Characteristics of Foreign Subsidiaries in Industry Clusters

Julian Birkinshaw*
LONDON BUSINESS SCHOOL

Neil Hood**
UNIVERSITY OF STRATHCLYDE

This paper examines the characteristics of foreign-owned subsidiaries in export-intensive "leading-edge industry clusters" as defined by Porter [1990]. Using a sample of 229 subsidiaries from three countries, we show that subsidiaries in such clusters are more embedded, more autonomous, and more internationally-oriented than subsidiaries in other industry sectors. We also show that there are significant differences in the roles of foreign-owned subsidiaries from one leading-edge cluster to the next, that are associated with the dynamism of the cluster and the overall level of foreign ownership. The results indicate (1) that typologies of subsidiary roles should give increased consideration to environmental factors, and (2) that thinking on industry clusters, instead of treating them identically, should recognize that they have heterogeneous characteristics.

It is well established that the roles of foreign-owned subsidiary companies (i.e. the activities that they have responsibility for in the multinational corporation) vary according to such contingencies as the local environment [Ghoshal and Nohria, 1989], the structural context imposed by the parent [Gupta and Govindarajan, 1991], and the entrepreneurial capacity of subsidiary management [Birkinshaw, 1997], to name some of the most well-known factors. In this paper we examine another potentially important predictor of varying subsidiary roles – the membership (or not) of a leading-edge industry cluster. An industry clus-

---

*Julian Birkinshaw is an Assistant Professor of Strategy and International Management at the London Business School. His research is concerned with the strategy and organization of large multinational corporations.

**Neil Hood is Professor of Business Policy and Director of the Strathclyde International Business Unit at the University of Strathclyde in Glasgow. His research concerns the strategy of multinational enterprises, globalization, and public policy issues surrounding inward investment.

This paper benefited greatly from seminars given at the Institute of International Business and the Invest in Sweden Agency, and a presentation at the Academy of International Business annual meeting, Monterrey, Mexico, October 1997. Thanks to Örjan Sövell, Rod White, Alan Rugman and Don Lessard for their comments and advice.


Copyright © 2000. All rights reserved.
FOREIGN SUBSIDIARIES IN INDUSTRY CLUSTERS

ter can be defined broadly as an aggregation of competing and complementary firms that are located in relatively close geographical proximity. In this paper we focus on those “leading edge” clusters identified by Porter [1990, 1998] and operationalized in terms of high export intensity.

We address two specific research questions. First, we ask whether the characteristics of foreign owned subsidiaries in Porter’s “leading-edge industry clusters” differ significantly from those in other industry sectors. Porter’s [1990] response would be a strong yes – subsidiaries can “selectively tap” into the leading-edge thinking in the cluster with a view to transfer learning back home, or they can become a transplanted “home base” for one of the corporation’s major product lines. However, there is other research, mostly conducted within the field of subsidiary management, that offers some somewhat different perspectives on this question. Second, we address the question: Do we see significant differences in the characteristics of foreign-owned subsidiaries from one “leading-edge industry cluster” to the next? Here existing theory offers little guidance so we provide some preliminary evidence, and discuss possible reasons for the differences we observe. Our objective with this study is to contribute to two streams of literature. First, we seek to contribute to the literature on subsidiary management by examining an important, but under-researched, determinant of the characteristics of foreign subsidiaries. Second, we seek to contribute to the literature on industry clusters, by providing some tentative evidence about differences between clusters and how they might have arisen.

THE SPATIAL CLUSTERING OF INDUSTRY

It has been recognized for a long time that related firms and industries tend to locate in close geographical proximity. In Marshall’s [1916] seminal analysis, the three fundamental reasons for spatial clustering were identified as: (1) the existence of a pooled market for specialized workers, (2) the provision of specialized inputs from suppliers and service providers; and (3) the relatively rapid flow of business-related knowledge between firms, which results in technological spillovers. A variety of names have been put forward to describe such spatial agglomerations of firms, including industrial districts [Piore and Sabel, 1984], innovative milieux [Aydalot, 1986] and industry clusters [Porter, 1990, 1998]. While such concepts vary in their relative emphasis on the reasons for clustering, they still betray a remarkable consistency with Marshall’s original analysis [Malmberg, Sölvell and Zander, 1996; Krugman, 1991].

Spatial clustering has been a theme in international business research for several decades, but has only become a central concern in the last 5-10 years. The most important body of research is concerned with the link between industry clusters and national competitiveness [Narula, 1993; Rugman 1991; Porter, 1990]. Central to this line of research is the question of cluster sustainability, that is the ability of any given cluster to maintain or enhance its competitive position vis-à-vis other clusters over a long period of time. Porter argues that sustainability is a function of the dynamism of the cluster, which in turn is a function of the interaction between the four elements of the cluster’s “diamond” (demanding customers, related and sup-
porting industries, factor endowments, and firm structure and rivalry). Other theories of cluster sustainability are based more on the social interactions between participating firms [e.g. Pouder and St John, 1996; Saxenian, 1994]. A second line of thinking is concerned with the different roles that foreign-owned subsidiaries have in leading-edge industry clusters. Here the established logic is that the multinational corporation (MNC) attempts to "tap into" industry clusters in foreign countries in order to gain access to leading-edge ideas and specialized talents [Bartlett and Ghoshal, 1986; Kogut, 1983; Porter, 1990; Vernon, 1979].

**Characteristics of Subsidiaries in Leading-edge Industry Clusters**

A number of studies have discussed the roles of foreign owned subsidiaries in leading-edge industry clusters. Porter [1990] argued for two likely roles. The first is *scanning units*, that "tap selectively into sources of advantage in other national diamonds." They are often R&D units with a limited development capability of their own which allows them to contribute to as well as draw from the knowledge base of the cluster. See Bartlett and Ghoshal [1986], Vernon [1979] and Westney [1990] for similar concepts. The second is *transplanted home-bases*, which consist of the top management, R&D activities and main manufacturing operations of an entire product division. These are often referred to as world mandate subsidiaries [Crookell, 1986; Science Council of Canada, 1980] or strategic leaders [Bartlett and Ghoshal, 1986]. While many academic researchers have argued that such units are becoming increasingly common [Bartlett and Ghoshal, 1989; Forsgren et al, 1995; Hedlund, 1986] Porter sees them as relatively rare because the home country industry cluster should *ceteris paribus* also be the home base of the firm.

In addition to these high-profile subsidiary types, there are also likely to be many more traditional subsidiaries in leading-edge industry clusters. Some, for example, will be market-seeking units, located in the cluster because the country represents an important market for the firm’s products. Others will be resource-seeking units that are located in the cluster to access specialized inputs, well-trained labour or low-cost factor inputs [Dunning, 1993; White and Poynter, 1984].

In this paper our approach is to study the *characteristics* of foreign-owned subsidiaries in leading-edge clusters rather than their *roles*. This allows us to start from theory and deduce the likely characteristics that we would expect to see among foreign-owned subsidiaries, rather than working backwards from the empirical observations of others. There is no shortage of typologies of subsidiaries in the literature (see Birkinshaw and Morrison, 1996, for a review) but because they were all developed in different contexts their relevance to the study of industry clusters is limited.

**Proposition Development**

The basic argument developed here is that subsidiaries in leading-edge clusters will over time develop characteristics that mirror the characteristics of other firms in those clusters. Thus, subsidiaries are usually established in such clusters on account of the latent economies of agglomeration, but in order to realize those benefits they have to become fully-fledged "insiders". Note that this is a far from trivial hypothesis, because there are considerable bodies of literature arguing the opposite – that for-
eign-owned subsidiaries become part of a low value-adding “branch plant” economy that does not establish local roots, or they remain as isolated “enclaves” within their host country (Beigie and Stewart, 1986; Dicken, 1994; Hood and Young, 1988; Kobrin, 1999).

The first important characteristic is the nature of the interactions between the subsidiary and other firms or institutions in the cluster. As Porter [1990], Saxenian [1994] and others have argued, it is the tight business and social relationships between firms that give clusters their dynamism. Our argument is that foreign-owned subsidiaries in clusters will attempt to emulate such interactions – by building strong relationships with local customers and suppliers, and by becoming involved in contacts with government and local universities. Stated slightly differently, we see subsidiaries in leading-edge clusters becoming strongly embedded in the cluster - defined as the strength and extent of their network of local relationships [Andersson, 1997; Grabher, 1993; Granovetter, 1985]. By contrast, subsidiaries in other industry sectors would not expect to develop the same network of relationships – either because such partner firms and institutions are not present locally, or because the subsidiary was established for different reasons (e.g. low labour cost, market access). Thus:

Proposition 1. The foreign owned subsidiaries in leading-edge industry clusters will be more embedded in their local network (stronger customer and supplier relations; greater local government support) than those in other industry sectors.

A second important characteristic is the degree of decision-making autonomy in the subsidiary. For subsidiaries established purely for low-cost manufacturing reasons, it is likely that decision-making will be controlled strongly from headquarters. However, for subsidiaries established in leading-edge clusters it is usually expected that they will try to develop local customer and supplier relationships, experiment with new ideas, and often transfer some of their learning back home. To do any of these requires significant level of decision-making autonomy. Moreover, once some level of self-determination has been achieved, the subsidiary finds itself in a more powerful position vis-à-vis its parent company because it is in control of valuable local resources [Prahalad and Doz, 1981; Pfeffer and Salancik, 1978]. This gives it even greater degrees of freedom, and thus the possibility to further enhance its local embeddedness. As this process evolves, the subsidiary becomes more like an independent local firm.

Proposition 2. The foreign owned subsidiaries in leading-edge industry clusters will have greater decision-making autonomy than those in other industry sectors.

The third important characteristic is the subsidiary's international market scope, i.e. the extent to which it sells its products outside the host country [White and Poynter, 1984]. Many subsidiaries are established as “market seeking” units, with a view to selling the MNC’s products locally. However, our argument is that subsidiaries are established in leading-edge clusters to exploit economies of agglomeration, and this often means developing or manufacturing products for sale on a global basis. Thus, we would expect international sales from such subsidiaries to be significantly higher than in subsidiaries based in other industry sectors. It is important to
note that these leading-edge clusters are as a matter of definition internationally-oriented. The proposition, like the other two, thus becomes one of examining the extent to which foreign-owned subsidiaries reflect the international orientation of the other firms in the leading-edge cluster.

Proposition 3. The foreign owned subsidiaries in leading-edge industry clusters will have more international market scope than those in other industry sectors.

RESEARCH METHODOLOGY

The research was focused on three countries—Canada, Scotland and Sweden—for reasons primarily of convenience but also because the topic of investigation was important to them. Data was collected primarily through a questionnaire mailed to a sample of foreign-owned subsidiaries in each country. Information about industry clusters was obtained from secondary sources.

The questionnaire was developed through an iterative process of drafting, pilot-testing and redrafting, including matched pairs of subsidiary and HQ respondents. Samples of foreign-owned subsidiaries were drawn up as follows. In Canada we used the Financial Post 500, Report on Business 1000, and the Disclosure databases. In Scotland we used the database compiled by Scottish Enterprise, the inward investment agency, which keeps track of all foreign investors in Scotland. In Sweden we used the databases of foreign-owned subsidiaries compiled by Veckans Affärer and Compass. In all cases the criterion for inclusion was size: $50 million in Canada and Scotland and $25 million in Sweden. Using a standard procedure of mailing the questionnaire to the subsidiary CEO and mailing a reminder 4 weeks later we ended up with 229 responses (34% response rate). All mailing was done in 1995. Analysis of the number of respondents vs. non-respondents in each leading-edge cluster revealed that subsidiaries in leading-edge clusters were slightly more likely to respond than those in non-cluster locations, perhaps what one might expect. But among the clusters themselves there were no significant differences between respondents and non-respondents.

Identification of Leading-edge Industry Clusters

As already observed, our approach in this paper is simply to work with the list of leading-edge industry clusters assembled by Michael Porter during his Competitive Advantage of Nations study and subsequent consulting projects with the Monitor Group. Porter’s approach was to include all those clusters in which the share of world cluster exports was more than double the average for that country. Thus, if Sweden’s share of world exports is 1.75% only industry clusters with 3.5% or greater of world share were included. These are called “leading edge industry clusters” here. It is worth noting that Porter’s operationalization has two limitations. First, he worked at the country level, whereas the economies of agglomeration typically apply at a lower level of analysis (i.e. the city or region). Second, export intensity is only a moderate proxy for competitiveness. These were practical limitations that were unavoidable given the data available. Table 1 lists the leading edge clusters in the three countries under investigation, and the definitions as supplied by Porter/Monitor. The five Swedish ones were taken from Porter [1990], the five Canadian ones were taken from the Porter/


Table 1
Industry Clusters Characteristics and Responding Firms

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Number of Responding Firms</th>
<th>Cluster “Dynamism”</th>
<th>Foreign Ownership</th>
<th>Share of Country Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian petroleum, chemical</td>
<td>11</td>
<td>3.7</td>
<td>69%</td>
<td>10.6%</td>
</tr>
<tr>
<td>Canadian transportation</td>
<td>13</td>
<td>4</td>
<td>71%</td>
<td>30.3%</td>
</tr>
<tr>
<td>Canadian food &amp; beverage</td>
<td>10</td>
<td>3.7</td>
<td>34%</td>
<td>8.1%</td>
</tr>
<tr>
<td>Other sectors in Canada</td>
<td>37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swedish transport &amp; logistics</td>
<td>12</td>
<td>4.3</td>
<td>14%</td>
<td>20.5%</td>
</tr>
<tr>
<td>Swedish forestry</td>
<td>8</td>
<td>6.7</td>
<td>8%</td>
<td>17.9%</td>
</tr>
<tr>
<td>Swedish ferrous metals</td>
<td>9</td>
<td>6.3</td>
<td>31%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Swedish healthcare</td>
<td>14</td>
<td>4.3</td>
<td>38%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Swedish telecomms</td>
<td>8</td>
<td>2.3</td>
<td>29%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Other sectors in Sweden</td>
<td>54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scottish electronics</td>
<td>20</td>
<td>2</td>
<td>55%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Scottish oil and gas</td>
<td>9</td>
<td>4.3</td>
<td>25%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Other sectors in Scotland</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>229</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Monitor study, *Canada at a Crossroads* [1991], and the two Scottish ones were taken from a Monitor study written for *Scottish Enterprise* [Monitor, 1993].

Once these clusters had been defined, we assigned each subsidiary to one cluster or to the “non-cluster” group as indicated in table 1 above. This was done using the description of the subsidiary’s industry provided by the respondent. It actually proved remarkably easy to consider each subsidiary in turn and judge which category to assign it to. However, to validate the process we got an independent expert in each country to separately go through the same procedure and compare his findings to our own. The small discrepancies were reconciled through discussion.

**Construct Measurement**

Strength of suppliers and customers. Respondents were asked to indicate the extent to which they agreed with the following statements, where 1 = strongly disagree, 7 = strongly agree: (1) Local customers have exacting standards, (2) capabilities of suppliers are very high, (3) relationships between suppliers and buyers are very strong. Alpha = .62.

Government support. Respondents were asked to indicate the extent to which they agreed with the following statements, where 1 = strongly disagree, 7 = strongly agree: (1) the local government views this subsidiary as an important contributor to the local economy, (2) the standing of the subsidiary in the national business community is high, (3) the local government is actively looking to support investment and industrial growth. Alpha = .63.

Decision making autonomy. Following Roth and Morrison [1992], respondents were asked to state the level that had the authority to make the following decisions (where 1=made by corporate HQ, 2 = at sub-corporate level, 3 = within
TABLE 2
DIFFERENCES BETWEEN CLUSTER SUBSIDIARIES AND NON-CLUSTER SUBSIDIARIES (n = 229)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean in Cluster Subsidiaries</th>
<th>Mean in Non-Cluster Subsidiaries</th>
<th>T-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength of suppliers and customers</td>
<td>4.96</td>
<td>4.66</td>
<td>2.718**</td>
</tr>
<tr>
<td>Government support</td>
<td>4.61</td>
<td>3.98</td>
<td>4.250***</td>
</tr>
<tr>
<td>Decision making autonomy</td>
<td>1.46</td>
<td>1.22</td>
<td>2.723**</td>
</tr>
<tr>
<td>International orientation</td>
<td>38.4%</td>
<td>23.8%</td>
<td>2.84**</td>
</tr>
</tbody>
</table>

Key: ***p < .001; **p < .01.

subsidiary): (1) changes in product design, (2) subcontracting out large portions of the manufacturing instead of expanding subsidiary’s own facilities, (3) switching to a new manufacturing process. Alpha = .73

Subsidiary international scope. Respondents were asked to state their international sales as a percentage of the total (including both internal to the MNC and external).

FINDINGS

The propositions were tested using t-tests on the entire sample of 229 subsidiaries, as shown in table 2. All propositions were supported at the p<.01 level or better. In other words, subsidiaries in leading-edge clusters are more strongly embedded in their local cluster, are more autonomous, and are more internationally oriented than subsidiaries in other industry sectors. A number of additional analyses were performed to guard against spurious findings. First, the international scope of the subsidiary could easily be a function of the level of its R&D, rather than a function of its presence in a leading-edge cluster. We therefore ran an ANCOVA model for the measure of international scope in which level of R&D was the covariate. This analysis yielded F-values for the cluster index of 8.7 (p<.01) and 4.8 (p<.05), and F-values for the R&D covariate of 36.4 (p<.001) and 31.2 (p<.001), which showed that both level of R&D and cluster membership are strong predictors of international orientation, though level of R&D is stronger. Second, there was a risk that the level of embeddedness of the subsidiary in the local economy was a function of its age not a function of its presence in a leading-edge cluster. We therefore ran an ANCOVA analysis for each measure of embeddedness, with subsidiary age as the covariate. Strength of suppliers and customers, and government support came out as before, with the cluster index a significant predictor (F = 4.69, 2.8 respectively, p<.05) and the subsidiary age covariate non-significant (F = 0.21, 1.15 respectively). In other words, controlling for the age of subsidiary has no material impact on the observed differences in strength of suppliers and customers and perceived government support. Finally, we decided to check whether the results were spuriously picking up industry-level or country-level differences. To do this, we ran a series of regressions for each of the vari-
TABLE 3
REGRESSION ANALYSIS ON CLUSTER, COUNTRY AND INDUSTRY DUMMIES

<table>
<thead>
<tr>
<th></th>
<th>Strength of Suppliers/ Customers</th>
<th>Government Support</th>
<th>Decision Making Autonomy</th>
<th>International Sales of Subsidiary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster</td>
<td>.130*</td>
<td></td>
<td>-.126†</td>
<td>.146*</td>
</tr>
<tr>
<td>Canada host</td>
<td>.338***</td>
<td>.196***</td>
<td>-.234**</td>
<td>-.241**</td>
</tr>
<tr>
<td>Sweden host</td>
<td>.198*</td>
<td>-.444***</td>
<td>-.157†</td>
<td>-.275**</td>
</tr>
<tr>
<td>U.S. parent</td>
<td>-.017</td>
<td>-.053</td>
<td>.140*</td>
<td>.037</td>
</tr>
<tr>
<td>Healthcare industry</td>
<td>.015</td>
<td>.011</td>
<td>.038</td>
<td>-.058</td>
</tr>
<tr>
<td>Food &amp; drink industry</td>
<td>-.028</td>
<td>.071</td>
<td>-.071</td>
<td>-.139*</td>
</tr>
<tr>
<td>Electronics industry</td>
<td>-.120†</td>
<td>.056</td>
<td>.180**</td>
<td>.011</td>
</tr>
<tr>
<td>F test</td>
<td>3.12</td>
<td>12.90</td>
<td>4.37</td>
<td>4.85</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>.053**</td>
<td>.234***</td>
<td>.082**</td>
<td>.087**</td>
</tr>
</tbody>
</table>

Figures in cells are standardized Betas. Significance levels: †p < .10; *p < .05; **p < .01; ***p < .001.

variables, with the following dummy variables: (1) presence in a cluster, (2) Swedish host, (3) Canadian host, (4) US parent, (5) participant in the electronics industry, (6) participant in the healthcare/pharmaceuticals industry, and (7) participant in the food and drink industry. The three industries were selected on the basis that they were the most well-represented in the entire sample (53, 30, 20 respondents respectively). The results of this analysis, listed in table 3, show that the cluster / non-cluster dummy variable was a significant predictor in all six models, confirming the validity of separating the data in this way. The Canadian host and Swedish host dummies were also significant in many cases, as were the food and drink and electronics industry dummies, while US parent was never significant.

**FURTHER ANALYSIS: DIFFERENCES BETWEEN INDUSTRY CLUSTERS**

A second issue that the data allows us to explore is whether we see significant differences in the characteristics of foreign-owned subsidiaries from one leading-edge industry cluster to the next. Of course, it is self-apparent that there will always be some differences just based on the unique character of the clusters in question. This study includes the Canadian automotive cluster for example, which has become extremely closely integrated with its Detroit-based counterpart since the “Auto Pact” was signed in 1965, and which has correspondingly led to the emergence of many large export-oriented subsidiaries. Such cluster-specific explanations are important, but of greater interest are the systematic differences between industry clusters. If we can identify cluster-level characteristics that impact the likelihood of certain subsidiary characteristics, then we will have made an important contribution to our understanding of industry clusters and subsidiary roles.

Here we will focus on two important cluster-level variables, cluster dynamism and level of foreign ownership. Certainly there may be other important cluster characteristics as well, but be-
cause this is a relatively unexplored area and because good quality cluster-level data is hard to obtain we restrict ourselves to a careful analysis of these two.

Cluster dynamism is defined as its capacity for improvement, innovation and competitive upgrading [Malmberg, Sölvell and Zander, 1996: 88]. As stated by Porter [1990: 72], the diamond of national advantage is a "mutually reinforcing system" in which each element interacts with and reinforces the others. Thus, when all four elements are favourable and/or sophisticated, the net result is a high level of cluster dynamism. Building on the same logic as earlier, we therefore expect that the more dynamic clusters will ceteris paribus have more embedded, more autonomous, and more internationally-oriented subsidiaries than those that are less dynamic.

Level of foreign ownership is clearly an important cluster-level characteristic, both because of its political salience and because of the wide variation in foreign ownership between clusters, from close to zero (e.g. certain Japanese or South Korean clusters) to 70% or more (e.g. Singapore, some Irish clusters, some Canadian clusters). However, the impact that the level of foreign ownership has on subsidiary roles is not well understood. One approach is to argue that foreign ownership is “bad” for cluster development and sustainability because foreign subsidiaries tend to be less deeply embedded in the local economy, and more prone to move, than indigenous firms. This approach is rarely written down as starkly as this, but interviews with inward investment agencies in several countries confirm that it exists. An alternative approach is to argue that foreign ownership is a sign of good health in a leading-edge cluster, because it signals that foreign MNCs want to build a presence there in order to tap into leading edge ideas. Pre-eminent clusters such as Silicon Valley or London’s financial sector, for example, have large numbers of foreign subsidiaries that not only tap into the cluster’s dynamism but also contribute to it through their own activities. Finally, there is a third, more neutral, perspective that argues that foreign ownership per se is irrelevant [Sölvell and Malmberg, 1998]. Rather, the dynamism of the cluster is simply a function of the firms and institutions in that cluster and the interrelations between them, regardless of ownership. We will not state a preference for one argument or another at this stage. Instead we will present the data in an exploratory way and revisit these arguments at the end.

Empirical Analysis

In order to examine these issues empirically, we first had to develop operational measures of cluster dynamism and foreign-ownership level.

Cluster dynamism was measured through the ratings of experts, who assessed the extent to which the four elements of Porter’s [1990] diamond were present in each cluster. These numbers were then summed to give a dynamism index. To guard against the obvious problems of subjectivity we got three people to code each cluster, and used the average. We also got country experts to assess the face validity of our measures, with good results. See table 1 for measures.

Foreign ownership of the cluster. These measures were taken from a variety of sources. For Canada, Porter [1991] included an assessment of the level of foreign ownership of assets in each of the five clusters. For Scotland, measures were provided by Scottish Enterprise
who have data on all foreign investments in the country. For Sweden, we had to make our own calculations, by identifying all cluster participants, as defined by their Swedish Statistical Bureau classification codes, identifying which were foreign owned, and calculating the percentage of turnover that was foreign owned.

We also developed an additional subsidiary-level measure for relative subsidiary capabilities, as an indicator of the quality and scope of the activities of the subsidiary. It was measured by asking respondents to indicate their capability or distinctive competence in the following areas, where 1 = far below average, 7 = far above average: (1) product or process R&D, (2) manufacturing capability, (3) sales force coverage and quality, (4) marketing capability, (5) managing international activities, (6) managing the interface with the parent company, (7) innovation and entrepreneurship. Alpha = .65.

Having developed these measures, we summed all of the subsidiary-level measures to a cluster level, and then calculated the Spearman Rank correlation coefficients between the aggregated subsidiary characteristics, cluster dynamism and foreign-ownership level.

Table 4 indicates some interesting findings. First, there is a strong negative correlation between cluster dynamism and foreign ownership level, providing some support for the often-voiced concern that high foreign ownership clusters tend to be less dynamic, and thus less sustainable. Second, cluster dynamism is significantly associated with a high level of subsidiary autonomy, and moderately associated with strong supplier and customer relations. This is consistent with the logic developed earlier that subsidiaries can only become contributors to cluster dynamism if they are strongly embedded in the local economy and autonomous enough to interact freely with other local entities. Third, high foreign ownership is significantly and negatively associated with subsidiary autonomy. It is also negatively associated with the measure of relative subsidiary capabilities, providing support for the argument that foreign-dominated clusters often have relatively weak subsidiary companies.

The interesting finding here is the evidence that clusters with high levels of foreign ownership have subsidiaries that are in general less autonomous and have weaker capabilities. This suggests that
there are indeed some reasons for host country governments to be concerned about the sustainability of their largely foreign-owned clusters. However, it is important to realize that this does not lead to the conclusion that foreign ownership *per se* is bad, because there are a number of additional factors at work here. First, there are probably industry and country effects that are not factored in to this analysis. For example, we would expect the impact of foreign ownership to be very different in a growing industry (more greenfield investments) than in a consolidating industry (more acquisitions). And the historical levels of foreign ownership are much higher in Canada and Scotland than in Sweden, and the results we see are partly a reflection of this. Second, cluster dynamism and subsidiary autonomy are means not ends. While theory predicts that the more dynamic clusters will be the ones that are sustainable in the long-term, there may also be other viable paths to sustainability e.g. for Scotland to have the most attractive business environment for electronics manufacturing. Third, it is important to realize that foreign investment is never bad *per se*, because it is better than nothing. When we examine the findings in table 4, then, the key test may not be how the clusters compare to one another, but rather how they would have looked without foreign investment.

**Discussion and Conclusions**

This paper sought to contribute to two distinct bodies of literature, subsidiary management and industry clustering. Taking the industry cluster literature first, this paper offers the important (though tentative) finding that those clusters with high levels of foreign ownership have subsidiaries that in general are less autonomous and have weaker capabilities. As the discussion above suggests, there are a lot of possible explanations for this. There is not space in this paper to go into any of the explanations in depth, but this is clearly an issue that demands further empirical and theoretical research. Our answer to the question *does foreign ownership matter?* is therefore a clear yes, but in ways that are both positive and negative, and often rather complex.

For the subsidiary management literature, the paper provides confirming evidence that subsidiaries in leading-edge industry clusters tend to be more autonomous, more embedded in the local cluster, and have more international market scope than their counterparts in other industry sectors. It suggests, moreover, that it is not just cluster membership but the specific characteristics of the cluster in question that impacts the likely subsidiary role. This has two implications. First, in terms of the environmental determinism vs. strategic choice debate in subsidiary management [Birkinshaw et al., 1998] it suggests that greater weight needs to be given to the environmental determinism side because cluster-level variables have not hitherto been considered. Second, at a more managerial level, the data suggests that Porter’s concept of selective tapping is appropriate only in a subset of cases – some clusters are probably not dynamic enough to warrant selective tapping, while others may be populated predominantly by locally-focused subsidiaries.

This research had some significant limitations. First, we used Porter’s [1990] definitions of leading-edge clusters. While these are well-known, they do have significant limitations, and it is a priority for future research to find stronger measures of leading-edge clusters.
Second, we used attitudinal data for subsidiary-level data. Obviously attitudes are important in this context because they shape subsequent action, but at the same time there would have been considerable value in also getting some more objective indicators. This is an important issue for future research to look into. Third, we focused exclusively on the foreign-owned subsidiaries in our chosen industry clusters, rather than on the entire set of firms. This was appropriate for the subsidiary management aspects of the research, but for the industry cluster aspects it meant that we ended up with a rather restricted perspective on the dynamics of these clusters. This study points to some interesting differences between clusters, but a future study looking at both indigenous and foreign-owned firms will be necessary before any definitive conclusions can be drawn.

NOTES

1. Though we should acknowledge that we are deliberately focusing on the economic arguments here. Other theoretical approaches might yield different arguments, such as institutional theory, in which the choice of location would be primarily for legitimacy reasons, i.e. to adhere to the institutional norms of that country.

2. Note that a number of additional propositions were developed in an earlier formulation of this paper, including the value-added, level of R&D, and size of subsidiaries in the two groups. Of these, only the proposition concerning the size of subsidiaries was supported, i.e. with subsidiaries in leading-edge clusters larger than those in other industry sectors.

3. Further details on the methodology are reported in Birkinshaw, Hood and Jonsson (1998).

4. The Swedish questionnaire was translated into Swedish and back-translated to verify accuracy. Managers were sent both English and Swedish language versions, with approximately half filling in each version.

5. Though it should be noted that most of the country clusters are actually fairly local in scope. In this study, we examined the locations of the responding companies and in ten of twelve cases there was a very strong geographical concentration to the cluster (i.e. down to the level of a particular city).

6. Note that it would also have been possible to do this analysis at the subsidiary level by allocating cluster-level variables to each subsidiary, but this is a potentially flawed approach because it ends up attributing cluster-level factors to individual subsidiaries [cf. the “Ecological Fallacy”, Hofstede et al. 1990; Robinson, 1950].

REFERENCES


