The role of multinationality and foreign ownership in innovation.
An analysis of the Community Innovation Survey 2
for the UK financial services[*]

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Abstract

The paper starts by highlighting a change of emphasis in the internationalisation literature from the nationality of ownership of the investor to the degree of multinationality of the company. This shift has implications for our understanding of innovation activities and their diffusion. It is in this context that the research sets out to test the hypothesis that multinationality is a more relevant characteristic than nationality of ownership in the interpretation of the results from the UK Community Innovation Survey (CIS). The study is confined to data from the CIS 2 for financial services, a sector where both innovation and internationalisation have been very significant in the 1990s. Following a discussion of methodology and data sources, the results are presented and analysed in sections four and five. They show that belonging to a group and multinationality are more significant characteristics than the nationality of ownership in a variety of innovation variables in financial services fom the UK CIS 2. The innovation variables considered fall within the following elements: innovation propensity; levels of innovation; sources of innovations; innovation-related performance; aims of innovation. It is concluded that a full understanding of innovation activities within the enterprise may need to take account of some characteristics of the company to which the enterprise belongs and in particular its degree of multinationality and its size. It is suggested that: (a) future models explaining innovation from CIS data should allow for the multinationality of the company; and (b) that the CIS provides some information on the companies' characteristics as well as those of the enterprises and specifically on multinationality and size.

1. Introduction: the context of this study

The last three decades have seen a significant change in internationalisation at both quantitative and qualitative levels. All variables related to cross border transactions show upward trends and this extends from foreign direct investment (FDI) to portfolio investment to trade to the movement of people. The number of transnational corporations (TNCs)[1] has been increasing and now stands at 63,312 with a network of foreign affiliates of 821,818 (UNCTAD, 2001: Annex table A12, pp. 239-42). The growth of sales via their foreign affiliates has been greater than the growth of world trade for more than fifteen years (Ietto-Gillies, 2001: table 2.5, p. 16).

On the qualitative side, the transaction modes across borders have been enhanced by the increasing number and types of cross-border inter-firm partnerships (Contractor and Lorange, 1988; Hergert and Morris, 1988; Hagedoorn, 1996; Narula, 2000). Moreover, FDI has increasingly taken the mergers and acquisitions (M&As) mode (Ietto-Gillies *et al.,* 2000; UNCTAD, 2000).

These changes in the economic base have gone hand-in-hand with changed attitudes towards TNCs and their activities. In the 1960s and 1970s the debate was centred around issues of nationality of ownership, the exploitative nature of activities of foreign companies and the extent to which investment by a foreign company would benefit or harm the economy, society and politics in the host country (Servan-Schreiber, 1968; Hymer and Rowthorn, 1970). In general, the relationship between national governments and foreign TNCs was one of confrontation (Dunning, 1993; Ietto-Gillies, 2001: ch.10). Nationalization of foreign enterprises was quite high throughout the period and peaked in the mid-1970s (UNCTAD-PTC, 1993: fig.1, p. 17).

Since then the attitudes of governments have changed dramatically and so has the tone of the academic debate. These changes have their origin in a variety of elements such as the deflationary processes from the 1970s onwards with related high levels of unemployment. In this climate any investment, by whichever company, was seen by politicians, trade unions and the general public as better than none. Other elements leading to changes in attitudes include the advancing globalisation process which puts a more inevitable and, indeed, acceptable face on anything related to foreign countries or companies. Lastly, the changes in the political environment and the shifts towards liberalization and deregulation in both developed and developing countries. Privatizations started in mid-1970s – as nationalizations began to decline – and increased rapidly throughout the 1980s and 1990s.

Far from seeing investment by foreign companies as a threat, national – and indeed regional – governments compete with each other to attract it; their investment incentives have been spiralling upward in the last two decades (Oman, 2000; Phelps and Raines, 2002). In parallel with these changes in the economic and political environment, the intellectual debate has shifted from an emphasis on the nationality of the investor to an emphasis on the degree of internationalisation of the company and the country[2]. Various indices have been developed to capture the companies' degree of internationalisation (Dunning and Pearce, 1981; Sullivan, 1994; UNCTAD, 1995; Ietto-Gillies, 2001: ch. 4). Some are based on single variables some on a combination of several. Several indices have also been developed to assess the degree of internationalisation at the macro level. UNCTAD, *World Investment Report* has been

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[1] In the context of this study the terms transnational, multinational and their derivatives are used interchangeably.

[2] The conceptual issue behind the assessment of the degree of internationalisation are discussed in Ietto-Gillies (2002).

publishing for many years, ratios of FDI to GDP and to GDFCF for most countries and regions. Ietto-Gillies (1989) develops an indicator of multinational domination of national economies. UNCTAD (2001) develops and estimates a new FDI index in an attempt to capture the countries' propensity to attract FDI.

This shift affects also the way we look at the relationship between TNCs and innovation. The TNCs have been considered to have a very significant role in the development and diffusion of innovation and technology since the post-WWII decades when the increase in FDI in manufacturing and later in services spiralled upwards. However, in the early post-WWII decades the emphasis was on the hierarchy of nations in terms of innovative capacity. The diffusion of technology and innovation was then seen as a process involving transfer from the most innovative to the less innovative countries via – to a large extent – the activities of TNCs. This is one of the key aspects of the international product life cycle literature (Hirsch, 1965; Vernon, 1966 and 1979).

More recently we have seen in the literature the development of a more dialectical and interactive relationship between location of production and TNCs. The transnational companies are seen as learning from the local environment – be it home or host country - in which they operate as well as contributing to it. They diffuse innovation – both organizational and technological across countries via their internal networks of activities and via the external effects on the locations in which they operate. They also learn from the various environments in which they operate (Cantwell, 1989 and 1995; Zanfei, 2000). In this context the multinationality of operations may be more relevant than the nationality of the investor for the learning process of both the firm and the local environment of the countries in which the TNC operates.

Innovation activities in EU countries have been the focus of a series of large surveys now in its third phase: the *Community Innovation Survey (CIS)*. Among the information on structural features of the surveyed enterprises is the nationality of the company to which the enterprise belongs. Information is also given on whether the enterprise is or not part of a group belonging to the same company.

Several studies based on the second Community Innovation Surveys (CIS 2) have analysed the nationality of ownership of the enterprises in relation to their innovation propensity and activity. Tether *et al.* (1999) in a study of the UK CIS 2 find that the nationality of ownership is relevant in terms of size, propensity to innovate and involvement in collaborative work agreements on innovation. However, it does not appear to be relevant in relation to R&D expenditure, or to innovation aims. Tether (2001) in an analysis of co-operative agreements and innovation from the UK CIS 2 finds that both foreign nationality and being part of a group are significant characteristics in relation to innovation propensity as well as to co-operative agreements.

However, the significance of foreign ownership could arise – ceteris paribus - for two reasons: (a) because non-British firms are more innovative than the British ones; or (b) because firms that are multinationals have a stronger propensity towards innovation activities. It should be noted that all foreign firms with at least one enterprise in Britain are, in fact multinationals by definition being firms that operate in at least one foreign country. Moreover, all enterprises belonging to a multinational company are part of a group.

The present study therefore arises from the feeling that there may be another characteristic which is relevant for innovation activity and propensity: multinationality. This is indeed the hypothesis we want to test: that multinationality is

more relevant for innovation activities than the nationality of ownership. Therefore the study is not about causal relationship for innovation activities and specific variables within it, but about assessing the relative weight of multinationality *versus* foreign ownership in a variety of innovation activities.

Multinationality is a characteristic related to both the nationality of ownership and the group belonging but does not coincide with either. All enterprises belonging to foreign companies are by definition part of a MNC because they are part of a company that owns assets and controls activities in more than one country. However, they are not the only enterprises that are part of MNCs: some enterprises may belong to UK MNCs that is to companies that are UK-owned and have operations abroad as well as in the UK.

As regards the group issue, all enterprises owned by a company that is multinational – whether UK or foreign-based – are part of a group. However, they are not the only ones. Those enterprises that are part of a group all operating within the UK – and therefore part of uninational company (UNC) – are domestically-owned. They are not MNCs though they are part of a group.

Being part of a group may affect innovation propensity and activities as the group learns from the various environments, customers or employees. Even more so is the case of being part of a MNC where the learning process is influenced by the group effects as well as by the different national environments in which the subsidiaries of the company are located. Operating in a variety of national environments with different organizational and technological systems of innovation may enhance the scope for learning and diffusion of knowledge over and above the effects of belonging to a group.

The present study aims to analyse a variety of innovation elements from the UK CIS 2 for the following three structural characteristics: multinationality; nationality of ownership and group belonging. The general aim of the study is to find out the relevance of these characteristics for innovation activity. As far as we know, no other study relates multinationality to innovation within the findings of the CIS.

The variables related to innovation activity will draw on the information available from the CIS 2. The latter is designed to provide data mainly on the *enterprise* itself and its activities. However, multinationality is a characteristic of the *company* as a whole, not the enterprise. Therefore information on it is not available from the CIS and thus a different database will be used as explained in section three. Apart from the different data sources needed, this is an issue with wider conceptual implications. Essentially we are saying that a proper understanding of innovation activities within the enterprise should draw on activities and feature of the company as a whole.

The study is confined to the application to a specific sector, the financial services sector. Ideally, we should have conducted the research for all the enterprises in CIS 2 for the UK or indeed for all the EU countries for which the CIS is available. However, given the unavailability of the information on multinationality from the CIS, the task of linking two different databases is a very large one and impossible within the scope of this study. We feel nonetheless that a considerable amount can be learned from a single sector; in any case enough to make recommendations for future research work.

The paper proceeds as follows. The next section discusses the financial sector and its features that make it relevant for this study. Section three is devoted to a discussion of databases and methodology. Sections four and five present and analyse the results and the last section concludes.

2. The financial services sector

The CIS covers 16 sectors in services and we are here concentrating on all the enterprises surveyed which are included in the financial services category that is 149 firms belonging to SIC 65, 66 and 67 (respectively: financial intermediation; insurance and pensions; and activities auxiliary to financial intermediation). There are two sets of reasons for our choice of sector: some are economic in nature and some are more pragmatic.

On the economic side, over the period surveyed (1994-96) the financial sector has been very dynamic in terms of growth, innovation, organisational changes and internationalisation. Moreover, it is a sector relevant to all or most of the other sectors in the economic systems, as it plays an essential role in the overall economic performance[3].

However, recent studies in the EU have largely focused either on the manufacturing sector and/or services sector as a whole (see, for example, Metcalfe and Miles, 2000) and as far as we are aware, there is a paucity of studies focusing specifically on the financial services industry. In fact, much about the innovation potential in financial services and their effects on performance is yet to be understood (Frei, Harker and Hunter, 1997).

On the pragmatic side, the choice is also directed towards a sector with a relatively high number of enterprises surveyed (21 percent of services firms) and a relatively high number of replies to many questions. This was essential to have a degree of confidence in our results.

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[3] Cf. Herring and Santomero (1991) and Bhattacharya and Thakor (1993) for comprehensive studies on this issue.

Three major interconnected changes have been taking place within the financial services sector, all significant from the point of view of this study. The first relates to *changes in innovation patterns and activities*. Traditional innovation literature suggests that organisations innovate by getting new and/or improved products to market or by new or improved production processes[4]. However, in a service the product and the process tend to be more closely related than in manufacturing. Innovation for FSFs (Financial Services Firms) has often been identified more in process and organisational changes than in new product development in a traditional sense (Frei, Harker and Hunter, 1997). Recent innovations in FSFs raise also fundamental questions concerning competition among, for example, banks and non-banks, interaction with the consumer and the delivery of innovative products, organizational issues within the firms and the industry, including vertical integration (Harker and Zenios, 1998).

Among the most important conditions that encourage innovation within FSFs is the nature of technology and its diffusion within the industry (White, 1997)[5]. In this context, FSFs increasingly use information technology (IT) as an important strategic tool to achieve cost-efficiency, improve their profitability and retain or increase their competitive advantages. According to ECB (1999: 8), IT affects FSFs in two main ways: (1) it contributes to the reduction in costs associated with the management of information (collection, storage, processing and transmission) by replacing paper-based and labour-intensive methods with automated processes; and (2) it modifies the

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[4] Schumpeter (1939: 62) defined innovation as follows: "[...] the setting up of a new production function. This covers the case of a new commodity, as well as those of a new form of organisation such as a merger, of the opening up of new markets, and so on [...]".

[5] Other important conditions that appear to affect innovation are (White, 1997): the structure (eg., firm size) and competitiveness of the industry and the economic and regulatory environment of the industry.

ways in which customers have access to FSFs' services and products, mainly through automated channels (e.g., remote banking). Moreover, the use of IT: (3) allows stronger control of internalised and externalised networks of activities; and (4) it also gives the company valuable access to its customers' data[6].

Tether *et al.* (2001) in a comprehensive EU-wide report on the results of CIS 2 by sector, give the following findings for EU financial services and the UK in particular. For the EU as a whole, the enterprises for the FSF sector are more likely to innovate than enterprises for the whole of services (p. 96). The UK firms record innovative activities just below the EU averages. The British firms are very likely to declare that they had developed their innovations in-house. In general, for the EU as a whole, financial services are less likely to conduct R&D than all services together. However, the UK enterprises are less likely to conduct R&D than the EU average (p. 97). UK financial services enterprises are less likely to engage in co-operation for innovation than the average EU enterprise surveyed (p. 99).

The second relevant sets of changes relates to *consolidation and restructuring of the sector*. This must be seen in the context of a general trend towards restructuring particularly through M&As in all sectors of the economy[7]. Between 1995-99 the UK has experienced an average of 16 M&As per year in the banking sector alone (ECB, 2000). Moreover, most recent M&As activity has been between domestic banks; on average 60 per cent of total M&As were domestic in the UK. This can be seen as banking firms' strategies designed to increase their market power at the domestic level as well as their relative size at the European level.

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[6] On the latter two advantages cf. Cox, Mowatt and Prevezer (2001).

[7] On the factors driving M&As, see European Commission (1997: 58). Meschi (1997) contains a useful survey on motivations for M&As. Ietto-Gillies *et al.* (2000) analyses patterns of cross-border M&As.

There has also been a trend towards M&As involving domestic banks and non-banking providers of financial services, in particular insurance companies (so-called *bancassurance*). However, M&As leading to the establishment of a financial conglomerate are qualitative different from pure banking M&As since they lead to the creation of a group which is active in different sectors of the financial industry (ECB, 2000). The ECB (2000) reports that a total of 438 transactions to achieve conglomeration were carried out over 1995-99; 78 per cent of these concern Italy, UK, Luxembourg, Portugal and Greece. By contrast, there has been a considerably lower number of transactions in Finland, The Netherlands, Austria and Denmark. Acquisitions have been the preferred mode in the pursuit of conglomeration in Italy, Ireland and Belgium. Setting up enterprises in new sectors of the financial industry has been preferred in the UK, Luxembourg, Portugal, Greece, Spain and France. In Sweden there has been a balance of different modes.[8]

The end result is a growing concentration in the industry within the EU as well as in other regions and countries (ECB, 2000). A small core of banks now accounts for a relatively large proportion of total financial sector assets. In the UK banking industry, for example, the level of concentration measured by the Herfindahl index has increased by 37.7 per cent from 0.0191 to 0.0263 over the 1995-99 period.[9]

The third main change relates to *the process of internationalisation* which has affected the sector to a very considerable degree. A study of the world largest 664 companies found that the financial services exhibits indices of internationalisation higher than the same indices for the whole of services. They have an index of

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[8] For studies investigating the efficiency of financial conglomerates see, for example, Vander Vennet (2001) and Casu and Girardone (2002).

[9] See for more details, ECB (2000). The Herfindahl index (Hi) is equal to the sum of squared market shares.

internationalisation (Ii) equal to 48.3 and a Network Spread index (NSi) of 10.3 against corresponding indices for the whole of services of 43.9 and 9.6 respectively[10] (Ietto-Gillies, 2001: ch 4, tables 4.5 and 4.6, pp. 83 and 84).

There is disagreement in the literature on the extent to which the internationalisation process in financial services and banking in particular, is led by strategies of 'follow the leader' or by wider market-seeking strategies (Arora, 1995; Roy, 2002). As Molyneux *et al.* (1996) note, the important element in the recent process of financial deregulation has been the opening-up of the EU banking systems to domestic as well as foreign competition. The opening of the EU banking market has provided domestic banks and other FSFs with an opportunity to expand their activities abroad, but also forced them to face increased foreign competition in their domestic market place. Financial integration has been generating incentives for FSFs to increase their activities in international markets and to develop a broader network of connections among financial institutions, both at the domestic and cross-border level.

3. Data sources and breakdown of enterprises

Three large data sources have been used. One is the *second Community Innovation Survey* (CIS 2), an EU-wide survey conducted for the UK by the Department of Trade and Industry (DTI). In total 2,344 UK enterprise units were surveyed, 744 in the service sector. This paper concentrates on financial service enterprises of which there are 149 in the survey. The reference period is 1994 to 1996. The information given refers to the enterprise only and not to the company to which the enterprise belongs.

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[10] For the methodology on these indices see section three.

Given the nature of the survey, the valuation of innovation activities generated by it, is self–assessed by the participating enterprise.

The second dataset is Dun and Bradstreet's *Who owns Whom, 1997* (WoW). WoW provides company tree data; name, number and location of foreign subsidiaries, associates and trade partners. This database was used to gain information on whether the enterprise belongs to a multinational company and to calculate related indices of multinationality.
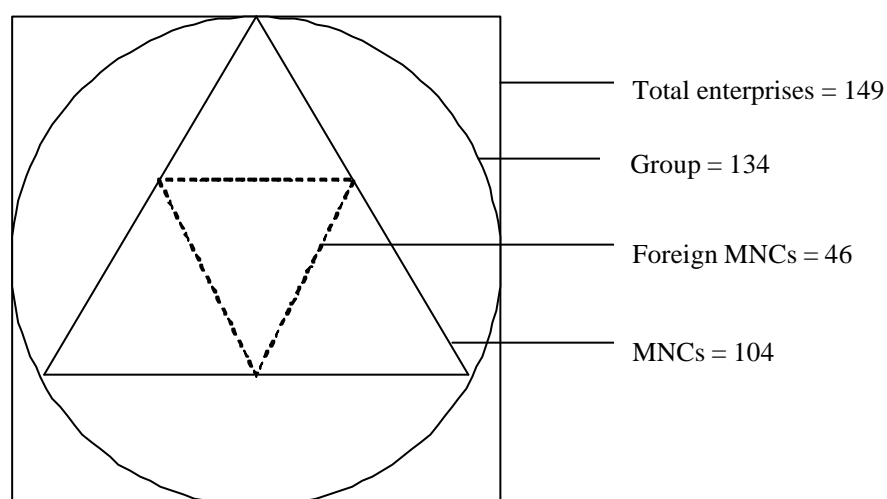
Embedded in the CIS are questions related to some structural characteristics as well as the many directly related to innovation activities. Among the former, two, in particular, are used in this study. The nationality of ownership, a variable giving the country of origin of the ultimate parent of each enterprise surveyed. This variable has been recoded into a dummy variable distinguishing between either foreign ownership or UK ownership. The second variable gives insight into whether an enterprise is part of a wider group as opposed to being an independent entity. We have used WoW data to create a third dummy variable identifying all multinational companies in our sample.

The third source of data comprises three databases, FAME (Financial Analysis Made Easy), AMADEUS (Analyze Major Databases from European Sources) and BankScope. They provide financial data in the form of balance sheets and profit and loss accounts for approximately the last ten years. FAME relates to UK companies only, while AMADEUS relates to EU companies. BankScope is an international database which provides banks' financial data. Similar data for three of the non-European companies was taken directly from annual reports available on World Wide

Web[11]. From these sources we gathered companies' turnover[12] and employment data as proxies for size of the companies of which the enterprises surveyed are part.

The different categories of enterprises considered in this study, how they relate to each other and how they split up the sample for financial services is shown in figure one.

Figure 1:   Total enterprises and their constituent parts by multinationality and group belonging. CIS 2 data. Financial services sectors.

Total enterprises = 149

Group = 134

Foreign MNCs = 46

MNCs = 104

The 149 financial service enterprises were identified by UK SIC92 section J which comprises financial intermediation (SIC 65), insurance and pension funding (SIC 66) and activities auxiliary to financial intermediation (SIC 67). Table 1 shows the frequencies observed in the three industries according to the chosen characteristics: *foreign ownership; multinationality; and group belonging*. The spread

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[11] WWW was used to gather information on employment and turnover for the following three companies: General Electric plc. (USA), Thomson Corporation (Canada) and United Overseas Bank Group (Singapore).

[12] For some companies the available data refer to total operating revenue and this is used as a proxy for turnover.

of the three industries within the multinational and group belonging categories is fairly even. Foreign ownership shows a slightly higher percentage of enterprises operating in financial intermediation; an indication of a relatively higher foreign presence in SIC 65 compared to SIC 66 and 67. It should, however, be noted that this imbalance in presence does not affect our empirical work because the three sectors are considered all together in the empirical analysis of the next section.

Table 1:   Frequencies and percentages of enterprises in different industry classifications

Industry	Foreign ownership		MNCs		Group	
	Frequencies	Percentages	Frequencies	Percentages	Frequencies	Percentages
Financial Intermediation (SIC 65)	18	39%	35	34%	40	30%
Insurance & Pensions (SIC 66)	15	33%	35	34%	48	36%
Financial Intermediation (Activities Auxiliary) (SIC 67)	13	28%	34	33%	46	34%
Total	46	100%	104	100%	134	100%

4. Methodology and results

The aim of this paper is to analyse the impact of foreign ownership, multinationality and belonging to a group on innovation and related characteristics derived from the CIS. In particular the following elements were chosen: *innovation propensity*; *innovation activities; sources of innovation information; enterprise performance; aims of innovation* and *size*. Each of these elements contains various variables though not all the ones available from the CIS were used. The selection of variables is guided by theoretical reasons as well as data constraints. In particular, we wanted only those

variables for which we have answers from at least 100 enterprises in the CIS in order to give us meaningful results[13].

In respect to *innovation propensity,* CIS 2 provides information on whether an enterprise has introduced any technologically new or improved services between 1994 and 1996 (service innovation) and whether these innovations were not only new to the firm but also new to the market (novel innovation). In terms of *innovation activity* we consider total R&D expenditure. Of the various *information sources* which the enterprise relies on, we selected sources within the enterprise and sources within the group to which the enterprise belongs. *Performance* is represented by changes in employment and by productivity levels in the initial and final years of the survey. The *aims of innovation* is represented by a variable related to improvement in product quality. The size variables refer to the enterprise and not the company to which the enterprise belongs. It is represented by two variables: number of employees and turnover.

The main methodology used is binary regression analysis in which the aim is to assess the degree of correlation between dependent and independent variables rather than to estimate parameters in a causal explanatory model. The independent variables are foreign ownership (a), multinationality (b), belonging to a group (c). The dependent variables are grouped according to the above innovation related categories. The variables related to size are also added at the end. The regression models applied are linear, logistic or ordinal regression depending on the type of dependent variable. Linear regression is applied where the dependent variable is continuous, such as

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[13] The number of observations we operated with in the regressions are equal to the full numbers of surveyed enterprises (149) only for the variable 'group'. We worked with 144 observations for 'foreign ownership' and 117 for the other three related to multinationality and its indices. This is because not all CIS enterprises were found in *Who owns Whom.*

turnover data. Logistic regression is used for binary dependent variables, such as service innovation '1 = yes', '0 = no'. Ordinal regression is used when the dependent variable is categorical, i.e. '0 = not used', '1 = slightly important', '2 = moderately important' or '3 = very important'. Table 2 gives the regression coefficients and their significance levels.

Besides regressions, a variety of ratios and indices are also used to draw inference on the overall results.

Table 2: Binary regressions on innovation related factors.

Dependent variables	Independent variables		
	Foreign ownership	Group	MNCs
	(a)	(b)	(c)
Innovation propensity			
[1] Service innovation	-0.359	0.989 *	0.920
[2] Novel innovation	0.538	1.320 *	2.055 *
Innovation activities			
[3] Total R&D expenditures; ln(exp)	0.125	2.767 ***	2.673 ***
Sources of information			
[4] Importance of information sources within the enterprise	-0.446	1.585 ***	1.290 **
[5] Information source of another enterprise within the group	0.487	-0.352	1.895 ***
Performance of enterprise			
[6] Changes in employment numbers	-0.254	-1.281 ***	-1.804 ***
[7] Productivity 1994 ln(prod94)	0.063	1.022 ***	0.749
[8] Productivity 1996 ln(prod96)	0.368	1.291 ***	0.732
Aims of innovation			
[9] Improve product quality	-0.261	-0.317	1.482 **
Size of enterprise			
[10] Number of employees in 1996; ln(emp)	-0.797**	2.118 ***	1.179 **
[11] Turnover in 1996, in £000s; ln(turn)	-0.428	3.409 ***	1.911 **

*significant at 10%
**significant at 5%
***significant at 1%

5. Analysis of results

Table 2 gives the results of bivariate regressions in relation to the following elements: innovation propensity; innovation activities; sources of information; performance and aims of innovation; size of the enterprise. Each element is characterized by one or more specific variables.

Looking at the coefficients for each of the above elements we see the following results. Being part of a group seems relevant in terms of *innovation propensity* and this applies to both variables defining such propensity: service innovation [1] and novel innovation [2]. As regards the latter, multinationality also plays a role. In terms of *innovation activities* represented by the CIS variable total R&D expenditures [3], the results also show a statistically significant relationship between total R&D expenditures and both multinationality and group belonging.

The *sources of information* are strongly correlated to both group belonging and multinationality for the first of the two defining variable (information *within* the enterprise [4]). The result for the second variable - information sources of other enterprises group [5] - shows a significant relationship with multinationality. This is as expected; enterprises learn from other enterprises within the ownership group. The information process seems to be more pronounced for companies which operate internationally than for group companies all located within Britain. One possible reason we would like to suggest for this result is that multinational companies are more aware and more sensitive to the potential for spreading innovation information and for learning from various national environments. They may be more likely to have mechanisms for spreading information internally to the company because that is one of their overall strategies in locating abroad.

Performance is captured by three variables: changes in the number of employees between 1994 and 1996 [6]; productivity as ratio of turnover to employees in 1994 and 1996 [7] and [8] respectively. Changes in employment are significantly and negatively correlated to being part of a group and to being a MNC. Productivity levels are significantly related to being part of a group for both initial and final year. As regards the *aims of innovation* multinationality is significant in relation to improvement in the quality of products [9].

Looking at the results by columns (a, b and c), it seems clear that being part of a group and being a multinational show significance in a larger number of innovation-related variables from the CIS 2 as shown by the results in columns *b* and *c*. These results fit in with the pattern of internationalisation and innovation in financial services, though they may not be specific to this sector only. The extent to which they may apply to other sectors can only be ascertained through further research. The specific relevance to financial services is due in particular to the fact that the sector has indeed experienced an increase in internationalisation. Moreover, such an increase coupled with the large M&As activity that has taken place is likely to have increased the internal network of the companies. This means that both elements relevant for innovation activity (multinationality and group belonging) have been prominent in the sector.

Size is positively and significantly associated to being part of a group and to being part of a MNC and this is true for both variables measuring size: number of employees [10] and turnover [11] at the end of the period. It is to be expected that companies constituted of a network of enterprises are likely to be larger. Size is, however, negatively correlated to foreign ownership.

We wanted to explore the *Size* issue further for two main reasons: (a) it appears at first sight rather strange to have a negative relationship between size and foreign ownership; and (b) it might be that the low levels of significance between foreign ownership and innovation variables could be due to a negative size effect. However, the relevant size dimension may refer to the company and not necessarily – or not only – to the size of the enterprise.

We remind the reader that the size variables (employment and turnover) used in equations [10] and [11] relate to the enterprise and not the company as a whole. We have separately gathered information on these two size variables for both the enterprises within CIS 2 and the companies of which they are part. The companies' data was derived from the FAME, AMADEUS, BankScope and the WWW sources mentioned in section three.

Table 3 shows the average size in the three chosen categories for both the surveyed enterprises and their companies. It shows that foreign owned enterprises are, on average, smaller than enterprises in the other two categories. This is as expected because foreign enterprises by definition do not include parent companies but only affiliates. The other two categories (MNCs and group belonging) include, among some of the surveyed enterprises, parent companies as well as affiliates. The former tend to be larger than the affiliates. Therefore, on average, we expected the foreign enterprises to have a smaller size.

Table 3:   Average size of enterprises and companies by employment and turnover.
Foreign owned; all MNCs; belonging to a group.

		Size by employment		Size by turnover	
		Number of observations	Number of Employees	Number of observations	Turnover in £mil.
Enterprise data	Foreign owned	46	946	46	291.4
	All MNCs	104	1,786	104	437.9
	Belonging to a group	134	1,577	134	372.3
Company data	Foreign owned	19	28,236	30	3,980.9
	All MNCs	66	30,104	62	3,391.1
	Belonging to a group	76	26,310	68	3,095.6

Source: CIS 2, FAME, AMADEUS, BankScope and WWW.

In terms of the company size all enterprises belonging to a group have on average the smallest number of employees, which is an expected outcome, because this is the only subset of companies containing uninational firms likely to be smaller than MNCs (whether UK or foreign). As regards the foreign owned companies the number of observations we managed to put together from various sources is too small to give reliable results or to use the company size variable in regressions. Nonetheless, the larger average turnover is as expected since the foreign owned companies tend to be large. It should however be noted that the foreign owned companies for which we managed to obtain data are more likely to be the very large ones. This introduces a bias in the results in table 3. On the whole, we are left with the feeling that size does matter in the relationship between our chosen characteristics (foreign ownership, multinationality and group belonging) and innovation activities and that it should play a role in future explanatory models.

Similarly we wanted to probe further into the degree of multinationality of the foreign and UK MNCs. Multinationality is identified by three elements: being part of a company that operates in at least two countries; this is a yes or no variable and does not give any indication of possible degree of multinationality. The latter element is captured by two indices developed in Ietto-Gillies (1998 and 2001: ch. 4): the internationalisation index (Ii) and the Network Spread index (NSi). Ii is designed to capture the *intensity* level of internationalisation, that is the degree of international activities in relation to the total activities of the company. Ii is calculated as the ratio of foreign to total companies' affiliates and it thus gives the degree of foreign projection of the company. NSi aims to capture the degree of geographical (by nation-state) *extensity* of the MNC. It is the number of foreign countries in which the company has affiliates in relation to the total number of foreign countries in which it could potentially have operated. The latter is identified as the number of countries in receipt of inward stock of FDI: an indication that the country is potentially willing to accept foreign investment. Both indices are based on the number of affiliates rather than value of their assets or activities. This is due to paucity of data on such values by affiliates.

Both indices have value 0 for those enterprises which are part of UK uninational companies, whether these are independent or part of a group. There are 13 such enterprises. The average Ii for all MNCs amongst the financial services enterprises in our sample is 43.4 per cent; the highest value is 94.0 per cent. The average NSi is 10.0 per cent. On average the companies of which our enterprises are part have affiliates in 18 foreign countries.

Table 4: Indices of multinationality. UK and foreign MNCs within CIS 2

	MNCs	Ii	NSi	No. of foreign locations	No. of foreign affiliates
Foreign	46	47.0%	11.3%	20	103
UK	58	40.6%	9.0%	16	101
Total	104	43.4%	10.0%	18	102

The indicators of multinationality do not show very significant differences between foreign and UK MNCs. Nonetheless, the UK MNCs appear to be less internationalised than the foreign ones on both indicators of intensity and extensity.

Table 5 gives the breakdown of foreign-owned companies whose enterprises were included in the CIS 2, by home country. Over a quarter of these companies are US-based and just over a fifth are French. Whatever their nationality, the foreign-owned companies are indeed very internationalised. Their Ii (47.0 percent) and NSi (11.3 percent) are not far off the value obtained for the world's largest 664 TNCs: 52.8 and 12.5 percent respectively (Ietto-Gillies, 2001: table 4.2, p. 78).

Table 5:   Number of foreign-owned MNCs by home country. CIS 2

Australia	4	Netherlands	4
Canada	2	Norway	1
France	10	Singapore	1
Germany	1	South Korea	1
Hong Kong	1	Switzerland	4
Italy	1	USA	12
Japan	4	***Total***	***46***

We conclude, therefore, that the foreign companies whose enterprises were included in the CIS are very internationalised. One would have expected them to be

also among the largest. However, the similarity in the multinationality characteristic between UK and foreign-owned MNCs contrasts with the considerable differences in the size characteristic as we saw from table 3. This comparison sheds further doubts on the paucity of observations for the size variables of foreign-owned companies (table 3).

It should be noted that both size and multinationality are characteristics of the company (to which the CIS enterprise belongs) and not of the enterprise itself. The CIS provides information mainly on the enterprises, though there are questions in it on whether the enterprise belongs to (and learns from) a group. We argue that a full understanding of innovation activities within the enterprise makes it necessary to look at features of the company as well as the enterprise. Knowledge and innovation spread within the company and indeed enterprises learn from the local (and national) environment and spread their knowledge to other parts of the company[14]. The information needed to analyse innovation activities necessarily reflects the theoretical approach. In the theoretical approach adopted in this paper, data on both the enterprise and its company are therefore essential for an understanding of innovation activities. This is why we needed to link several databases.

5. Conclusions

The paper starts by highlighting a shift in the emphasis in the internationalisation literature from the nationality of ownership of the investor to the degree of multinationality of the company. This shift affects also issues related to innovation activities and diffusion. It is in this context that the research sets out to test the hypothesis that multinationality and group belonging are more relevant characteristics

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[14] On spillover effects of basic research cf. Funk (2002).

than nationality of ownership in the interpretation of the results from the UK CIS. The study is confined to data from the CIS 2 for the financial services sector.

Following a discussion of data sources and methodology, the results are presented and analysed in sections four and five. Our findings suggest that being part of a group and being a multinational are more significant elements than the nationality of ownership of the company to which the enterprise belongs, in a variety of innovation activities in which the enterprises are involved.

The stronger effect of multinationality in comparison with foreign ownership may, in fact, come about largely via the effect of group. However, it is suggested that multinationality may have a positive effect on learning processes and innovation diffusion over and above the effects due to the fact that the enterprise belongs to a group. The reason for these extra effects has to do with the fact that multinationality puts the enterprise in contact with a variety of different national innovation systems.

Whether the latter point holds or whether the multinationality effects are all subsumed within the group effects, the following is clear. The results confirm our initial hypothesis that multinationality is a stronger variable in the explanation of innovation activities compared with the nationality of ownership. These results suggest that a better understanding of innovation activity and its diffusion may have to take account of the fact that each enterprise within the company learns from the other internal parts of the company within and between countries. The results confirm other findings in the literature (Cantwell, 1989 and 1995; Zanfei, 2000) in relation to multinationals and Tether (2001) in relation to group belonging in the CIS data. Size seems to play a role though its full extent can only be ascertained by using a much larger sample than the one available for a single sector.

The results we have been able to obtain show that multinationality is a characteristic worth exploring in future explanatory work on innovation. As pointed out, it is a characteristic of the company rather than the enterprise; nonetheless it may affect the innovation level and activities within the enterprise.

From the various results in this paper it is clear that a study of innovation in specific enterprises needs to take account of characteristics related to the company as a whole and not just the enterprise. In this context we have argued for a consideration of both the multinationality and the size characteristics, though we could not use the latter due to paucity of data.

The results may also point the way for new lines of research as well as for improvement in the data provided to the researchers, to allow a further exploitation of the Community Innovation Surveys database. The new lines of research emerge from the consideration of multinationality variables in the explanation of innovation activities. The improvement in the database requires the recognition that some information on the whole company is necessary for an understanding of innovation even at the enterprise level. It would be very useful, in particular, to have information on the multinationality and the size of the company together with all the data on the enterprise from the CIS.

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