INTERNATIONAL BUSINESS IN A WORLD OF INCREASING RETURNS

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By

Lilach Nachum
ESRC Centre for Business Research
The Judge Institute of Management
University of Cambridge
Trumpington Street, Cambridge, CB2 1AG, UK

Tel: +44 (0) 1223 765333
Fax: +44 (0) 1223 765338
e-mail: l.nachum@cbr.cam.ac.uk

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Abstract
This study examines the factors affecting the propensity of firms to engage in cross border activities in a world of increasing returns.

A model connecting outward FDI from the US with a set of firm-specific advantages is estimated on samples of industries dominated by increasing and diminishing return processes.

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INTRODUCTION

Traditional economic theory was based on the assumption that, over a certain level of production, there will be diminishing returns (DR) as the scale of production increases, that is, each successive increment of input will add less to production than the last so that marginal output will decline the more input is used (Nicholson 1998). This assumption was made at a time in which most of what was produced was based on finite, scarce resources (e.g., land, capital), and output consisted of tangible products. However, as economies have undergone a transformation from large-scale material manufacturing to the design and use of new technologies, the underlying mechanisms shaping economic activity are increasingly characterised by increasing returns (IR). These are mechanisms of positive feedback that act to reinforce that which get success (Arthur 1996). They occur due to three reasons: 1. High fixed costs and very low variable costs; 2. Network effects, that is, the value of a product increases with the number of users; and 3. High switching costs.

The logic of IR is maintained to modify some fundamentals of economics (Arthur 1994, Romer 1986) and management (Arthur 1996, Vandermerwe 1997). As argued by Arthur (1996): 'The two worlds [of diminishing and increasing returns] have different economics. They differ in behaviour, style and culture. They call for different management techniques, strategies and codes of government regulation. They call for different understandings' (p. 101).

What does this different logic imply for international business activity? To what extent, and in what ways, does it affect the propensity of firms to invest overseas and the ways in which they organise their international activity? And if, as Arthur (1996) forcefully argues, '…it is a mistake to think that what works in one world is appropriate for the other' (p. 103), what modifications should be made in the theories of international business in order to reach a fuller understanding of international activity in a world of IR?

The theory of international business was implicitly formulated for the DR world, which at the time the theory was initially introduced accounted for the overwhelming share of business activity (Dunning 1993). Most international activity at that time was in industries such as coal, petroleum, food, tobacco, metal processing, which are, for the most part, dominated by the logic of DR. Over the years, attempts have been made to modify the theory to the changing nature of the industries in which most international business activity takes place. As part of these attempts, scholars have acknowledged the accumulated nature of both firm- and country-advantages and have shown how these characteristics influence the activities of MNEs (e.g., Buckley/Casson 1976, Cantwell 1989, Nachum 2000). A large body of literature has also examined the innovative activities of MNEs and the implications of knowledge creation and transfer for the international operation of these firms (e.g. Zander 1999, Kogut/Zander 1993).

These developments accommodate many features of the IR world, but they may not take full account of all of them. Indeed, studies of industries dominated by IR processes have noted the need to examine the applicability of prevailing international business and management theories to the sector/industry concerned, and to develop specific theories of internationalisation of such industries (e.g., Sarkar et al 1999 with reference to telecommunications; Mascitelli 1999 with reference to high tech).

In this study I seek to make a contribution in this direction, by examining, both theoretically and empirically, to what extent and in what ways the logic of IR influences the factors affecting the propensity of firms to operate in foreign markets, and by suggesting directions in which the modification of existing paradigms might take place. I start by examining the main firm-specific advantages of MNEs identified in the literature to see whether a-priori considerations enable one to set up hypotheses about their likely effect on international business activity in industries dominated by IR

processes. The impact of these advantages on MNEs operating in the traditional, DR industries is used for comparison, to isolate the attributes unique to IR industries. I then go on to suggest additional firm-specific advantages, which were not included in the traditional model of international business, and may affect the propensity of firms operating in IR industries to compete overseas. The theoretical arguments that emerge from these discussions are put forward for empirical testing in the following section, contrasting IR and DR industries. I conclude by drawing the implications of the analysis for a theory of international business activity in a world of IR and for MNEs operating in this world, and by suggesting directions in which future research may make progress.

SOME GENERIC CHARACTERISTICS OF IR PROCESSES

IR implies that production is more efficient the larger the scale at which it takes place, that is, a proportionate increase in all inputs allows for a more than proportionate increase in outputs. This characteristic of the production process implies that small initial differences are magnified by self-reinforcing mechanisms of positive feedback that operate to reinforce initial success.

IR processes occur for three reasons. First, the cost structure of the production, with high fixed costs but low marginal costs, brings about substantial economies of scale (Shapiro/Varian 1999). For example, the first copy of Windows 2000 cost Bill Gates 100 million dollars; further copies cost 2-3 dollars (Business Week 2000). Films, records, and the like cost hundreds of thousands to produce but can be reproduced for a dollar or two. Hence, volume of sales has an insignificant effect on the costs of production. This differs from the cost structure of DR activities, where total costs are spread more evenly across units of production, and increase in production entails a more even increase in costs.

Second, the presence of network effects implies that the value of a product for customers increases with the number of users (Katz/Shapiro 1985, 1986, Garud/Kumaraswamy 1993). These are what Katz and Shapiro termed ‘demand side economies of scale’ (1986, p. 824). Products such as an Internet connection or a fax machine have no value unless used in a network and their value increases when others obtain compatible equipment (Brynjolfsson/Kahin 1999). Similar effects do not apply to products of the DR world, whose value is either not affected or is diminished as the number of users increases. For some of these products (e.g, fashion, special cars, special books) there is a premium associated with exclusivity (Koford/Tschoegl 1998), and once too many people use them, they no longer satisfy the need for individuality and novelty (Kretschmer et al 1999). The differences between DR and IR in this respect are strikingly illustrated by the price reaction to an increase in the number of users. In the former, increased demand often raises the price, while in the latter prices tend to fall as the network gets larger.

A third reason for IR is high switching costs. Unlike most DR products, IR products are typically difficult to use and require training. Hence, it is costly to switch over to alternative products and consumers are reluctant to change. For example, the costs of changing a computer system can be astronomical – data files are unlikely to transfer perfectly, incompatibility with other tools often arise, and training is required. Hence, consumers get locked-in to some historical system or product, which may not necessarily be the best one available any longer (Shapiro/Varian 1999).

Knowledge intensive products, such as computer hardware and software, telecommunications, pharmaceuticals, bioengineering drugs and the like have all these characteristics and are largely subject to IR logic (Arthur 1994). In contrast, raw-material intensive products, based on tangible resources as their primary inputs, are, for the most part, subject to DR logic.

In the next section I examine whether and to what extent the logic of IR affects the firm-specific advantages characterising MNEs, and I suggest directions in which such influence may take place.

THEORY AND HYPOTHESES

International business theory suggests that MNEs possess certain firm-specific advantages, allowing them to overcome the disadvantages of foreignness and compete successfully against local firms in foreign markets (Hymer 1960/1976). These advantages are based on the possession of certain intangible assets (Caves 1996), the market for which is imperfect and they therefore favour internal transfer over arm's length transactions (Buckley/Casson 1976).

While it has been recognised that firm-specific advantages are industry specific, a generic set of advantages, characterising MNEs regardless of their industrial affiliation, has been identified (see Dunning 1993, Caves 1996 for comprehensive surveys). This set is examined here with reference to industries dominated by IR processes, and compared with its impact on MNEs operating in the traditional, DR industries.

Innovative Capabilities

The link between the propensity of firms to operate overseas and their technological intensity is well established in the international business and management literature. The knowledge embodied in new products, processes and proprietary technology is widely regarded as premier among the assets providing MNEs with the advantages necessary to overcome the disadvantages associated with foreign activity (Caves 1996).

Due to certain characteristics of IR processes, the potential advantages that MNEs derive from the commercial exploitation of new knowledge are likely to be considerable, exceeding those of the traditional DR world. First, knowledge occupies a central position in

the creation of value by firms, and more so than in the traditional processing world. In contrast with DR industries, that are based on resources combined with little knowledge, IR processes are characterized by heavy reliance on knowledge, combined with little other resources. This focus on knowledge as the central resource puts a high premium on the creation of new knowledge.

Second, the rate of obsolesce of knowledge is far more rapid in IR industries than it is in the traditional DR world. Change is deeply rooted in these activities, and firms are in a constant search for new innovations and ideas, what Arthur (1996) named 'the search for the Next Big Thing' (p. 104). The typically short life cycles of products and processes make a constantly renewed stock of proprietary knowledge a critically important asset.

Third, in many IR activities, standard-based technologies and network interconnections break the isolating mechanisms that prevent rivals from gaining access to proprietary knowledge (Garud/Kumaraswamy 1993). This stands in sharp contrast to the unconnected close systems characterising the traditional processing world, in which firms restrict access to their proprietary knowledge as a way of protecting their competitive position (Katz/Shapiro 1994). With the dissolution of isolating mechanisms firms that wish to survive must introduce new products continually, making innovative capabilities a critical advantage for survival and success. Hence I hypothesize:
H1: Innovative capabilities would have a significant, positive impact on the propensity of firms competing in industries dominated by IR processes to operate overseas, and this impact will be stronger than in DR industries (i.e., a more positive association is expected).

Scale
Scale has traditionally been regarded as a major firm-specific advantage of MNEs (Dunning 1993). Large firms have been perceived as being better endowed with the tangible and intangible assets conducive to foreign activity, and the ability to acquire new technologies and know-how, to penetrate new markets, and to benefit

from scale economies in production and distribution. They are also likely to enjoy privileged access to capital markets, special relations with governments, and to be able to cover fixed costs and bear the inherent risk associated with foreign investment.

Theory provides reasons for expecting that large scale will convey an important source of advantage for MNEs operating in the IR world, although for somewhat different reasons from those conceptualised for the DR world. On the supply side, the huge reduction in unit costs associated with increase in production typical to IR processes provides a strong source of advantage to large-scale production (Shapiro/Varian 1999). On the demand side, the network effects characterising industries dominated by IR logic favour large size (Katz/Shapiro 1986). Success of a product depends on its achievement of a critical mass of major users, thus providing strong incentives for other potential users to join[1]. Large firms are more likely to generate the critical mass required to become the standard in an industry. The network effects also imply that consumers' choices between alternative technologies are likely to be affected by the numbers of each adopted at the time of the choice (Arthur 1994). Large market shares may thus determine the probability of present selection of a given technology, and the larger the market a firm controls, the easier it becomes to capture future markets.

Anecdotal observation of the size of MNEs operating in industries dominated by IR processes, however, provides only partial support for these theoretical arguments. Some firms indeed manage to take advantage of the unique characteristics of IR activities, and to lock-in an entire market. Firms such as Cisco or Intel control 80% or more of their markets (Gruber 2000). At the same time, the phenomenon of small firms becoming multinationals is common in industries dominated by IR logic (Coriello/Munro 1999). The papers in Bohlin and Granstrand (1994) provide no clear indication that large size is an advantage in the telecom industry. It is possible to identify both very large telecom firms and much smaller ones in international

competition. Similar situations seem to prevail in activities such as software and internet-related services.

These conflicting suggestions might be explained by certain characteristics of IR processes, that may eliminate some of the advantages of large scale. Firstly, such advantages are often associated with the degree of vertical integration, but IR processes favour focus and vertical disintegration, because these allow firms to reap the advantages associated with increased scale in a single activity. Secondly, new technologies and operational methods enable small firms to overcome some of the main advantages of large firms, notably economies of scale and favourable access to resources. The tendency by MNEs to source out all activities except the core ones (Prahald/Hamel 1990) is common in industries dominated by IR logic. In some cases firms outsource even the production itself, and focus on innovation and the introduction of new products and processes (The Economist 2000b), where size may not necessarily provide an advantage. Thirdly, size might be less of an impediment for international activity in industries where the most important advantages are those related to the transfer of existing knowledge and the acquisition of new ones (Oviatt/McDougall 1994), where IR processes tend to dominate. The impact of scale on the creation, acquisition and manipulation of knowledge is far from established and is not at all clear (see e.g., Graves/Langowitz 1993). Fourth, the ease with which many IR products can be transferred electronically diminishes the costs of transactions in external markets (Roche/Blaine 2000). Hence, large, vertically integrated firms may not realise the cost advantages needed to justify the internalisation of many activities.

This discussion provides no clear basis for hypothesising the impact of scale on the propensity of firms competing in IR industries to operate in international markets.

Differentiation

Following the pioneering theoretical contribution of Caves (1971), the ability of firms to differentiate their products has been regarded as a key competitive advantage leading to foreign activity (Dunning 1993).

For several reasons, differentiation and a firm's success in creating a strong brand name are likely to provide an important source of advantage in the IR world, exceeding its value in the traditional DR world. Firstly, the high switching costs, and the subsequent lock-in, that characterise IR processes put a high premium on establishing a brand name, and doing it very rapidly, before customers get locked-in to competing products. The more a firm gains prevalence, the more likely it will emerge as the standard, and will gain strong market power. Competition to become the market standard tends to be intense because the ultimate outcome is one of moving towards a single system, and firms are effectively competing for future monopoly profits (Katz/Shapiro 1994). It is not always the superior technology that emerges as the standard but rather the one that is most effectively positioned and marketed (Vandermerwe 1997).

Secondly, many IR products are experience goods, whose quality is difficult to assess before, and often even after, consumption. Software, information provided on the Internet, and the like, are purchased before consumers know what value they are getting. Selection among competing brands is often based on brand names, making brand name a critical asset (Vandermerwe 1997, Shapiro/Varian 1999, Kotha et al 2000). Thirdly, in competing to become the standard, or at least to achieve the critical mass, consumer expectations are critical. The product that is expected to become the standard usually becomes the standard because self-fulfilling expectations are one manifestation of positive-feedback economies. Firms participating in such markets seek to convince customers that their products will ultimately become the standard (Shapiro/Verian 1999), putting an additional premium on promotion capabilities. These characteristics are unique to IR industries, distinguishing them

from industries dominated by DR logic, and are likely to lead to a greater value of established reputation and well-known brand name in IR industries than in DR industries.

The huge sums spent by Internet firms on establishing an identity (The Economist 2000a), which are often far in excess of those spent by firms competing in the traditional processing industries, indeed provide an indication of the importance of branding in the IR world. For example, in 1999 the marketing budget of Coca-Cola accounted for 16.7% of its revenues. The comparable figures for Yahoo! And Amazon.com were 35.9 and 25.9% respectively (Business Week 1999). In line with this discussion I hypothesise:
H2: Differentiation would have a significant, positive impact on the propensity of firms competing in the IR world to operate overseas, and this impact will be stronger than in DR industries (i.e., a more positive association is expected).

Advantages of multinationality
The advantages referred to above are important for the competitive position of any firm, regardless of the geographic scope of its activity. In addition to these, there are certain other advantages arising specifically because a firm is operating in multiple markets. Such activity enables a firm to take advantage of international differences in factor endowments and markets, and to diversify risks. It also offers wider opportunities, by providing more favoured access to or better knowledge of information sources, inputs and markets (Dunning 1993).

A-priori it is not clear whether multinationality per se is likely to provide similar advantages for MNEs operating in IR activities. The possible advantages of multinationality might result from several forces. First, multinational activity has the potential to magnify the advantages associated with size (to the extent that they exist, as discussed above). Thus, it allows firms to reach large markets for their products, and benefit from scale advantages on both the demand and the supply side. It also facilitates the ability of firms to reach a critical

mass and to become the standard in their industries. Standards of most IR products are increasingly set up globally rather than in national markets (Sarkar et al 1999), increasing the value of global reach. Second, standardisation of products and services across borders – a major determinant of advantages derived from multinationality – tend to be easier in IR industries than in the traditional DR world. For example, software, TV programmes, music, and the like are sold world-wide with minimum local adaptations, and those adaptations that are made are typically confined to translation to the local language. The increasing acceptance of English as the world's dominant language[2] increases the potential to reap advantages of scale by selling identical products world-wide.

At the same time, however, there are also reasons for expecting multinationality to provide limited, if any, advantages. Most products dominated by IR logic can be transferred electronically in real time and at no cost, eliminating many of the reasons for investing overseas. Many of the benefits of multinationality may not necessarily require local presence in foreign markets and can be captured by serving them via exports.

This discussion provides no clear basis for hypothesising the potential advantage of multinationality for MNEs competing in IR industries.

Entrepreneurship

Notwithstanding earlier conceptualisations of foreign investment as an outlet for underutilised entrepreneurial resources of firms (Caves 1974), and of MNEs as firms with entrepreneurial and cognitive resources that take a world-wide view of the opportunities open to them (Penrose 1959), entrepreneurship was not regarded traditionally as one of the firm-specific advantages affecting the propensity of firms to compete in international markets.

Recent conceptualisations, however, typically formulated with implicit or explicit reference to the advanced, knowledge-based industries, where IR processes are most pronounced, have shown the

importance of entrepreneurship in explaining both the initial geographic expansion of firms and their subsequent activities in foreign locations (Oviatt/McDougall 1994, Birley/MacMillan 1995, Birkinshaw 2000). The heavy reliance on innovation and the need for continuous introduction of new products and processes typical in the IR world creates an environment in which entrepreneurship is a highly valuable advantage, and more so than in the traditional world, where changes occur at a slower pace. As stressed by Arthur: 'What matters most in the increasing returns world is less the capabilities a firm has than its mission, its ability to make sense of the new technological wave, to recognise them, to see their shape. …Bill Gates is not so much a wizard of technology as a wizard of precognition, of discerning the shape of the next game' (1996, p. 104). Superior technology alone is rarely enough basis upon which to build competitive advantage in the IR world. Cognitive and managerial skills to discern the shape of the play and then act upon it are highly valuable (Teece 2000). Such entrepreneurial spirit is likely to be vital not only in relation to start-up or new product development but also with respect to geographic expansion and the ability to take advantage of market opportunities overseas (Birkinshaw 2000). Hence, I hypothesise:

H3: Entrepreneurship would have a significant, positive impact on the propensity of firms competing in industries dominated by IR processes to operate overseas, and this impact will be stronger than in DR industries (i.e., a more positive association is expected).

Flexibility of organisational structure

The way in which MNEs organise their international activity, the relations between the parts of the organisation which are located in different countries, how control is achieved and responsibility divided, have been regarded as distinct sources of advantage in international competition (e.g. Ghoshal/Westney 1992, Nohria/Ghoshal 1997).

International activity in the IR world requires different organisational structures than those suitable for the traditional industries of the

processing world. In the fast changing IR economy, success depends on adaptation to the ever-changing rules of the game (Arthur 1996). This means watching for the next wave that is coming, figuring out what shape it will take, and positioning the entire organisation to take advantage of it. High payoffs are associated with rapidly sensing and then seizing opportunities (Teece 2000). To be effective in meeting these goals, affiliates need a considerable amount of autonomy and independence (Birkinshaw 2000). The extent to which MNEs are organised in ways that enable the various parts to respond flexibly to rapid changes in technology and market demand is thus likely to be a valuable source of firm-specific advantage. Hence I hypothesise:
H4: Flexibility of organisational structure would have a significant, positive impact on the propensity of firms competing in industries dominated by IR processes to operate overseas, and this impact will be stronger than in DR industries (i.e., a more positive association is expected).

Networking

The ability to constantly reconfigure business relations via networking with other firms in foreign countries was not originally considered to be part of the firm-specific advantages affecting the propensity of firms to compete in foreign markets. Recent conceptualisations, however, have acknowledged the role of linkages external to MNEs as critical sources of their competitive advantage (Nachum/Keeble 2001, Birkinshaw/Hagstrom 2001) and as important drivers of international expansion (Mattsson 1998, Chen/Chen 1998). According to this view, firms engage in international activity in order to establish or enhance their position in foreign networks, rather than to extract economic rents by exploiting their own strategic assets. Networking is seen as an advantage of its own right, enabling firms to access resources not otherwise accessible and to learn from the skills and capabilities of their network partners.

Several unique characteristics of IR processes suggest that the ability to successfully establish and maintain network linkages is likely to be a major source of advantage for MNEs competing in IR industries,

and more important than in industries dominated by DR processes. First, the rapid technological change characterising IR industries places a premium on the ability to learn. Firms have to use all possible ways of acquiring new knowledge and updating existing knowledge. The ability to link with firms in foreign locations could provide an important way to accomplish these objectives (Chen/Chen 1998). Second, the complexity of many IR products means that it is often not feasible to fully develop in-house the requisite knowledge. Hence, production systems tend to be highly fragmented, structured as networks of multidimensional exchange relations between actors who control heterogeneous, interdependent resources and carry out inter-linked activities (Stiroh 1999). For example, no one company in PC production integrates the entire value added chain. A PC is assembled from a combination of separately produced components (Curry/Kenney 1999). Such a production structure implies a constant need for a reconfiguration of business relationships. Third, the rapid changes typical in industries dominated by IR processes favours outsourcing of other than core functions over internalisation, in order to permit greater flexibility in adopting to changing technology and market conditions. Fourth, in the highly turbulent IR industries, collaboration is a useful way for reducing technological and market uncertainty, by sharing risk with other firms. In this context, the ability to create and successfully manage external linkages is a most valuable source of competitive advantage.

Indeed, the internationalisation of firms in industries dominated by IR processes was shown to be positively related to the intensity of their networking and collaborative activities (Coriello/Munro 1997, Kotha et al 2000). Firms with higher levels of cooperative activity were found to be better able to sustain their competitive advantage and were more likely to capitalise on it by pursuing internationalisation. In light of this discussion, I hypothesise:
H5: The ability to take part in network relationships in foreign countries would have a significant, positive impact on the propensity of firms competing in industries dominated by IR processes to invest

overseas, and this impact will be stronger than in DR industries (i.e., a more positive association is expected).

Operation of the constructs

- *Innovative capabilities* – R&D expenditure as % of sales is the most widely used measure of innovative capabilities in studies of this kind (see Dunning 1993) and will be used here.

- *Size* - $ sales of affiliates and parent. Parent data are included to capture the benefits of size of the MNE as a whole.

- *Differentiation* - the common operational measure of this advantage is advertising expenditure, as it captures two important aspects of product differentiation: product branding and marketing skills. Since there is a lack of such data for MNEs, I use the advertising expenditure of all firms in an industry (including both indigenous and MNEs). Such a measure is likely to be biased as MNEs tend to spend higher shares of sales on advertising than local firms (Caves 1996, Dunning 1993). Following Owen (1982), I add an alternative marketing proxy, to correct for this potential bias – the costs of goods sold, and selling, general and administrative expenses (as % of total costs). This is a broad measure, which captures a set of factors not directly related to promotion resources, but it also provides indications of the strength of the marketing efforts undertaken by MNEs. In an analysis of inter-industry determinants of FDI, Owen (1982) found this measure to have a significant, positive association with FDI.

- *Multinationality* - share of affiliates' employment to total MNE employment is used as an operation for the magnitude of business conducted outside the home country. I use employment rather than sales, because the latter is likely to be biased by inter-firm transactions.

- *Entrepreneurship* – This construct is typically regarded as a characteristic of an individual rather than of a firm and most often it is operationalised through reference to certain attributes of a person or a small group of persons, typically the top management (see e.g., Knight 1997 for a representative approach). In these conceptualisations, a firm is regarded as entrepreneurial if it is lead by an entrepreneurial manager, who is a risk taker and proactive. However, some attempts have been made to apply these ideas to the level of firms and industries, some of them also in the context of international business, and these will be used here: 1. Growth of international sales. In the entrepreneurship literature, the determinants and outcomes of growth have been seen as a way of understanding the development of entrepreneurial firms. Penrose (1959) regarded growth as an outcome of a firm's entrepreneurial and managerial knowledge capacities. Much of this literature has focused on sales growth, and some have used sales growth to distinguish entrepreneurial from non-entrepreneurial firms (Birch 1987, McDougall et al 1994). This approach has been extended to the international business context by Autio et al (2000), who linked growth of international sales with the firms' entrepreneurial knowledge. 2. Leverage (the ratio between debt and equity) as a measure of attitude towards risk. A fundamental attribute of entrepreneurial firms is their willingness to undertake risk and to be proactive in maximising the probability of exploiting potential opportunities (Birch 1987). Hence, attitude towards risk is often regarded as an indication of the degree of entrepreneurship (Knight 1997)[3].

- *Flexibility of organisational structure* – level of autonomy of affiliates is often regarded as an indication of the degree of flexibility of a MNE's organisational structure (e.g., Nohria/Ghoshal 1997). This construct is typically measured by respondents' assessment of the level of control exercised by headquarters over affiliates and the extent to which affiliates participate in certain decisions (e.g., the papers in Otterback

1981). Such data are not available in a study of this kind, hence I use sales of affiliates to parents to capture the level of autonomy of the affiliates. When affiliates are operating independently in their respective host countries there is less internal trade, and this tends to be associated with decentralisation of control. Smaller transfers between parents and affiliates are thus taken to signify greater flexibility of organisational structure. Intra-firm transactions have previously been used by Korbin (1991) to indicate the degree of dependence of affiliates on the MNEs of which they are part. Nohira and Ghoshal (1997) have subsequently used internal transactions as indicators of the nature of the relationships between affiliates and headquarters.

- *Networking* – Two operations will be used to measure this construct: 1. Size of firms. The extent of networking tends to be related to the size of firms and flourishes particularly in localities populated with smaller firms (Keeble/Wilkinson 2000). This operation has been used in previous studies to measure the intensity of networking and collaboration of MNEs (e.g., Nachum 2000). 2. External purchases[4] as share of sales - as an indication of the extent to which firms are dependent upon external relationships for the provision of specific functions. Outsourcing and heavy reliance on the external market is often linked with the extent of networking (e.g. Jonsson 2000). As the scope of activities performed in house shrink, there is a greater need for external linkages.

Table 1 presents the variables identified as potential sources of firm-specific advantages in IR industries and their operation measures. Descriptive statistics and correlation coefficients are presented in this table for IR (the upper right section of the table) and for DR (the lower left section of the table) industries. Most coefficients are low, ensuring that the various firm-specific advantages are not correlated.

The accuracy of the operations as measures of the constructs signifying the firm-specific advantages might be a source of controversy. Some constructs may not be fully operationalised and there may be a discrepancy between them and their operational counterparts. This reservation should be borne in mind when evaluating the findings, as the observations derived from constructs that are not fully operationalised are 'exact' to the extent that the operation counterpart depicts the constructs (Machlup 1978).

METHODOLOGY

In order to test the hypotheses formulated above, I construct a model, using outward FDI as the dependent variable and the set of potentially significant firm-specific advantages as the explanatory variables. The model is of the general form:

$$FDI_{it} = f(O_{it}) + E_{it}$$

Where:
FDI – total capital flow (capital flow, inter-company loans and reinvested earnings).
O – a vector of firm-specific advantages (summarised in table 1)
i – industries, i=1….n
t- time, t=1….m
E - random error term.

A flow measure, as opposed to a stock, was selected to measure FDI, since it is more informative regarding current advantages, albeit having the drawback of being sensitive to annual fluctuations. A stock measure would have corrected for this disadvantage, but, by definition, would reflect the outcomes of historical advantages. Since the independent variables are flow rather than stock variables, the former was regarded as more adequate.

The nature of the return to scale can be measured at the level of an industry, a firm or a plant (Bertin/Bresnahan/Raff 1996). For the purpose of the present analysis, the industry level was judged to be

most appropriate, as it enables one to focus on the implications of the characteristics of production technologies and processes for the international activity of MNEs, and ignores inter-industry variations that reflect firm-specific characteristics. A firm-level analysis would have been affected, in part, by idiosyncratic characteristics, such as the level of efficiency with which individual firms utilise resources, thus obscuring the mere impact of the technology, which is the focus of interest here. The disadvantages of firm-level data are particularly severe in longitudinal analysis, of the kind undertaken here, as firms respond differently to dynamic changes in their industries (Goodfriend 1992) and this introduces additional variations that are not related to the return to scale but rather reflect asymmetry among firms in their response to cyclical shifts. A plant level analysis might be too narrow to provide an understanding of the impact of the characteristics of the technology on a firm's competitive advantages. A plant is a production, rather than a strategic unit, and analysis at the plant level is likely to have less strategic implications for the firm as a whole. Further, much of the data needed for analysis of the kind undertaken here is not available at the level of a single plant.

The model is estimated for the years 1989-1998[5], based on outward FDI from the US, as the US is the only country that publishes the data needed for the analysis. All industries which have outward FDI of any magnitude were analysed. The micro-economic procedure used for the classification of industries by the type of returns is described in the Appendix. The IR industries include the advanced, knowledge-based industries, such as industrial chemicals, electronic components and accessories, and also some service industries such as communications, business services etc.. The DR industries include more traditional industries, such as grain mill products, meat products, primary metal industries, as well as service industries, such as transportation services[6]. The level of industrial aggregation follows the level of the source of the FDI data. The single industry with constant returns to scale was excluded from the following statistical analysis, in order to create a sharp distinction between DR and IR industries.

The attempt to classify industries by the nature of returns to scale raises both technical and theoretical difficulties since this concept refers to activities and technologies, and those may not correspond neatly with common industrial classifications (McCombie 1985). Industry data often group DR products with products based on IR processes. Furthermore, the worlds of DR and IR exist simultaneously in most industries (Arthur 1996), albeit in different magnitudes. For example, most high-tech industries have both knowledge-based and bulk processing operations, while the traditional processing industries have operations which belong largely to the knowledge world. For reasons of data availability, industry data are used here, but the findings must be interpreted with these reservations in mind.

STATISTICAL ANALYSIS AND DISCUSSION

The model was estimated by means of panel data (Baltagi 1995, Hsiao 1999), using Eview software (table 2). Panel data techniques enable the introduction of different slopes to test for industry and time effects. The hypothesis that the time effects are the same was not rejected for both models (F=8.75; F=9.95 for IR and DR respectively), and the hypothesis that the industry effects are the same was rejected at the 0.01 level (F=4.35) for IR and at the 0.1 (F=2.33) for DR. Hence, the model was estimated only with the industry effects. These effects can be introduced as fixed or random. A Hausman test was conducted to test which of these effects would be more suitable. F=9.78 for IR and F=7.89 for DR were not significant (χ^2), implying no significant differences between these effects. Fixed effects had lower variance and were therefore selected for the analysis. The estimated autocorrelation (conducted while allowing the autocorrelation coefficients to vary across industry groups) is small (0.0247 and 0.0365 for IR and RD respectively). Independent sample t-tests suggested that the missing value patterns are not random, and they were estimated from available observations, by testing a model based on all observations for which there were no missing values, and

using it to estimate the missing values. This analysis was conducted separately for the IR and DR industries.

The hypotheses were tested by estimating two regression equations, for the IR and DR industries respectively, and then testing differences in the explanatory power of individual independent variables between them. The analytical methodology wherein regression coefficients are compared across two models has been utilised extensively in prior research (e.g., Dean/Brown/Bamford 1998). In order to provide support for the hypotheses, three criteria have to be met. First, individual coefficients in the regressions have to be significant and follow the expected direction of causality with the dependent variable, to allow one to conclude that this element of firm attributes is in line with theoretical expectations. Second, the differences between the explanatory power of each pair of variables in the two models have to be in the direction predicted in the hypotheses. For example, if a hypothesis predicts that a variable is more important in the IR world than in the DR world, t-values in the IR model should be greater than t-values in the DR model. Third, individual explanatory variables should possess significant explanatory power in discriminating between IR and DR industries. Difference statistics were introduced by calculating an interaction variable for each explanatory variable, thus measuring whether this element of firm attributes has a differential impact on international expansion in IR and DR industries. The explanatory power of these interaction variables was tested by estimating the following model:

$$FDI_{it} = f\,(O_{it}\,;\,(I_i \times O_{it})) + E_{it}$$

Where:
FDI – total capital flow (capital flow, inter-company loans and reinvested earnings).
O – a vector of firm-specific advantages (summarised in table 1)
I – industry dummy variable which gets the value 1 for IR industry, 0 otherwise.
i – industries, i=1….n
t- time, t=1….m
E - random error term.

The data in Table 2 confirm only some of the hypotheses advanced above regarding the firm-specific advantages in international competition in IR industries. While no clear predictions were made in relation to the explanatory power of size and multinationality, these are the two most significant variables in the IR model. The strong explanatory power of multinationality refutes the suggestions raised above regarding the possibility of reaping the advantages of international activity via exports, and shows that multinationality does provide considerable advantages. The findings also imply that while the phenomenon of small firms becoming MNEs is spreading, size confers a significant advantage in the IR world. These findings might be interpreted as an indication of the value of critical mass required to lock-in a market and to reach the necessary volume for a product to become the standard for international activity in industries dominated by IR processes.

The strong explanatory power of innovative capabilities confirms the vital role of innovation in these knowledge-based, rapidly changing activities. The non-significant results of both measures of differentiation are in opposition to the hypothesised relationships. It has been argued that it is difficult to build brand name for some IR products (e.g., Internet) as the lack of physical presence and direct human contact make such virtual businesses less tangible to customers than traditional businesses (Porter 2001). It might be that the huge investment in advertising and brand building common in these industries has not yielded the expected impact on brand loyalty and barriers to entry, that affect international activity. The significant and positive explanatory power of costs of sales in the DR model (see ahead) further supports this explanation.

These findings suggest that the mere possession of certain skills and capabilities might not be sufficient for explaining variation in the intensity of international activity in IR industries. The ability of firms to reach a critical mass, which enables them to lock-in a particular market, is a vital determinant of such activities. This suggestion

signifies a shift from the traditional model with its sole emphasis on the skills and capabilities of individual firms as the major factor facilitating their international expansion.

The significant explanatory power of most operations of entrepreneurship, flexibility and networking, neither of which was typically included in the traditional model of international business, highlights the need to acknowledge the unique attributes of IR industries in order to reach a fuller understanding of foreign activity in these industries. Such an understanding cannot be reached by relying only on the factors traditionally viewed as affecting international activity. The highly significant explanatory power of external purchases as an operation of networking illustrates the value of advantages external to MNEs, created through interaction with other firms, in international competition in markets dominated by IR logic. This represents a departure from the traditional emphasis on the resources and capabilities internal to MNEs, which are owned and controlled by them, as the sole determinants of their ability to compete effectively outside their home markets.

A comparison of the IR and DR models supports most of the hypotheses advanced regarding the differences between the firm-specific attributes in these industries. Most individual explanatory variables differ in the direction hypothesised, and most of the differences are statistically significant. Notable exceptions include advertising, where - as discussed above - one of the operations is more significant in the DR than in the IR model. Likewise, of the operations of entrepreneurship and networking, only one operation of each construct is in support of the hypothesised relationships. Somewhat surprising is the non-significant result of multinationality, which might be attributed to the nature of some of the industries analysed (e.g., food), in which there is a need for a considerable amount of local adaptation. This limits the advantages of multinationality, that to a considerable extent rely on the ability to apply similar production and distribution methods world-wide.

For the purpose of identifying the firm-specific advantages affecting the tendency of firms competing in IR industries to operate overseas it is particularly important to examine the unexplained variation in the dependent variable of the IR model, that is the residuals. Such an examination enables one to find out whether there are some variables missing, or the residuals are due to unique attributes of individual observations.

One possible advantage, which may explain the residuals, is capital intensity. In the past, the capital-intensive processing industries were among those with the most intense foreign activity (Dunning 1993). Hence firms' stock of capital and their ability to raise capital were regarded as key advantages in foreign activities. This variable was excluded from the analysis because industries dominated by IR processes tend to be less capital intensive in production. Knowledge is their basic form of capital (Romer 1986), and value creation lies in access to information and knowledge and the ability to wield them most effectively, rather than in financial strength. Furthermore, particularly in recent years, many of these activities have enjoyed high market valuation and easy access to capital (Scott et al 1998). As capital has become easier to raise than ever before, it is no longer a scarce commodity, and its value as a source of advantage has diminished.

Nonetheless, capital might possess some explanatory power for foreign activity in IR industries, as some aspects of operation, apart from production, are capital intensive. For example, the costs of both innovation and brand building are very high lending considerable advantage to financial strength. In addition, recent fluctuations of stock exchanges listing firms engaged in IR activities suggest that easy access to capital enjoyed by these firms may not be of a long-term nature.

Table 3 presents the results of the regression analyses of the residuals on capital intensity (measures as capital expenditure per employee), for the IR and DR industries. The IR analysis yielded insignificant

results, excluding this possible explanation for the residuals. By contrast, in the DR analysis, the coefficient for capital was highly significant, as was the regression as a whole. These findings lend support for the value of capital in DR industries, and highlight additional differences between IR and DR industries.

In order to test for the possibility that the residuals are attributed to specific attributes of individual observations, the differences between actual and predicted FDI were calculated for each observation. Standard Diagnostic Plots on these values showed that the residuals were normally distributed, with several outliers. Estimation of the models without these observations improved their fit, but did not change the conclusion drawn based on the analysis of the complete samples.

CONCLUDING REMARKS

This study sought to identify the firm-specific advantages explaining the propensity of firms operating in a world of IR to engage in foreign activities. A comparison between IR and DR industries was used to isolate the unique attributes of international activity in the former. The theoretical discussion suggests that some of the firm-specific advantages identified in international business theory with reference to the traditional world of DR are likely to also convey an important source of advantage in the IR world, although for different reasons. This discussion also suggests that certain additional advantages, for the most part not included in traditional conceptualisations, might be important for MNEs competing in IR industries.

Probably the most important lesson of the findings is a shift away from sole emphasis on the importance to MNEs of certain skills and capabilities superior to those of their competitors in determining their ability to engage in foreign activity. Rather, the intensity of international activity in the IR world may also depend on the ability to capture the benefits of self-reinforcing feedback that enables a firm to

lock-in a market. The findings also highlight the limitation of the traditional set of advantages in explaining international business activity in industries dominated by IR processes, and the need to complement it with additional sources of advantages. The three advantages added here – entrepreneurship, flexibility of organisational structure and networking – were all found to be fundamental in explaining the international activity in IR industries.

Taken together, these findings imply that to a certain extent MNEs operating in IR industries have characteristics that differ from those of MNEs in the traditional, processing world. The estimation of the model based on a group of industries dominated by DR processes supports this suggestion, as it demonstrates that different attributes, or the same attributes to different degrees, explain the propensity of firms to engage in foreign activities in these industries.

The findings of this study have several implications for managers of MNEs. First, they highlight the importance of understanding the nature of the returns to scale in an industry, as this largely defines the nature of competition and market structure and it is a primary determinant of a firm's strategic opportunities. It affects both the value of particular assets as sources of competitive advantage and the potential advantages of different growth options available to firms. Hence, the nature of the returns to scale in an industry has fundamental implications for the way MNEs should manage their international (and national) operations and should receive specific managerial attention.

Second, the highly significant explanatory power of the variables capturing the magnitude of international activity - size and multinationality - suggests that activities geared towards reaching a critical mass should be explicitly incorporated into MNEs' international strategies. The pace of international expansion and the positioning of a new technology in international markets should be planned and implemented while acknowledging the network effects and the lock-in nature of IR processes, in order to reap the potential

advantages that a small advantage, once gained, might provide as it is being developed. Furthermore, rapid international expansion is far more critical in the IR world than in the more traditional segments of the economy, since capturing a market at an early stage has the potential to provide considerable advantage, which will increase over time. In selecting specific markets for international expansion, preference should be given to markets requiring minimum local adaptation, in order to increase the benefits associated with scale.

Third, the significant explanatory power of entrepreneurship, networking and flexible organisational structure in the IR model suggests that MNEs operating in these industries should develop a set of capabilities, and allocate managerial resources to somewhat different directions than those recommended traditionally. The ability to build value through external relationships and networking should be recognized as an important aspect of successful international operation, as it enables MNEs to tap into external sources of knowledge in foreign business environments. Such capabilities should be seen as a potential source of advantage on its own right, just like any other resource or asset. Superior networking ability enhances the MNEs' competitive edge over competing MNEs (Henderson 1994). The findings also highlight the need for managers to facilitate the development of entrepreneurial initiatives at all levels of the MNE. They also illustrate the advantages of a flexible organisational structure that allows for rapid response by affiliates to new opportunities or threats in their environments.

This study opens up a large area for future research, to apply the logic of IR to other aspects of international business activity, and to establish the foundation of a theory of international business activity in a world dominated by IR processes. The focus here was on the advantages of firms, but research addressing the factors influencing MNEs' location decisions across and within countries in the IR world is also needed. Such research may take a similar approach to that undertaken here and examine the extent to which the traditional location advantages identified in the literature (as summarised for

example in Dunning 1993) possess explanatory power for the location choices of MNEs operating in IR industries. This research may also suggest what, if any, additional location advantages come into play, and incorporate them systematically in the location model of MNEs. There is also a need to examine the nature of market failure and the balance between advantages of internalisation and those of the market in IR industries, as they affect the choice of a modality to serve foreign countries and of entry mode.

Notes

[1] It is the understanding of this fundamental characteristic of markets dominated by IR logic that explains the willingness of firms to give their products for free in order to achieve the critical mass. For example, Netscape captured the Web browser market early on by giving its product free of charge. Initially it lost money on every sale but eventually it made up for this in volume (Shapiro and Varian 1999). The desire by firms to keep their systems open (Graves and Langowitz 1993), so that competing services can connect with their own, is also related to this characteristic. The recent attempt by AOL to create open standards for its increasingly popular form of on-line communication – Instant Messenger - (The Economist 2000c) is an example of this.

[2] For example, it has been estimated that more than 80% of the material available on the Web is in English (U.S. Department of Commerce, 1999), (although more recent reports (e.g., Business Week 2000a) show that by far the fastest growth on the Web comes from non-English languages).

[3] Another possible operation of entrepreneurship is change in the number of foreign affiliates in an industry. In domestic context, the number of new start-ups often measures the extent of entrepreneurship in an industry (e.g., Busenitz et al 2000), as it signifies the dynamism of an industry. The equivalent of this measure in international competition is the number of new foreign market entries, measured by the change in the number of foreign affiliates in an industry. This operation is highly correlated with change of international sales and was therefore excluded from the analysis.

[4] External purchases = output – gross product = (sales + (current inventory – last year's inventory)) – Gross product

[5] This time span was selected for reasons of data availability.

[6] IR processes are usually discussed in the context of manufacturing industries. However, Arthur (1996) argues that the nature of return of some service industries, notably those based on processing of knowledge and information, and which are connected into software networks, tends to be of the increasing type. The findings of the analysis presented in the Appendix supports this argument.

TABLES AND FIGURES

TABLE 1: FIRM-SPECIFIC ADVANTAGES IN INCREASING RETURNS (IR) AND DECREASING RETURNS (DR) INDUSTRIES

Firm-specific Advantages	Operation measures	Descriptive statistics Means (S.D.)		Pearson correlation coefficients (p-values) (IR coefficients are presented in the upper right section of the table; DR in the lower left section)									
		IR	DR	R&D	Scale	Advertising	Costs sales	Multinationality	Sales Growth	Risk	Flexibility	Firms size	Purchase
Innovative capabilities	R&D expenditure as share of sales (affiliates + parents)	0.039 (0.027)	0.016 (0.049)	**1.000**	.094 (.394)	-.096 (.386)	-.141 (.247)	.236 (.030)*	-.029 (.810)	-.137 (.223)	.017 (.879)	.022 (.844)	.175 (.235)
Scale	Sales($) (affiliates + parents)	110,909.04 (70,845.29)	120,595.61 (107,858.89)	-.340 (.005)**	**1.000**	-.248 (-.023)*	-.183 (-.015)*	-.258 (-.018)*	-.091 (.448)	.022 (.843)	.149 (.177)	.200 (.068)	.519 (.000)**
Differentiation	Advertising expenditure as share of sales	0.032 (0.026)	0.038 (0.029)	-.251 (.300)	.562 (.012)*	**1.000**	.052 (.054)*	.018 (.871)	.040 (.742)	.090 (.423)	.081 (.463)	-.259 (.017)*	.048 (.748)
	Costs of sales as share of sales	0.788 (0.124)	0.905 (0.063)	.114 (.366)	-.131 (.298)	-.503 (.033)*	**1.000**	.251 (.016)	.119 (.379)	-.081 (.516)	.084 (.493)	.133 (.276)	-.158 (.381)
Advantages resulting from multinationality	Affiliates employment/total employment	0.289 (0.126)	0.235 (0.097)	-.055 (.662)	.109 (.385)	-.132 (.590)	-.223 (.075)	**1.000**	.079 (.509)	-.019 (.863)	.059 (.595)	.104 (.347)	.001 (.997)

Entrepreneurship	Growth of international sales	0.135 (0.202)	0.096 (0.354)	.032 (.368)	-.245 (.315)	.405 (.056)*	.127 (.602)	.408 (.072)*	**1.000**	.127 (.298)	-.084 (.485)	.028 (.817)	-.004 (.978)
	Attitude to risk: debt/equity	1.127 (0.389)	0.987 (1.026)	-.069 (.578)	.515 (.018)*	.257 (.345)	.201 (.629)	.379 (.297)	.259 (.103)	**1.000**	-.130 (.248)	.041 (.719)	-.394 (.006) **
Flexibility of organisational structure	Sales of affiliates to parents/local sales of affiliates	0.29 (0.21)	0.67 (0.64)	.238 (.056)	-.481 (.000)**	-.366 (.123)	.222 (.079)	-.062 (.625)	.279 (.356)	.358 (.425)	**1.000**	.026 (.815)	.225 (.124)
Networking	Size of affiliates: average number of employees	618.358 (472.376)	598.785 (378.697)	-.289 (.068)*	.497 (.000)**	.306 (.426)	.328 (.290)	.372 (.129)	.428 (.072)*	.402 (.068)*	.397 (.285)	**1.000**	.312 (.326)
	External purchases/ affiliates' sales	0.701 (0.127)	0.685 (0.367)	.126 (.287)	-.365 (.027)*	.290 (.325)	.327 (.206)	.279 (.329)	.326 (.125)	.298 (.307)	.408 (.059)*	-.379 (.162)	**1.000**
N		390	260										

Significance levels, 2-tails: ** 0.01; * 0.05

Sources of data: Various issues of US Department of Commerce, Bureau of Economic Analysis, *US Direct Investment Abroad: Operations of US Parent Companies and the Foreign Affiliates* and *Balance of Payment and Direct Investment Position Estimates* Washington D.C.; *Advertising Age*

Data refer to majority-owned non-bank affiliates of non-bank US parents.

TABLE 2: FDI MODEL FOR INCREASING (IR) AND DIMINISHING (DR) RETURN INDUSTRIES (UNSTANDARDISED REGRESSION COEFFICIENTS AND T-VALUES)

	Increasing return (IR) industries	Diminishing return (DR) industries	Difference statistics[a]
Innovative capabilities	15550.907(3.214) ***	59753.476(2.302) *	-9.791(-3.321)***
Scale	.199(3.674) ***	.313(2.854) **	-.210(-2.350)**
Advertising	-1987.310(-1.431)	2325.397(1.026)	-4861.412(-3.287)***
Costs sales	23646.440(1.237)	122375.800(2.322) *	10375.401(.900)
Multinationality	49710.590(4.056) ***	83031.440(.914)	22724.432(.805)
Risk	9432.570(2.055) *	-4643.461(-.246)	-8.680(5.371)***
Sales growth	28346.008(2.448) **	13457.869(2.285) *	7639.625(.536)
Flexibility	-26247.350(-2.366) *	-117981.40(-1.644) +	6459.310(.144)
Firms' size	-1.073(-.405)	3.879(.758)	3.785(1.296)
External purchases	72671.566(3.080) ***	30926.785(.938)	54783.653(2.587)**
N	390	260	
Adj. R^2	.755	.497	
Prob. (F-statistics)	.000	.002	

+p<.10;*p<.05; **p<.01;***p<.001

[a] Reported only the statistics of the interaction variables.

TABLE 3: REGRESSION ANALYSES OF CAPITAL INTENSITY ON THE RESIDUALS

	Increasing return (IR) industries	Diminishing return (DR) industries
Capital intensity	-6.12 (-.720)	23.712 (3.583)***
N	390	260
Adj. R^2	.013	.198
Prob. (F-statistics)	.393	.002

+p<.10; *p<.05; **p<.01; ***p<.001

REFERENCES

Arthur W. B. (1994) *Increasing Returns and Path Dependence in the Economy*, Ann Arbur, The University of Michigan Press.

Arthur W. B. (1996) "Increasing returns and the new world of business" *Harvard Business Review* July-August, pp.101-109

Autio E., Sapienza H.J., Almeida G. (2000) "Effects of age at entry, knowledge intensity and imitability on international growth", *Academy of Management Journal* 43(5): 909-924

Baltagi B.H. (1995) *Econometric Analysis of Panel Data* John Wiley & Sons, Chichester

Bertin A.L., Bresnahan T.F. and Raff D.M.G. (1996) "Localised competition and the aggregation of plant-level increasing returns: Blast furnaces, 1929-1935" *Journal of Political Economy* 104(2): 241-266

Birch D.L. (1987) *Job Creation in America: How Our Smallest Companies Put the Most People to Work* The Free Press, New York

Birkinshaw J. (2000) *Entrepreneurship in the Global Firm* Sage Publication, London

Birkinshaw J./Hagstrom P. (Eds.) 2000. *The Flexible Firm: Capability Management in Network Organisations* Oxford University Press, Oxford and New York

Birley S. and MacMillam I.C. (eds.)(1995) *International Entrepreneurship* Routledge, New York and London

Bohlin E. and Granstrand O. (eds.)(1994) *The Race to European Eminence: Who Are the Coming Tele-Service Multinationals?* North Holland, Amsterdam and London

Brynjolfsson E. and Kahin B. (eds)(1999) *Understanding the Digital Economy* MIT Press, Mass.

Buckley J.P. and Casson M. 1976. *The Future of the Multinational Enterprise* Macmillan, Houndmills

Busenitz L.W., Gomez C. and Spencer J.W. (2000) "Country institutional profiles: Unlocking entrepreneurial phenomena" *Academy of Management Journal* 43(5): 974-993

Business Week. (1999) "The name's the thing: Dot.com's are spending like mad to establish an identity" November 15th, 48-53

Business Week. (2000) "A chat with the new guy in product development" January 31st , 53

Business Week. (2000a) "Surfing in tongues: It's not English-only anymore" December 11th,
EB11

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

Caves R.E. (1971) "Industrial corporations: The industrial economics of foreign investment" *Economica* February, 38: 1-27

Caves R.E. (1974) "Causes of direct investment: Foreign firms' shares in Canadian and United Kingdom manufacturing industries" *Review of Economics and Statistics* November, 279-293

Caves R.E. (1996) *Multinational Enterprise and Economic Analysis* 2nd edition, Cambridge University Press, Cambridge UK

Chen H. and Chen T.J. (1998) "Network linkage and location choice in foreign direct investment" *Journal of International Business Studies* 29(3): 445-468

Coriello N.E. and Munro A. (1999) "Internationalisation and the smaller firm: A review of contemporary empirical research" *Management International Review* 1999/3, 39: 223-256

Curry J. and Kenney M. (1999) “Beating the clock: Corporate responses to rapid change in the PC industry” *California Management Review* 42(1): 8-36

Dean T.J., Brown R.L. and Bamford C.E. (1998) “Differences in large and small firm responses to environmental context: Strategic implications from a comparative analysis of business formations” *Strategic Management Journal* 19: 709-728

Dunning J.H. (1993) *Multinational Enterprises and the Global Economy* Addison-Wesley Publishing, Wokingham

The Economist (2000a) “Online retailing: The fright after Christmas” February 5th: 85, 88

The Economist (2000b) “Have factory, will travel” February 12th: 81-82

The Economist (2000c) “Instant messaging: Trying to connect you” June 24th: 99

Garud R. and Kumaraswamy A. (1993) “Changing competitive dynamics in network industries: An exploration of Sun Microsystems’ open system strategy” *Strategic Management Journal* 14(5): 351-369

Ghoshal S./Westney E. (eds.)(1993) *Organisation Theory and Multinational Corporations* Macmillan, Basingstoke

Goodfriend M. (1992) “Information-aggregation bias” *The American Economic Review* 82(3): 508-519

Graves S.B. and Langowitz N.S. (1993) “Innovative productivity and returns to scale in the pharmaceutical industry” *Strategic Management Journal* 14(8): 593-605

Gruber H. (2000) “The evolution of market structure in semiconductors: The role of product standards” *Research Policy* 29: 725-740

Harris D.I./Law E. (1998) “Verdoorn’s Law and increasing return to scale in the UK regions” *Oxford Economic Papers* 50(2): 201-219

Henderson R.M. (1994) “The evolution of integrative capability: Innovation in Cardiovascular drug discovery” *Industrial and Corporate Change* 3: 607-630

Hsiao C. (1999) *Analysis of Panel Data* Cambridge University Press, Cambridge (reprint)

Hymer S.H. (1960/1976) *The International Operations of National Firms: A Study of Direct Investment* MIT Press, Mass.

Jonsson S. (2000) “Innovation in the networked firm: The need to develop new types of interface competence” in J. Birkinshaw and P. Hagstrom (Eds.), pp. 106-125

Katz M.L. and Shapiro C. (1985) “Network externalities, competition, and compatibility” *American Economic Review* 75(3): 424-440

Katz M.L. and Shapiro C. (1986) “Technology adoption in the presence of network externalities” *Journal of Political Economy* 94(4): 822-841

Katz M.L. and Shapiro C. (1994) “System competition and network effects” *Journal of Economic Perspectives* 8(2): 93-115

Keeble D. and Wilkinson F. (2000) "High-technology clusters, regional clustering and collective learning: an overview" in Keeble D. and Wilkinson F. (Eds.), *High-Technology Clusters, Networking and Collective Learning in Europe,* Aldershot, Ashgate, pp. 1-20

Knight G.A. (1997) “Cross-cultural reliability and validity of a scale to measure firm entrepreneurial orientation” *Journal of Business Venturing* 12: 213-225

Koford K./Tschoegl A.E. (1998) “The market value of rarity” *Journal of Economic Behaviour & Organisation* 34(3): 445-457

Kogut B. and Zander U. (1993) “Knowledge of the firm and the evolutionary theory of the multinational corporation” *Journal of International Business Studies* 24(4): 625-646

Korbin S.J. (1991) “An empirical analysis of the determinants of global integration” *Strategic Management Journal* 12: 17-31, special issue

Kotha S., Rindova V. and Rothaermel F.T. (2000) “Identifying firm specific factors in the internationalisation of US Internet firms” A paper presented in the AIB conference, Phoenix, November

Kretschmer M., Klimis G.M. and Choi C.J. (1999) “Increasing returns and social contagion in cultural industries” *British Journal of Management* 10, Special issue: S61-S72

Machlup F. (1978) *Methodology of Economics and Other Social Sciences* Academic Press, New York and London

Mascitelli R. (1999) “A framework for sustainable advantage in global high-tech markets” *International Journal of Technological Management* 17(3): 240-258

Mattsson L.G. (1998) “Dynamics of overlapping networks and strategic actions by the international firm” in Chandler A.D., Hagstrom P. and Solvell O. (eds.), *The Dynamic Firm* Oxford University Press: Oxford and New York

McCombie J.S.L. (1985) “Increasing returns and the manufacturing industries: Some empirical issues” *The Manchester School of Economic and Social Studies*, 53(1): 55-75

McDougall P.P., Shane S. and Oviatt B.M. (1994) “Explaining the formation of international new ventures: The limits of theories from international business research” *Journal of Business Venturing* 9: 469-487

Nachum L. (2000) “Economic geography and international business activity: Inward FDI to the US in financial and professional services” *Journal of International Business Studies* 31(3), 367-386

Nachum L./Keeble D. (2001) “MNE linkages in localised clusters: Foreign and indigenous firms in the media cluster of Central London” *Best Paper Proceedings of the Academy of Management’s conference*, Washington, August

Nicholson W. (1998) *Microeconomic Theory* 7th edition, Dryden Press, Orlando

Nohria N./Ghoshal S. (1997) *The Differentiated Network: Organising Multinational Corporations for Value Creation* Jossey-Bass Publishers, San Francisco

Penrose E. (1959) *The Theory of the Growth of the Firm* New York, Wiley

Porter M. (2001) “Strategy and the Internet” *Harvard Business Review*, March: 62-79

Prahalad C.K./Hamel G. (1990) “The core competence of the corporation” *Harvard Business Review* May-June, 79-91

Otterback L. (ed)(1981) *The Management of Headquarters-Subsidiary relationships in Multinational Corporations* Aldershor, Gower

Oviatt B.M. and McDougall P.P. (1994) “Towards a theory of international new ventures” *Journal of International Business Studies* 25(1): 45-64

Owen R.F. (1982) “Inter-industry determinants of foreign direct investment” in A. Rugman (Ed.), *New Theories of Multinational Enterprise*, London, Croom Helm, pp. 135-149

Roche E.M. and Blaine M.J. (2000) *Information Technology in Multinational Enterprises* Edward Elgar, Cheltenham and Northampton

Romer P.M. (1986) “Increasing returns and long-run growth” *Journal of Political Economy* 94(1): 1002-1037

Sarkar M.B., Cavusgil T. and Aulakh P.S. (1999) “International expansion of telecommunication carriers: The influence of market structure, network characteristics, and entry imperfections” *Journal of International Business Studies* 30(2): 361-382

Scott D., Lowy A. and Ticoll D. (eds)(1998) *Blueprint to the Digital Economy*: *Creating Wealth in the Era of E-Business* McGraw- Hill, New York

Shapiro C. and Varian H.R. (1999) *Information Rules. A Strategic Guide to the Network Economy* Boston, Mass. Harvard Business School Press

Solow R. (1957) “Technical change and the aggregate production function” *Review of Economics and Statistics* 34: 312-320

Stiroh K. (1999) “Is there a New Economy?” *Challenge* 42(4): 82-101

Teece D.J. (2000) *Managing Intellectual Capital: Organisational, Strategic, and Policy Dimensions* Oxford University Press, Oxford and New York

U.S. Department of Commerce. (1999) “Electronic commerce in the digital economy” www.ecommerce.gov/ede

Vandermerwe S. (1997) “Increasing returns: Competing for customers in the global market” *Journal of World Business* 32(4): 333-350

Zander I. (1999) “How do you mean 'global'? An empirical investigation of innovation networks in the multinational corporation” *Research Policy* 28(2-3): 195-213

APPENDIX 1: CLASSIFICATION OF INDUSTRIES BY TYPE OF RETURN TO SCALE

Verdoorn's Law, a widely used procedure to examine the nature of returns to scale in an industry (e.g. Harris and Lau 1998, McCombie 1985), was used to classify the industries. This Law establishes a link between the rate of growth of output and total factor productivity. In its original formulation, it was based on physical capital and labour as the only inputs. More recent developments, based on theoretical and empirical contributions - notably those of Solow (1957) and Romer (1986) - have introduced measure(s) of technological progress (e.g., Morrison and Siegel 1997).

Formally:

$$TFP = a1 + b1q$$

Where:

TFP - Total Factor Productivity = (α k + β e + δ t). k, e and t are the exponential growth rates of capital, employment and technology respectively. α, β and δ are the relevant weights of k, e and t and sum to unity.

b = 1/v where v is the degree of homogeneity.

q = level of net output.

The analysis was conducted using PcFiml 9.0 software. Time series data on GDP, employment, capital expenditure, R&D investment (all expressed in log form) were drawn from the US Dept. of Commerce, Bureau of Economic Analysis (www.bea.doc.gov).

For the purpose of estimating the nature of returns to scale, the interest is in the coefficient b. Based on these values, industries were classified into three groups (5 industries, whose b values were not significant at the 0.90 confidence level, were excluded):

Type of return	Average score (S.D.)	Number of industries
Increasing returns (b>1)	2.45(4.56)	39
Constant returns (b=1)	1	1
Diminishing returns (b<1)	0.89(1.07)	26