

# EXPLAINING THE EXPORT INTENSITY OF MULTINATIONAL SUBSIDIARIES: AN EU-BASED EMPIRICAL STUDY

Ana Teresa Tavares\*

CEMPRE, UNIVERSITY OF PORTO

Stephen Young

UNIVERSITY OF STRATHCLYDE

## Abstract

The paper investigates the FDI-trade relationship, and tests empirically (in a cross-country EU setting) the key determinants of the export intensity of multinational (MNE) subsidiaries.

The central focus is the link between the strategic roles and characteristics of MNE subsidiaries, and their export patterns. Expectations about high export intensities of rationalized manufacturers and product mandate subsidiaries are confirmed, as well as the negative association between miniature replicas and exports. A crucial finding is the negative relationship between value-added scope (measured by autonomy and specialized capabilities) and export intensity. Subsidiaries which are relatively larger, more recently established, and located in smaller markets, are also more export-oriented.

The results indicate that exports *per se* are not automatically beneficial from the perspective of host country impact, and challenge conventional wisdom on the effectiveness of conventional export-promotion policies.

## Keywords:

Export intensity; Multinational exports; FDI-trade relationship; Subsidiary roles/strategies; Value-added scope; Autonomy; International specialization; Economic integration; Corporate integration; European Union.

## Contact author:

Professor Stephen Young

Department of Marketing

University of Strathclyde

Stenhouse Building

173 Cathedral Street

Glasgow G4 0RQ

Email: [stephen.young@strath.ac.uk](mailto:stephen.young@strath.ac.uk)

Phone: ++ 44 (0)141 548 3146

Fax: ++ 44 (0)141 552 2802

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# **EXPLAINING THE EXPORT INTENSITY OF MULTINATIONAL SUBSIDIARIES: AN EU-BASED EMPIRICAL STUDY**

## **INTRODUCTION**

There is continuing interest in the subject of the relationship between foreign direct investment (FDI) and exports. FDI and trade are major engines of growth in developed and developing economies (OECD, 1998); and empirical evidence shows that the two are often complementary in respect of market servicing and sourcing (Caves, 1996).

Multinational (MNE) subsidiaries are accounting for an increasing share of world exports, a large proportion of which represents intra-firm trade, as part of integrated international corporate systems (UNCTAD, 1996). Estimates indicate that the ratio of exports of foreign subsidiaries to world exports of goods and non-factor services rose from 27 percent in 1990 to 51 percent in 2000; in the latter year, foreign subsidiary exports represented 23 percent of total MNE sales (UNCTAD, 2001).

The relationship between the strategic roles of MNE subsidiaries and their export patterns is central to this paper. Studies based upon the subsidiary as the unit of analysis are now well established, but there has been relatively little empirical research on the links between subsidiary roles and their trade patterns (a notable exception is Egelhoff *et al*, 2000).

The export patterns of MNE subsidiaries are influenced *inter alia* by processes of globalization and regionalization. In a European context, the enlargement of the European Union (EU) and the removal of trade barriers and harmonization of standards are very significant. Economic integration has enhanced the opportunities for product and process specialization by MNEs, and, therefore, for exporting on both an intra-firm and inter-firm basis. The relationship between corporate integration and regional integration is a major area of inquiry in the present research.

Reflecting the above discussion, the stimulation of MNE subsidiary exports is an area of long standing public policy interest. Policy makers in host countries are seeking guidance on the factors influencing export orientation, and particularly those which are amenable to public policy intervention.

The overall objective of this paper is thus to provide explanations for the export patterns of MNE manufacturing subsidiaries, and to derive lessons for host country policy. It analyzes econometrically the determinants of exports, drawing on the results of a large-scale mail survey undertaken in four EU countries (Ireland, Portugal, Spain and the UK).

## **LITERATURE REVIEW**

From a macroeconomic perspective, the classical theory of international trade viewed FDI and trade as substitutes, largely based on the view of FDI as a tariff-jumping device (Mundell, 1957). However, this conclusion was challenged by Markusen (1983), Helpman (1984) and Markusen and Venables (1995) on the basis of imperfect competition. Markusen (1995), moreover, showed that while trade barriers cause substitution towards FDI, they also depress both trade and investment. Markusen and Venables (1995, 1996) developed the theoretical case for complementarity between FDI and trade; and concluded that MNEs become more important relative to trade as similarities increase between countries in respect of size, relative endowments and technologies. It is now accepted that FDI and international trade are complementary under certain conditions. However, information is deficient in respect of the particular circumstances in which complementarity as compared with substitutability occurs (e.g compare Torstensson [1998] and Barrell and Pain [1997]). Furthermore, there are differences in the relationships between outward investment and trade flows, and inward FDI and international trade. Early empirical studies included Horst (1972), Swedenborg (1979) and Buckley and Pearce (1979),

with a full review in Caves (1996, ch. 2). Much of the initial interest was home country (mainly US) oriented.

In the international business literature, Gray (1999; see also Cantwell, 1994; Cantwell and Bellak, 2000) attempted to develop a paradigm of international economic involvement (IIE) incorporating a range of determinants of trade *and/or* FDI flows, namely, differences in endowments or assets; financial factors; transborder impediments to trade and investment; the commercial environment; and cultural factors affecting efficiency. This highlights the complexity of trade/investment relationships but at the expense of conceptual clarity.

Studies at the industry and firm level are most directly relevant to the present research. Vernon's (1966) international product cycle model (IPLC) revealed how FDI and trade patterns change as products and markets mature, based on the US as the innovation-initiating country. In the maturing product phase of the IPLC, threats to large-scale export business encouraged international investment (indicating substitution of trade by investment). By the standardized product phase, US subsidiaries in low wage countries were assumed to begin exporting back to the home base (showing complementarity between investment and trade). Although Vernon's notions still have relevance, for example, to production transfers to low wage countries, much has changed since his ideas were formulated (Cantwell, 1995). There are many country sources of FDI; international production processes and supply chains are integrated regionally and globally in complex forms; and innovations may be generated at both parent and subsidiary levels.

Other relevant work includes that of Buckley and Casson (1976) and Dunning (1977) which can help explain intra-firm trade within MNEs through the incentive to internalize intermediate product markets in R&D-intensive industries. The distinction that Dunning (1993) makes in respect of investment motivations (resource-, market-, efficiency- and strategic asset or capability-seeking) is also useful in identifying particular types of FDI where investment and

trade are clearly complementary. Specifically, efficiency-seeking and strategic asset-seeking investments are clearly trade-creating at subsidiary level and consistent with such a relationship of complementarity (Cantwell and Bellak, 2000). These two types of investment motivations are typical of complex specialized production systems encompassing extensive intra-firm trade.

Caves (1971) showed that the organization of international operations influences trade at subsidiary level. With *horizontal integration*, MNE subsidiaries are replicas of home-based operations and produce for the local market with little trade between them. By contrast, MNEs may specialize internationally, through a process of *vertical integration*, with intermediate goods being shipped between subsidiaries. The result is a relatively high propensity to export at subsidiary level (Andersson and Fredriksson, 1996).

A related distinction from an international management perspective is between the *multidomestic* MNE, with the organization of operations on a stand-alone, polycentric basis; and the *globally or regionally integrated* multinational (Perlmutter, 1969; Porter, 1986; Bartlett and Ghoshal, 1989; Tallman and Yip, 2001). The implication is that the multidomestic MNE will primarily produce and sell in the domestic market abroad; whereas trade flows, both intra-firm and arm's-length, will be extensive within the integrated multinational.

A number of the above notions are encompassed within the growing body of research on the characteristics, behavior and performance of MNE subsidiaries (Birkinshaw, 2001; Paterson and Brock, 2002). Subsidiaries have distinct strategic roles and scope as part of the differentiated corporate network of the multinational. As part of this network, subsidiaries may be active in both export and import operations, and in both internal markets within the MNE itself and in external markets. This paper adopts this subsidiary perspective and draws on role typologies (White and Poynter, 1984; Bartlett and Ghoshal, 1989; Jarillo and Martinez, 1990; Taggart, 1997) and on the factors influencing subsidiary evolution (Birkinshaw, Hood and Jonsson, 1998).

Some subsidiaries possess specialized resources which are recognized and utilized by the MNE group (Birkinshaw *et al.*, 1998). Terms applied include the specialized contributor, strategic leader and active subsidiary types, as well as world product mandate (WPM) and center of excellence designations. The WPM term has a particularly long tradition (Crookell, 1987), having been widely used to refer to subsidiaries which have responsibility to develop, manufacture and market a product-line worldwide. Such ‘high contributory role subsidiaries’ (Birkinshaw *et al.*, 1998) are contrasted with the implementer and rationalized subsidiary types, which lack the authority or capability to generate independent competencies.

A range of perspectives provide the conceptual underpinnings for this MNE subsidiary research. These are reviewed in Birkinshaw (2001), and show the importance attached currently to ‘competence-based’ perspectives such as the resource-based view (Barney, 1991), dynamic capabilities’ (Teece *et al.*, 1997) and evolutionary theories (Cantwell, 2001); and network perspectives (Gupta and Govindarajan, 2000). These indicate how the subsidiary may acquire or develop distinctive competences or control critical resources, which in turn can impact *inter alia* upon exporting as an entrepreneurial and innovative decision. However, empirical research has been limited. Egelhoff *et al.* (2000), for example, indicate that there is little theory or knowledge on the specific trade flows produced by different types of foreign subsidiaries (see also Andersson and Fredriksson, 1996).

A related issue of importance to this paper concerns the relationship between corporate integration, subsidiary roles and economic integration, emphasizing in both cases the regional (EU) dimensions. Authors have studied the effects of regional integration agreements (RIAs) on FDI (with respect to the EU, see Dunning and Robson, 1988; Clegg and Scott-Green, 1999; Dunning, 2000). The emphasis in empirical work has been on the impact of RIAs on FDI flows into the regional block. In the case of the EU, Spain and Portugal as well as Ireland benefited

from significant increases in FDI as a result of membership (Winters, 1996; Blomström and Kokko, 1997; Barry and Bradley, 1997). It is suggested that small open economies are more strongly influenced by international economic developments such as regional integration than larger EU members.

Major issues concerning the impact of economic integration on intra-regional FDI, linked to corporate integration and restructuring, have been subject to less investigation. Data are deficient since empirical enquiry has to be undertaken on a corporate-specific basis. However, there are suggestions that MNEs evolve from country-centered to regional (EU) strategies as economic integration proceeds. Horizontally organized subsidiaries within the region may be replaced by centralized, specialized and integrated networks (Pelkmans, 1984). The outcome may be more rationalized subsidiaries and greater intra-firm and intra-regional trade flows. This is a continuing process, influenced by EU enlargement and specific events such as the Single Market Programme (Cantwell and Iammarino, 2001). Interestingly, Egelhoff *et al* (2000) have suggested that world mandates for subsidiaries should be accompanied by a shift from regional to global exports; and generally there is continuing debate over the importance of regional versus global integration in MNEs (Morrison and Roth, 1992; Rugman, 2000).

The themes of this paper are of major public policy significance. High contributory role subsidiaries will have the autonomy and capabilities to pursue an export expansion strategy. Such MNE-related exports provide opportunities for achieving economies of scale, with positive effects on output and productivity. Similarly there may be positive learning effects from foreign competitors and customers, which, in turn, can spill-over to other domestic enterprises (Blomström and Kokko, 1998). In addition, export expansion has beneficial foreign exchange and balance of payments benefits (UNCTAD, 1996). However, the benefits are not unequivocal. For instance high exporting MNE affiliates may be low labour cost, rationalized operations

which, by their nature, are footloose; and linkages to the local economy may be very low, with production inputs largely imported. The latter are features of export-oriented MNE activities, in developing countries at least (UNCTAD, 2002). Other studies of the determinants of foreign production by US MNEs have not been concerned with host country impact (e.g. Kumar, 1994). In general, the relationship between subsidiary roles and evolution and economic development impact has been little researched, although this subject area is identified as being of considerable importance (Paterson and Brock, 2002).

Thus the broad topic area has attracted interest from a range of disciplines, with the focus upon different issues, including FDI and trade relationships, parent and subsidiary perspectives, and home and host country factors. While the theoretical underpinnings of these approaches vary, there is evidence of converging perspectives. However, it is also apparent that the topic of this paper is under-researched, a significant weakness given the importance of the subject for literature development and host country policy formulation. The literature review suggests that subsidiary roles will influence the propensity to export; that more integrated subsidiaries will be formed over time as MNEs take advantage of specialized opportunities at country level within the economically integrated block; and that the latter trends will be encouraged by both the deepening and the widening of the process of regional integration.

## **DEVELOPMENT OF HYPOTHESES**

The paper aims to provide explanations for the export intensity of MNE subsidiaries, using data collected in four EU host countries. The empirical model is centered on the potential effects of subsidiary roles and characteristics (age, entry mode, size, subsidiary role/strategy, specialized capabilities, autonomy and performance), controlling for country and industry factors.



### **Subsidiary Roles and Characteristics**

*Subsidiary role/strategy.* The present study distinguishes between Miniature Replica, Rationalized Manufacturer and Product Mandate subsidiaries. This represents a revised version of the role categorization originally proposed by White and Poynter (1984). Miniature Replicas are local market-oriented subsidiaries that produce a significant part of the parent MNE's product range for sale in the host country. Rationalized Manufacturers specialize on the manufacture of part of the product range or by production stage for regional or global markets. Product Mandate subsidiaries have the resources and mandate to develop, produce and market a specialized product line for country, regional or global markets.

Drawing on Caves' (1971) distinction between operations which are horizontally or vertically integrated, Andersson and Fredriksson (1996) support the idea that the factors determining subsidiaries' export intensity relate to the organization of foreign production. With horizontal integration, each foreign affiliate produces for the local market, with little export activity. This category of enterprise is very similar to the Miniature Replica subsidiary in the present study. It might be argued, however, that even for such firms, EU integration and the operation of the EU's Single Market Programme would reduce trade barriers and provide opportunities for exporting.

Vertical integration is encouraged where significant economies of scale exist at plant level; and/or where differences exist between stages of production in their intensity of exploiting factors of production (Casson and Associates, 1986). It is associated with international specialization and trade in intermediate goods. Andersson and Fredriksson (1996) confirmed a strong correlation between vertical integration and export propensity in their study of Swedish affiliates. Vertically integrated subsidiaries have some similarities to the Rationalized Manufacturer category.

The Product Mandate subsidiary has autonomy and significant resources for development, production and marketing, which should encourage exporting on either a stand-alone product or vertically integrated basis (Morrison and Roth, 1992; Egelhoff *et al*, 2000). It is expected that:

*Hypothesis 1: Export intensity will be negatively associated with Miniature Replica subsidiaries, and positively associated with Rationalized Manufacturer and Product Mandate subsidiaries.*

*Strategic decision-making autonomy.* The variable employed was that of decision-making autonomy in strategy formulation. There is an assumption in the MNE literature that autonomous affiliates are likely to be more export-oriented (Birkinshaw and Morrison, 1995). In fact, there is probably a stronger presumption that firms which have little autonomy and are tightly controlled by their parents are more strongly export-oriented. Such subsidiaries are part of internationally integrated operations (as in the vertically integrated/Rationalized Manufacturer categories), with tight controls necessary to maximize integration benefits. On balance, it may be anticipated that:

*Hypothesis 2: Export intensity is negatively associated with autonomy in MNE subsidiaries.*

*Specialized capabilities.* Kravis and Lipsey (1982) and Blomström *et al.* (1992) found that FDI in host developing countries impacts positively on exports in industries characterized by high R&D intensity. More generally, Buckley and Pearce (1979) and Lall (1980) have both shown that R&D level is positively related to exports (as well as to FDI). In the present work, the variable employed was that of product development capability, a measure of innovative potential in the subsidiary. This capability is likely to be utilized to gain competitive advantage in both domestic and export markets. Hence the expectation is that:

*Hypothesis 3: Export intensity will be positively associated with the product development capability of the subsidiary.*

*Performance.* This is measured by relative productivity (of the focal subsidiary *vis-à-vis* other EU sister subsidiaries). Higher relative productivity should *inter alia* improve competitiveness on both home and export markets and lead to stronger export performance. In the same vein, Lages and Montgomery (2002) found that performance impacts positively on exports. These authors argue in favour of considering performance as an independent variable, and not only as an outcome as in most previous studies. Thus, it is expected that:

*Hypothesis 4: Export intensity is positively associated with performance (relative productivity).*

*Age of subsidiary (and relationship to year of EU accession).* The literature investigating the direct relationship between subsidiary age and export behavior is rather limited. However, the likelihood is that recently established subsidiaries will have a greater export propensity because of their more active responses to economic integration. This can be seen, for example, in the behaviour of late entrant Japanese MNEs which treated the EU as a single market from the outset. MNEs with networks of longer established subsidiaries were slower to react to economic integration because of inertia barriers (Young *et al*, 1991). Aside from testing the effects of age *per se*, economic integration can be evaluated more specifically by including an interaction term between age of subsidiary and date of establishment (related to the host country's year of accession to the EU); this aims to capture both age and integration effects. Separate models are tested for the variable age and for the interaction term. The expectation is that:

*Hypothesis 5: More recently established subsidiaries will have a higher export intensity than those which have been longer established.*

*Entry mode.* There is more evidence on the relationship between import (or local sourcing) propensity and entry mode than is the case with exports. Research results indicate that greenfield ventures have lower local sourcing propensities than operations established through mergers and

acquisitions (M&As) or joint ventures (JVs) (UNCTAD, 2000, 2001); the latter have stronger links with local suppliers because of relationships established by the previous indigenous owners. Although there is little research on export intensity and entry modes, a similar type of logic would suggest that subsidiaries formed through M&As and JVs would be less export intensive. Thus sales will more domestically market-oriented, because of the market servicing patterns developed by the previous owners or local partners. Greenfield ventures, in contrast, are likely to be established with the intention of serving the wider EU market and/or formed as part of an integrated European subsidiary network involving intra-group trade. Hence, it is expected that:

*Hypothesis 6: Export intensity will be positively associated with subsidiaries established as new greenfield ventures.*

*Size of subsidiary.* Andersson and Fredriksson (1996) found a positive association between firm size and export intensity, where size was indicative of economies of scale at plant level and associated with international production specialization. The work of Egelhoff *et al.* (2000) on Ireland showed an increasing share of exports in total sales with increased subsidiary size. Increasing size was also linked to more geographically dispersed sales patterns. The underlying rationale is that larger subsidiaries require a broader market scope, which will extend to regional / global markets.

The extensive study in the export marketing literature (though mainly conducted on domestic enterprises) indicates on balance a positive relationship between firm size and export performance, especially in the initiation of export activity (Wheeler and Ibeh, 2001). There are some convincing arguments to reject this widely held notion (Bonaccorsi, 1992), but given the weight of evidence, the expectation is that:

*Hypothesis 7: Export intensity is positively associated with the size of MNE subsidiaries.*

### **Control Variables**

Two country (home and host) and one industry variable are included in the analysis to control for possible extraneous variation.

*Host country:* following Andersson and Fredriksson (1996), it is expected that export intensity will be more strongly associated with a subsidiary location in the small host countries (Portugal and Ireland), than with a location in the UK and Spain. The Irish situation is particularly interesting given that the country targeted export-oriented inward FDI through the provision of tax relief on export profits (this was replaced subsequently by a low flat rate corporation tax). Like Ireland, Portugal is also small and peripheral and might be expected to be used as an export base into the wider EU market (Tavares and Pearce, 2001).

*Home country:* export intensity is anticipated to be positively associated with US-owned subsidiaries (where evidence indicates a pan-European approach to serving the EU market), but a negative association is expected for EU-owned subsidiaries (Papanastassiou and Pearce, 1999; Egelhoff *et al.*, 2000, Tavares and Pearce, 2001).

*Industry:* export intensity is expected to be positively associated with MNE subsidiaries in globalized industries (automobiles, chemicals, electronics and pharmaceuticals, as defined by Morrisson and Roth [1992] and Makhija *et al.* [1997]) as compared with other sample sectors. Egelhoff *et al.* (2000) found that subsidiaries in global industries had more geographically dispersed trade patterns, although exports were primarily European- rather than globally-oriented.

### **DATA**

The data supporting this analysis were obtained through a large-scale survey of MNE affiliates in four EU host countries. The survey includes large and small EU host economies, with distinct degrees of industrial development and manufacturing tradition. This diversity of situations was

explicitly sought in order to allow for relevant comparative analysis. All countries are EU members, hence controlling for the trading and regulatory environment.

This cross-country primary data collection represented an important initiative given the lack of appropriate (micro-level) data about the export intensity of affiliates, usually leading researchers to rely on aggregated data as proxies for decisions that are *par excellence* taken by the firm (and sometimes by the subsidiary). An exception to this is Egelhoff *et al.* (2000), who collected data from MNE subsidiaries in a specific host country (Ireland).

Due to the intention of gathering a sample large enough to enable rigorous empirical testing, a postal questionnaire was deemed the most suitable research instrument. The questionnaire was pre-tested by interviews, in order to ensure clarity of content. Some changes to the wording of the questionnaire were implemented.

The sampled subsidiaries were chosen from a wide range of public and private sources (lists provided by Ministries, Chambers of Commerce, publications identifying the largest firms in each country, Jordan, Kompas and Dun & Bradstreet). Information from distinct sources was cross-checked to increase reliability, and a total of 1092 questionnaires were sent to the largest manufacturing and majority-owned only subsidiaries in the four host countries under analysis. The questionnaire was sent twice (the second time four weeks after the first) to the subsidiaries selected. The questionnaire was sent in the language of each host country, and was translated from the original version in English and then back translated to ensure consistency.

The survey was administered in 1999 and 265 replies were received (24.3 per cent response rate), which compares rather favorably with similar survey-based work (Harzing, 1997). 32 replies were not used in the present investigation, due to incompleteness, leaving for analysis 233 valid and complete replies.

## METHODOLOGY

The hypotheses identified above are tested by using regression analysis, estimated by ordinary least squares (OLS). This is justified by the continuous nature of the dependent variable described below. The size of the sample permitted robust estimations. Alternative models (for instance, dividing export intensity into categories and then using binomial or ordered probit models) were also tested, but they proved slightly inferior as they would lead to an arbitrary reduction in the variability of the sample without increasing the quality of the estimations. The results were, as expected, very similar.

The model's objective is to test the significance of distinct explanatory variables (identified in the hypotheses and in Table 1 below) on the export intensity of the subsidiaries surveyed.

## MEASURES

### *Dependent variable*

The dependent variable (export intensity) is the percentage of exports of the subsidiary *vis-à-vis* the subsidiary's total production. It has a continuous nature.

### *Explanatory variables*

**Subsidiary-related variables.** The explanatory variables are defined and characterized in Table 1 below. These variables allow the testing of the hypotheses developed above, and the posited relationships (expected signs) regarding the impact of each variable are also identified in the same Table. A number of points of clarification are included following:

A key objective of the paper is to test whether value-added scope is related to export behavior. Two measures are used as proxies for value-added scope: level of strategic decision-making autonomy and specialized capabilities in product development. *Strategic decision-making autonomy* measures the degree to which the focal subsidiary collaborates in defining its own

strategy (export behavior being a crucial strategic issue), mainly whether decisions are emanated from HQ or in turn whether the subsidiary defines (alone or in consultation with HQ) its strategy.

*Specialized capabilities in product development* is a relative measure *vis-à-vis* other EU ‘sister’ subsidiaries, aiming to test the focal subsidiary’s relative creative scope.

*Subsidiary age* (number of years since its establishment in the host country) is also investigated as a relevant predictor of subsidiary export intensity. An interaction term (*Agedat*) was used to include the interaction between age *per se* and the impact of EU accession.

*Affiliate size* was here measured by the logarithm of the number of employees (considered an appropriate form to dampen down the considerable variation in values for this variable, which could impede the estimation of the model [Greene, 1997]).

**Controls.** *Host country* variables are included in the model, one for each country surveyed. Due to their dichotomous nature, one of these variables had to be excluded. The host country with fewer observations was therefore excluded. *Home country* variables are also taken into account, distinguishing among cases in which the parent is from the EU, the US and Other countries.

An *industry* dichotomous variable (*Inglob*) is in addition included, differentiating ‘globalized’ and ‘non-globalized’ sectors.

Appendix 1 provides descriptive statistics on the relationship between the independent variables selected and export intensity.



**TABLE 1. VARIABLE DESCRIPTION**

VARIABLE	TYPE <sup>a</sup>	OPERATIONAL DEFINITION	EXPECTED SIGN
<b>CONSTANT</b>		Constant	
<b>SUBSIDIARY-RELATED VARIABLES</b>			
<b>SUBSIDIARY ROLES/STRATEGIES</b>			
Miniature Replica	L/D	Miniature replica subsidiary (4=only role; 3=main role; 2=secondary role; 1=not part of role)	-
Rationalized Manufacturer	L/D	Rationalized manufacturer (4=only role; 3=main role; 2=secondary role; 1=not part of role)	+
Product Mandate	L/D	Product mandate subsidiary (4=only role; 3=main role; 2=secondary role; 1=not part of role)	+
<b>STRATEGIC DECISION-MAKING AUTONOMY</b>	L/D	Degree of strategic decision-making autonomy (1= decisions mainly taken by HQ without consulting subsidiary; 2= decisions mainly taken by HQ after consulting subsidiary; 3= decisions mainly taken by subsidiary after consulting HQ; 4= decisions mainly taken by subsidiary without consulting HQ)	-
<b>SPECIALIZED CAPABILITIES</b>	L/D	Specialized capabilities in product development (Do not exist=1; Distinctive strength in this capability=4)	+
<b>PERFORMANCE</b>	L/D	Performance (Productivity: Significantly worse than other subsidiaries=1; Significantly better=5)	+
<b>AGE</b>	C	Age (Number of years subsidiary has been established in host country)	-
<b>AGEDAT</b>	C	Interaction term (number of years if subsidiary has been set up before its host country's accession; 0 if subsidiary has been established after EU integration)	-
<b>MODE</b>	B/D	Mode of entry (Greenfield=1; Non-greenfield [takeover and JV]=0)	+
<b>SIZE</b>	C	Employment (Number of employees in logarithmic form)	+
<b>CONTROLS</b>			
<b>HOST COUNTRY<sup>b</sup></b>			
Portugal	B/D	1= Subsidiary is located in Portugal/0=otherwise	+
Spain	B/D	1= Subsidiary is located in Spain/0=otherwise	-
Ireland	B/D	1= Subsidiary is located in Ireland/0=otherwise	+
UK	B/D	1= Subsidiary is located in the UK/0=otherwise	-
<b>HOME COUNTRY</b>			
EU	B/D	1=Parent from the EU; 0=otherwise	-
US	B/D	1=Parent from the US; 0=otherwise	+
OTHER	B/D	1=Parent from other home countries; 0=otherwise	+
<b>INGLOB</b>	B/D	1=Firm belongs to globalized <sup>c</sup> industries: 0=otherwise	+

<sup>a</sup> Binary (B); /Likert (L); /Continuous (C); /Discrete (D).

<sup>b</sup> One of the host country variables had to be excluded, as they all had a dichotomous nature. It was decided to exclude Spain, as it was the host country with fewer observations.

<sup>c</sup> Subsidiaries in the following sectors were considered as belonging to 'globalized industries': Automobiles & auto components; Chemicals; Electrical & electronics; Pharmaceuticals. Other industries, such as Metal products; Machinery, engineering & instruments, and Textiles, clothing & footwear, were considered non-globalized. The regression was run with individual industry dummies as well, providing similar results.

## RESULTS

The regression results are reported in Table 2.

**TABLE 2. REGRESSION ESTIMATES**

VARIABLE DESCRIPTION	RESULTS <sup>a</sup>	RESULTS <sup>a</sup>
<b>CONSTANT</b>	<b>37.17 (20.33)*</b>	<b>35.53 (20.54)*</b>
<b>SUBSIDIARY ROLES</b>		
Miniature Replica	<b>-10.29 (3.40)***</b>	<b>-10.29 (3.40)***</b>
Rationalized Manufacturer	<b>9.08 (3.14)***</b>	<b>9.32 (3.16)***</b>
Product Mandate	<b>5.66 (3.25)*</b>	<b>5.83 (3.26)*</b>
<b>STRATEGIC DECISION-MAKING AUTONOMY</b>	<b>-10.63 (2.54)***</b>	<b>-10.22 (2.56)***</b>
<b>SPECIALIZED CAPABILITIES</b>	<b>-4.25 (2.01)**</b>	<b>-4.30 (2.01)**</b>
<b>PERFORMANCE</b>	1.34 (2.03)	1.21 (2.03)
<b>AGE</b>	<b>-0.29 (.11)***</b>	
<b>AGEDAT</b>		<b>-0.22 (.09)**</b>
<b>MODE</b>	5.00 (4.00)	4.53 (3.98)
<b>SIZE</b>	<b>3.10 (1.65)*</b>	<b>2.92 (1.63)*</b>
<b>HOST COUNTRY</b>		
Portugal	<b>17.25 (6.83)**</b>	<b>17.27 (6.95)**</b>
Ireland	<b>40.94 (6.92)***</b>	<b>39.40 (7.16)***</b>
UK	6.26 (6.77)	4.56 (6.95)
<b>HOME COUNTRY</b>		
EU	4.31 (5.47)	3.80 (5.53)
US	7.04 (5.96)	6.78 (6.05)
<b>INGLOB</b>	2.02 (4.40)	1.79 (4.38)
<b>Overall goodness of fit (F-test) - F[15,155]</b>	16.78***	16.51***
<b>R<sup>2</sup></b>	0.62	0.62
<b>Adjusted R<sup>2</sup></b>	0.58	0.58
<b>Durbin-Watson statistic</b>	1.72	1.77

<sup>a</sup> The results reported consist of the estimated coefficients followed by the respective standard errors (the latter in brackets) and by the corresponding levels of significance.

\*\*\*p<0.01; \*\* p<0.05; \* p<0.10

### *Overall goodness of fit, diagnostics and predictive ability*

An F-test confirmed the models' overall goodness of fit. The reported value (Table 2) indicates that the model is significant at 0.00001 per cent. The model was corrected for heteroscedasticity using White's correction (White, 1980). This procedure ensures the consistency of the estimates. Regarding multicollinearity, and as there are no formal tests for such problem, the common rules

of thumb were used in order to detect whether it was a feature of the sample. Partial correlations were examined. The classic symptom of high  $R^2$  with few significant t-ratios does not apply to the estimations as well, as many variables proved statistically significant. The Durbin-Watson statistic (Table 2) indicates that these models do not suffer from autocorrelation.

### ***Discussion***

As hypothesized, the *strategic roles performed by subsidiaries* emerged as crucial factors underlying their export orientation. Rationalized Manufacturers and Product Mandate subsidiaries were unequivocally associated with higher export intensity; while Miniature Replicas were significantly associated with low export intensity. These findings support Hypothesis 1, and usually held expectations concerning the behavior of distinct subsidiary types.

An innovative feature of the model was the dimension of value-added scope (White and Poynter, 1984; Pearce, 2001). This was proxied by two variables, namely *strategic decision-making autonomy* and *specialized capabilities in product development*. It was found that both the existence of perceived greater development capabilities and greater decision-making autonomy were significantly associated with lower export intensities (leading to the acceptance of Hypothesis 2 and to the rejection of Hypothesis 3). The interpretation is that most of the ‘high exporters’ tend to be of the rationalized type, mainly obeying parent HQ directives, and with little autonomy or capabilities to undertake more creative and responsible strategies.

The *subsidiary age* variable was significant and negative, as proposed by Hypothesis 5, meaning that older subsidiaries have lower export intensity. The age / year of EU accession interaction factor was similarly significant and negative, but did not lead to an improvement in terms of fit. The suggestion is that the general environment surrounding EU membership for

recently established subsidiaries was more important in determining export intensity than the specific date of joining the European Union.

Other significant variables were *size*, with larger subsidiaries being associated with greater export intensity (as posited by Hypothesis 7). Conversely, neither *performance* (in terms of relative productivity) nor *entry mode* had a significant impact on export intensity (thus rejecting Hypotheses 4 and 6).

Considering the results for the control variables, the *host country* is a relevant predictor of a subsidiary's export intensity. In particular, the variables representing the two smaller EU countries (Portugal and Ireland) were statistically significant. This supports the established idea that subsidiaries based in smaller markets tend to export the majority of their output. This result was strongest in Ireland, confirming prior literature on the Irish case (Barry and Bradley, 1997). The lack of significance of the UK variable indicates that the UK sample included both high exporters and also an important proportion of subsidiaries mainly servicing the UK market. Moreover, some of the peripheral UK regions, were used (like Ireland and Portugal) as export bases for the EU market - by US firms specifically (Young *et al.*, 1988); whereas German affiliates in the UK were commonly local market-oriented (Taggart and Hood, 2000).

In turn, the *home country* does not appear as a good predictor of a subsidiary's export intensity. This finding contrasts with previous literature which considered non-EU MNEs as more export-oriented, and more involved in pan-European and global export networks. Concerning the *industry* variable, the expectation that globalized industries would have higher export intensities is rejected. The descriptive statistics (Appendix 1) support the view that within the sample affiliates there is a wide variety of domestic and export sales activity, which prevented the emergence of a statistically significant outcome.

This research confirms the Andersson and Fredriksson (1996) results on exports of Swedish subsidiaries in respect of the positive effects of affiliate size. The higher export intensity of subsidiaries in Ireland and Portugal also bears out their finding on the negative association between export propensity and market size. In addition, the paper confirms the results of Egelhoff *et al.* (2000) on Ireland, who found that size of subsidiary had an important influence on subsidiary trade patterns; and supports their view that subsidiary stage of development is related to trade flows. By contrast, our findings do not support home country and industry factors as determinants of export intensity. The differences could be explained by the focus on a single home country (Andersson and Fredriksson, 1996), and a single host country (Egelhoff *et al.*, 2000). In addition, Sweden was not a member of the EU when the Andersson and Fredriksson (1996) work was undertaken.

Taken together, our results provide a coherent and robust model of the factors influencing export intensity, with special reference to one major group of MNE subsidiaries within the sample. The literature review and hypotheses highlighted the expected central importance of subsidiary roles and integration effects (corporate and regional) in influencing the export propensity of MNE subsidiaries in the European Union. These expectations are borne out clearly in the results. High export propensities are associated with the specialized and integrated Rationalized Manufacturer category; with high levels of control (low autonomy) from parent headquarters, further supporting the notion of internationally integrated and networked operations; and with variables measuring age and integration effects, specifically, more recently established subsidiaries and those set up after host country entry into the EU. The negative sign for the significant variable specialized capabilities in product development, while contrary to expectations, may also be explained by a similar logic: these capabilities may not be required by such rationalized operations. Finally, the results tend to suggest that subsidiaries in small open

host economies (Ireland and Portugal) are most strongly influenced by regional integration (as proposed by Blomström and Kokko, 1997).

### **CONCLUDING REMARKS AND POLICY IMPLICATIONS**

This paper adds substantially to the limited literature on the export intensity of MNE affiliates in developed host nations. Its principal contribution derives the formal inclusion of a subsidiary strategy typology and associated subsidiary characteristics. Little work has been undertaken to date on the relationship between subsidiary roles and economic development (including export) impacts.

The subsidiary role categorization is shown to be very robust, and the results confirm the expectation that two of the categories, namely, Rationalized Manufacturer and Product Mandate subsidiaries, will have high export intensity. However the factors underlying their similar export performance are very different. Rationalized Manufacturers are driven by the centralized and integrated regional and global strategies of parent MNEs; the latter by a mandate which permits development, production and international marketing.

An overall implication of the results is that export decision-making is complex and strongly firm-specific. This is confirmed by other results from the regression analyzes which are intriguing and challenge conventional wisdom. Particularly interesting in this respect is the negative association between export intensity and value-added scope (strategic decision-making autonomy and product development capabilities) and the non-significance of the performance variable. On the face of it, these results appear to contradict other findings which show, for example, a positive relation between management and firm resources (including R&D) and exports. What is indicated, however, is that parent MNE influence on subsidiary role is a

dominating factor; and that even with product development capabilities and high productivity, the subsidiary may opt to concentrate on domestic market opportunities.

The negative sign for the autonomy variable is also fascinating. The usual assumption is that autonomy is important in determining the economic benefits that MNE subsidiaries generate for host economies. For example, Edwards *et al* (2002, p.184) argue that ‘national interest requires that subsidiaries have the autonomy necessary to develop new products, processes and markets’. However, research indicates that autonomy may have different consequences in different circumstances. For example, Birkinshaw (1997) showed that autonomy was a facilitating factor in local or global market initiatives by the subsidiary, but not in internal market or hybrid initiatives (see also Ghoshal and Bartlett, 1988). There is a need for further research to disentangle the interrelationships among autonomy, subsidiary roles and other dimensions of subsidiary behaviour.

In understanding economic development impact, furthermore, we still need to know more about other export characteristics, including export value-added, the nature of export activity (intra- or inter-firm) and the balance of trade (exports minus imports). Although not the subject of this paper, the sample data reveal clearly that high export intensive-affiliates have high levels of intra-group trade; and that high exporters also import a high proportion of their inputs. Many of the firms in these categories are likely to be Rationalized Manufacturers, where the subsidiaries are closely integrated into parent MNE manufacturing and sourcing strategies, through both import and export activity. The indication is that exports *per se* are not automatically beneficial from the perspective of host country impact.

Several important public policy conclusions emerge from these findings. First, the results cast doubts on conventional measures for promoting exports, such as export incentives and exchange rate depreciation, since export decision-making is highly complex and commonly driven by MNE

headquarters. Second, in targeting inward FDI, host governments need perhaps to pay less attention to the planned export objectives of the subsidiary, than to wider performance criteria which may be indicative of longer term developmental potential. Moreover, since the findings do not support home country and industry factors as determinants of export intensity, this questions the most common criteria for targeting export-oriented MNE operations. Third, host governments need to focus on fostering and sustaining creative and innovative subsidiaries of the Product Mandate type, through, for example, the encouragement of local R&D activity and the stimulation of the entrepreneurial capabilities of subsidiary managers (Blomström *et al.*, 1992; Pearce, 2001). However, the challenges of doing so seem formidable. The importance of the variables measuring age and integration effects tentatively suggests that Rationalized Manufacturers will become more prevalent over time, as regional economic integration is matched by MNE corporate integration (Dunning and Robson, 1988). Important issues, therefore, relate to the incidence of particular subsidiary roles within the population of foreign investors; and how these roles will change over time in response to the radical environmental transformations produced by the widening and deepening of the EU, as well as by globalization pressures.



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## APPENDIX 1: Descriptive Statistics

VARIABLES	% OF OUTPUT	EXPORTED	
	0-50.0	50.1-100.0	TOTAL
<b>SUBSIDIARY ROLES</b>			
<i>Miniature replica</i> <sup>a</sup>			
Not part of role/Secondary role	32.5	67.5	100.0
Main role/Only role	77.8	22.2	100.0
<i>Rationalized manufacturer</i> <sup>a</sup>			
Not part of role/Secondary role	68.2	31.8	100.0
Main role/Only role	24.6	75.4	100.0
<i>Product mandate</i> <sup>a</sup>			
Not part of role/Secondary role	41.2	58.8	100.0
Main role/Only role	44.8	55.2	100.0
<b>STRATEGIC DECISION-MAKING AUTONOMY</b> <sup>a</sup>			
Decisions taken mainly by HQ, without consulting subsidiary	12.9	87.1	100.0
Decisions taken mainly by HQ, consulting subsidiary	36.6	63.4	100.0
Decisions taken mainly by subsidiary, after consulting HQ	62.2	37.8	100.0
Decisions taken mainly by subsidiary, without consulting HQ	50.0	50.0	100.0
<b>SPECIALIZED CAPABILITIES IN PROD. DEVELOPMENT</b> <sup>a</sup>			
Do not exist in subsidiary	25.5	74.5	100.0
Limited capability <i>vis-à-vis</i> sister subsidiaries in the EU	49.0	51.0	100.0
Average capability <i>vis-à-vis</i> sister subsidiaries in the EU	44.6	55.4	100.0
Distinctive capability <i>vis-à-vis</i> sister subsidiaries in the EU	51.0	49.0	100.0
<b>PERFORMANCE (productivity)</b> <sup>a</sup>			
Worse/significantly worse than sister subsidiaries	46.2	53.8	100.0
Similar	42.0	58.0	100.0
<b>DATE OF ESTABLISHMENT</b>			
Before EU Entry	47.8	52.2	100.0
In same year/After EU Entry	38.2	61.8	100.0
<b>ENTRY MODE</b>			
Greenfield	33.6	66.4	100.0
Takeover	51.4	48.6	100.0
Joint venture	60.9	39.1	100.0
<b>SIZE</b> <sup>a</sup>			
0-99 employees	43.6	56.4	100.0
100-499 employees	35.4	64.6	100.0
500-999 employees	51.2	48.8	100.0
More than 1000 employees	44.0	56.0	100.0
<b>HOST COUNTRY</b>			
Portugal	38.0	62.0	100.0
Spain	60.6	39.4	100.0
Ireland	2.2	97.8	100.0
UK	70.7	29.3	100.0
<b>HOME COUNTRY</b>			
EU	44.8	55.2	100.0
Non-EU	39.8	60.2	100.0
<b>INDUSTRY</b>			
Automobiles & auto components	27.8	72.2	100.0
Chemicals & plastics	71.1	28.9	100.0
Electrical & electronics	31.6	68.4	100.0
Machinery, engineering & instruments	58.8	41.2	100.0
Metal products	54.5	45.5	100.0
Pharmaceuticals & healthcare	29.6	70.4	100.0
Textiles, clothing & footwear	11.1	88.9	100.0
Other manufacturing			100.0
Better/significantly better than sister subsidiaries	42.7	57.3	100.0

<sup>a</sup> The categories considered in this Table reflect those included in the questionnaire survey.