (CSOa).*
Table 3: Characteristics of Affiliate Traders

<table>
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<tr>
<th>Affiliate_Trader</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
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<tr>
<td>Age (young)</td>
<td>-.1049</td>
<td>-.1055</td>
</tr>
<tr>
<td></td>
<td>(.2019)</td>
<td>(.2019)</td>
</tr>
<tr>
<td>Productivity</td>
<td>.2127***</td>
<td>.2154***</td>
</tr>
<tr>
<td></td>
<td>(.0818)</td>
<td>(.0817)</td>
</tr>
<tr>
<td>Skill intensity</td>
<td>.0401</td>
<td>.0406</td>
</tr>
<tr>
<td></td>
<td>(.1181)</td>
<td>(.1180)</td>
</tr>
<tr>
<td>Capital intensity</td>
<td>.0302</td>
<td>.0313</td>
</tr>
<tr>
<td></td>
<td>(.0397)</td>
<td>(.0398)</td>
</tr>
<tr>
<td>Size (employment)</td>
<td>.6238***</td>
<td>.6227***</td>
</tr>
<tr>
<td></td>
<td>(.0698)</td>
<td>(.0698)</td>
</tr>
<tr>
<td>EU-owned</td>
<td>.1911</td>
<td>.1951</td>
</tr>
<tr>
<td></td>
<td>(.1708)</td>
<td>(.1706)</td>
</tr>
<tr>
<td>High tech</td>
<td>.6032***</td>
<td>.6065***</td>
</tr>
<tr>
<td></td>
<td>(.1795)</td>
<td>(.1795)</td>
</tr>
<tr>
<td>Management fees</td>
<td>- .0897</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.1237)</td>
<td></td>
</tr>
<tr>
<td>Year dummies</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>4490</td>
<td>4490</td>
</tr>
<tr>
<td>Affiliates</td>
<td>898</td>
<td>898</td>
</tr>
<tr>
<td>Wald ((X^2))</td>
<td>137.02</td>
<td>136.89</td>
</tr>
<tr>
<td></td>
<td>(.0000)</td>
<td>(.0000)</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-2210.644</td>
<td>-2210.428</td>
</tr>
<tr>
<td>Likelihood ratio</td>
<td>1181.99</td>
<td>1180.88</td>
</tr>
</tbody>
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Notes: Both regressions are estimated by panel-data Logit. dy/dx is for discrete change of dummy variable from 0 to 1. Standard errors are in parentheses denoting *** 1%, ** 5%, and * 10% significance.